CONCEPTUALIZING A FRAMEWORK

FOR

INTEGRITY IN ARCHITECTURAL EDUCATION

WITH SOME REFERENCES TO IRAN

DISSERTATION FOR PHD DEGREE

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IN THE NAME OF ALLAH, MOST GRACIOUS, MOST MERCIFUL

ABSTRACT

The present research is an attempt to bridge the gap between the perennial concern in architectural schooling, i.e., the integration of knowledge and design, and theoretical understanding of human learning process. By doing so, it aims *to provide the necessary ground* for a critical overview of what is currently practised as architectural education in Iran and elsewhere. The research report, though, is organized in three Parts. After a statement of the research procedures and methods, Part One (*Background Concepts*), explores the issue in its historical landscape as well as the status quo. Then it reviews the corresponding literature in the past two decades.

Part Two (*Core Concepts*), examines the relevant theories of *learning* and those of learning *transfer*, bringing them to bear on the various aspects of integrity in architectural education. Drawing on the involving mechanisms of human learning, it is ascertained that architectural education needs to adopt a sequential structure, whereby each sequence is planned to provide a general and inclusive map of the proceeding sequence, and by doing so, help the learners to make sense of the learning substance and further be able to transfer it to application circumstances. It is also argued that to enhance the integration of *taught courses* with *design activities*, the latter should be comprehensive and multi-disciplinary and the former be redefined according to the core competencies of architects, adopting the project method and its subsequent *apprenticeship* model of instruction as their mainstream teaching strategy. Finally, upon the assumption that the ultimate integrator is the learner's mind, the significance of the tacit power of human learning is underlined and architectural education is thus suggested to draw heavily on practice through attending to *exemplars*, which embody and convey the learning substance it its *whole.*

The last Part (*Towards a Framework*), employs a *peer review* technique for discussing the validity of the propositions emerging from the preceding study, followed by a set of recommendations. References are also made to the Iranian context throughout the thesis, where and when necessary.

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ACKNOWLEDGEMENT AND DEDICATION

All thanks to ALLAH, for, our efforts are nothing but HIS will.

The present research has benefited form numerous contributions through correspondence and interviews, either in the UK or in Iran. This makes it next to impossible to acknowledge them in a limited space such as this. Thus, it was felt to be more appropriate to acknowledge them throughout the dissertation, wherever they are referred to. But there are those whose contribution and influence could not have been mentioned elsewhere.

To begin with, I would like to offer my gratitude to my dear brother in Shahid Beheshty University, who backed me up with the necessary data from Iran, despite his time restrictions.

No words could express my thanks to my dear wife, whose sufferings in the course of this work are, I know, beyond my ability to compensate. I certainly share all my achievements with her, who shouldered part of my responsibilities to restore my peace of mind.

At the King's Manor, though, my acknowledgement is due to Keith Parker, who is more than a Librarian to the Institute.

And last but not the least, my gratitude goes to my supervisor, Charles Cockburn, who knows how to *influence* without *imposition*, and very well knows how to fuel a long and laborious research, such as this, with timely encouragements and help, as well as questions and comments.

And... I would like to dedicate this small piece of work to my dear parents, whose evident concern is a real gift.

PREFACE

What follows was first written as an annex to Chapter 6. Its full meaning, though, might be best revealed when read within that context. Having been put here, after my supervisor's right suggestion, it can also provide the ground for the better interpretation of the whole approach adopted in this study. The reader is, therefore, asked to regard it in both contexts.

Having read parts of my earlier writings on 'learning theories', Charles Cockburn put a question to me as to where was, then, the *Islamic Iranian culture.* It was indeed a challenging, if not worrisome, question.

With the 'ideo-cultural' element, in my research proposal, as one out of three determinants of an educational framework, I could not help admitting the validity of his point, even though it caused a sort of conflict in my mind between the approach I had chosen and the contention Charles tried to remind me of.

But despite the fact that I could not rationalize the stand I had adopted, there was somebody inside me who encouraged me to keep going and not to take *culture* as the subject and object of the enquiry. My approach, as stated in Part One, was to study the relevant theoretical background against which the present state of affairs in education, and of course in architectural education, could be put in a clearer perspective. I felt it was a fundamental study to be done to provide the necessary ground for further studies in Iran; a study which was certainly lacking. The sort of studies I have conducted were essentially found in 'Western' literature and hence, within the context of the 'Western' culture.

The question, though, was quite a serious one, particularly for me who comes from a background of personal and social commitment to cultural values (somewhat known as being *anti-Western*). The unique socio-cultural milieu of Iran after the 1979 Islamic Revolution was another conceived motive for a person, such as myself, to study the topic in the light of peculiarities of the Iranian context, and to bring the issue of cultural identity and such like to the fore.

Despite all the legitimate reasons that could have lead to a shift in my emphasis and approach, I had a strong feeling that what I was doing was *culture driven* anyway, albeit that I was not directly addressing the *Iranian* or indeed *Islamic* issues.

Following my intuitive feeling which was strong enough to give me the necessary drive, I worked and lived for some months with this intellectual conflict. It was a period of 'incubation', as it were, that I seem to have required before I was able to sort out a convincing answer. It was only in the final stages, that I came up with that exciting *Aha!* in my mind. Polanyi[1] gave me the clue. In fact I had already read about his theory by then, but,... hence the need for the development and *incubation* period to establish the new *associations.*

Polanyi's concept of 'particulars' and 'wholes' helped me to recognise the person inside myself. He was right, I would argue now, to lead me to conduct the research, which is inevitably analytical, on issues other than culture itself. Culture is a whole, or in Polanyi's words an 'entity'. It is of course possible to analyze culture into its compartments and scrutinise its identical particularities, but, as Polanyi has explained, it may well be at the price of losing its holistic feeling, so crucial to *practice* of the culture.

The issue of cultural identity is also similarly placed. When you are looking at a *culture* as an object, then that culture is not necessarily present in your way of interpreting things, rather is it 'something' *beside* other 'things'. Identity, in the

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1 Acknowledgement is due to Chris Abel, who, to the author's knowledge, is the first to show the meaningful (and fruitful) relation between Polanyi's theory of tacit knowing and architectural design and education. (in several articles, e.g., in his 1994, 1984 and most notably in his 1981). For more on Polanyi, see chapter 6, section: *We know more than we can tell.*

sense desired in architectural education, is one that can be manifest in architects' decisions and help to create places of identical characteristics; one that is alive.

In Polanyi's sphere of thought, identity can not be retained, and sustained, unless it is perceived beyond the tacit awareness of its 'particulars'. Perhaps this is why the best analytical studies on the cultures in my part of the world are done by Westerners. Those who have looked at, say, Islamic or Iranian culture as an object. And perhaps that is why those studies, in the eyes of the people who *live* those cultures, are not alive; hardly influence opinion; and can not therefore lead to *faith*. They certainly further the boundaries of *knowledge*, but are hardly able to form *attitudes*.

What I have tried to do in this research, has been to trust my intuition; to rely on my understanding of my *culture* as an *awareness* to attend to the issue of education. What I have found, or in better words *selected*, appears to be squarely along a line with my own identity. Ideo-cultural values have served, and I would say were bound to serve, as a mental *schema* to help me spot the theories and concepts that are compatible with my cultural contentions. They have also helped me put those concepts into meaningful patterns and shaped my understanding of the basics of architectural education.

The most telling analogy here is perhaps the act of the honey bee. It selects germane flowers by instinct, takes the sweet nectar, and through its digestive organs produces what comes to be known as honey. *Flowers*, to draw on our case, are contributions to human knowledge regardless of time and location, the *instinct* is our identity, and the *honey* is our contribution out of this process. That which is, in its turn, beyond time and place, although bearing the footprints of both. Had it not been the case, then how could human knowledge progress with an accumulative nature?

And what is more, we can not perceive things unless to look though our *identity* glasses. We are, in a sense, circumscribed in our identity, with all its layers; personal identity, group identity, national identity, cultural identity, human identity, and, what I would call, time identity[2].

Identity is the footprint of years (or centuries) of life experience; life of an individual, a people, a nation, and mankind[3]. it is the compound memory of events and episodes, shaped as mental schemata; the defining element of human perception of the world, as well as of ones attitude towards the world. The above definitions follow an extremely important issue in the identity debate.

Identity can be likened to the fruit of a tree. It needs fertile soil, weather, water, sun, and perhaps most importantly *time*, for those factors to function and make the fruit ripe and identical of the tree. What follows from this analogy is that identity can not easily be instantly created. And, thus, all hasty attempts to do so would be bound to face failure.

My message to my colleagues, though, would be: If we do suffer from a lack of identity in our architecture, and if we are keen to find a way out of the dilemma, we should seriously account, in due course, for the fact that there are no shortcuts. Hasty attempts will result in devising artificial *fruit* of the *tree,* which is obviously of no real value. All we can do as educationalists, is to accelerate the resolution of the problem. This is not attainable through incorporating numerous curriculum components on cultural issues here. That target, i.e., architecture of identity, is only grasped when it is *attended*; attended through a tacit awareness of its particulars, in Polanyi's vocabulary. For this tacit awareness to be accomplished, those particulars should be *interiorized*, and to that end, intensive *exposure* to identical exemplars is a prerequisite. It is only through the use of exemplars that the *whole* can be represented, and familiarity with identical exemplars will begin to implant the tacit awareness of identity. Otherwise, immature attempts to borrow formal elements from the past, in search

2 An aphorism by Imam Ali[A], the first man to have believed in Islamic revelation, reads: 'Be the offspring of your time'. It bears an advice to human beings to consider the time conditions they are living in, to pay due regard to their *time identity*.

3 In his contribution to the York Workshop on Architectural Education, 15 February 1995, Hadi Nadimi acknowledged two aspects of identity; historical identity and human identity. He is Professor of Architecture at Shahid Beheshti University, Tehran.

of identity, will result in what is called the Neo-Historicism after the Sixties in the West; which is interestingly enough, still influential in my part of the world.

Quantrill (1989) couldn't have put it better when he criticised the odd combinations of the sort of Post-Modern design that: 'Neo-Historicism can only be the answer if we have the question wrong'. I would interpret this *wrong question* as attending to the *particulars* of certain styles in the past and consequently losing their *whole.* Building on the tacit dimension of the human mind, I would acknowledge that cultural identity is not a to-be-taught subject, nor is it easily definable in analytical ways. It seems only transferable through representative examples of, in our case, architecture. Architectural education, though, should enhance the students' *familiarity* with identical examples of the built form which bear the values of the local culture. Familiarity of the sort which, as Abel (1984) rightly says, enables them '... [not only] to describe and appreciate their own regional architecture..., but also, ... to *do* traditional architecture'. (his own emphasis). This is the way identity is interiorized by students, so they *dwell in it* rather than get information about it.

I owe the pursuit of this line of argument to Cockburn's recurrent question. So, who is better than him for this preface to be devoted to? Hence the use of 'first person' in this preface which was rather personal and opinionated.

For closing, I would like to borrow a proverb from Bruner (1974):

"The fish will be the last to discover water".

And I would add:

"... but the best to *live* water".

In this context, the following narration from the Prophet Mohammed(S), may find one of its possible interpretations:

"The *believer* in the Mosque is like the *fish* in Water".

GENERAL INTRODUCTION

In the absence of due understanding of the underlying theoretical debates, academic architectural education was adopted in Iran and thus failed to develop its organic life as it comparatively did, in its original context, namely, the Western academia. As an integral part of higher education, architectural schooling in the West has developed along with developments in other disciplines, through organic interconnections and mutual influence. Parallels between the Bauhaus and the Gestalt movement concerning the perception of *productive thinking* and *innovation*, is just one significant evidence to the latter point[4]. This is probably the case with other movements and institutions.

Within such frame of reference, it was felt that, in order for architectural education in Iran to further the present system (and/or to reject it), a critical understanding of its theoretical backgrounds is a vital prerequisite. And given that *learning* is the common denominator of all educational settings[5], the present research undertook to bridge the gap between the areas of concern in architectural schooling and the promising developments in psychology of learning and education; a task which is more essential in such contexts as Iran, where the organic links between those developments are missing and thus the gap more dramatic. The initial research question, i.e., the '*... insufficient integration of lecture courses and their inadequate influence on design projects*'[6], and its consequent focus of attention on curricular *structure* and *methods* of delivery,

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4 See Chapter 2, under *The Bauhaus*, and *Western style higher education;* and Chapter 4, under *Cognitive trend.*

5 See Chapter 4, the outset.

6 See Chapter 1, under *Scope of the problem.*

was also pursued within this frame of reference.

The present research, though, contributes to assembling a literature on the issue of integrity in architectural education, with reference to the relevant theories and concepts developed by the experimental psychology of learning. The interdisciplinary pursuit of a conceptual framework for architectural education, enabled the author to argue a case for convincing interpretations of those theories and concepts and bringing them to bear on describing the aspects of integration in architectural schooling. This is done through a selective and critical review of those theories, and further organizing them in a meaningful pattern capable of generating a strategy for design and development of architectural curricula.

Since a full statement of the research process and methods is recorded in Chapter 1, what remains to be included here is a brief account of the structure of the dissertation which, in a sense, portrays the progression of the argument[7].

This work is presented in three Parts; *Part I, Background Concepts, Part II, Core Concepts,* and *Part III, Towards a Framework.* Covering the *background concepts*, ***PART I*** consists of three Chapters. The evolution of the research; the objectives, approach, and scope of the study; and the respective methodology and instrumentation is presented in **Chapter 1**. Three research reports are also incorporated there to further reinforce the statement of the research problem and the approach employed.

Chapter 2 explores the historical background of architectural education in a global scene as well as that in Iran. It then portrays the status quo in architectural education of the country, drawing on the volume and variety of courses as well as on the common programme which is implemented by all the schools of architecture. Chapter 2 is concluded by reporting a survey undertaken to test the entrants' view of the discipline, indicating an urgent demand for a preparatory

7 'Structure is argument and argument structure'. (*Writing a Thesis in the Social Sciences*, University of York, 1993, p. 7).

sequence in architecture curriculum.

Chapter 3 provides a cross section of architectural education debates in the relevant literature of the past two decades or so. This is done, of course, with an eye on the main concerns of the research, i.e., the curricular structure and methods of delivery. Covering a wide range of issues on the main attributes as well as the problematic areas of architecture and its education, Chapter 3 is concluded then with a set of core issues and arguments which underlie the recorded debates.

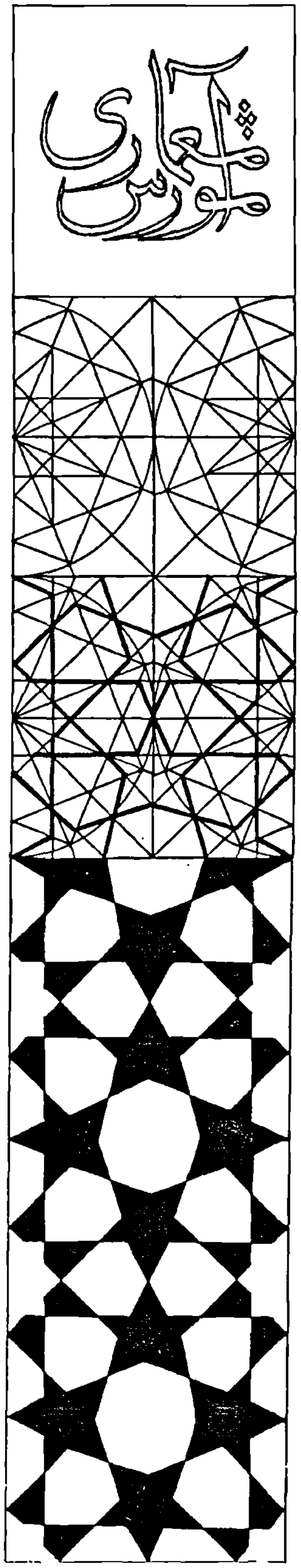
PART II develops the *core concepts* in three Chapters. Dedicated to provide a general map of the theories around human learning, **Chapter 4** draws upon the major contributions to the discipline of educational psychology, covering the *behavioural* and *cognitive* trends. Taking the information processing model of learning, it maintains that learning involves an active and constructive process whereby the learner's existing knowledge structures define how the received information is encoded and retained. The notions of *schema* and *meaningful learning* is also debated in due course

The theoretical debate on *learning* is taken a step forward in **Chapter 5**, to focus on higher levels of learning, more specific to architectural education. Thus, the issues such as *problem-solving, creativity,* and *designing* are discussed to reveal their common attributes. It suggests that *transfer of learning* is at the core of those cognitive competencies. Chapter 5 is then concluded by exploring what constitutes the enhancement of transfer, highlighting the *decontextualization of learning* and *memory retrieval* as two major determinants of learning transfer.

Building on the concepts elaborated so far, **Chapter 6** is rather focused on the central question under investigation, i.e., integrity in architectural education. *Integration* is suggested there as aiming actually to enhance *transfer* of knowledge from *learning* situations to *application* circumstances. Having mentioned that, three levels of transfer/integration is identified and alternative proposals in due course are put under analysis. Then the argument moves on to consider the seemingly contradictory aspects of *integration* and *flexibility*, arguing a case for a *flexible integration*, where the two notions co-exist. The tacit power of human learning, the *theory of practice*, and the idea of *academic apprenticeship* are, therefore, debated to back up the argument.

PART III is dedicated to *reflections* and *conclusions.* **Chapter 7** commences by laying out a *conceptual framework* for education, in order to organize the previous findings in a set of propositions and proposals. Having done that, this Chapter sets out to assess the propositions, drawn as the means and measures of integration, against a cross cultural peer group of both disciplines of architecture and educational psychology. The propositions, though, are presented along with the analysis of the peer group reflections.

Finally, **Chapter 8** includes two main sections, the first of which provides a *general summary* of the preceding Chapters, highlighting their main lines of argument; and the second pulls together a set of *concluding recommendations*, organizing them according to the same framework which was put forward in the previous Chapter. Chapter 8 is concluded with *hindsight and prospect*, which is a self assessment of the research procedures, and a glance at the possible areas of future research.



PART I

BACKGROUND CONCEPTS

CHAPTER 1.

RESEARCH STATEMENT

... the actual research process is usually a messy business, with periods of excitement, panic, disillusionment and dull slog experienced in no given order. Even when one reaches the end of a tunnel, one could usually start all over again, time permitting. Whilst involved in the process, one is often only dimly aware of the methods employed. (Saran, 1985, p. 208).

1. 1. 1. INTRODUCTORY POINTS

Although the above remarks reflect a feature of reality which might be assumed as discouraging, there is another feature to that reality which makes a research endeavour provocative and exciting. That feature is actually what keeps the researcher *on the way*, despite all uncertainties; a *tacit question* which works as a driving force throughout the process. Hence the evolution of the research *question* along with the development of the *study*. Research, in this sense, is an evolutionary process wherein, that *tacit question* is explicated and developed.

Whatever the type of research and whatever strategies adopted, the common aspect of all research endeavours is *thinking,* or to be more precise the *evolution of thoughts.* All methodological undertakings are there to help the researcher to develop their interpretation of the issues being investigated; to achieve a clearer understanding of reality. Bell (1993, p. 18) quotes Medawar (1972) as saying, 'All advances in scientific understanding, at every level, begin with a speculative adventure, an imaginative preconception *of what might be true* - a pre-conception which always, and necessarily, goes a little way (sometimes a long way) beyond anything which we have logical or factual authority to believe in... The conjecture is then exposed to criticism to find out whether or not that imagined world is anything like the real one'. Scientific reasoning is, he further quotes (p. 19), '... an interaction between two episodes of thought - a dialogue between two voices, the one imaginative and the other critical; a dialogue, if you like, between the possible and the actual, between proposal and disposal, conjecture and criticism, between what might be true and what is in fact the case'.

The above mentioned evolutionary nature of the research process puts it squarely parallel to design. A process of conjectures and refutations seems to be at work in the course of research, as will be argued later in the case of the design process[8]. Saran gives a telling account of the latter point: 'I came to see the research process as an ongoing spiral-like activity with no specific start and no specific end. Every question has its antecedents, every statement made or *answer* found in turn could lead to further questions'. (Saran, 1985, p. 208). (Emphasis of the main source).

There is another point which can usefully be appended here, that is what distinguishes the ruling tendency in *academic* from that in *non-academic* (most of the time *applied*) research. With educational objectives, in academic research the *process* is usually as important as is the end product (if not more), whereas in non-academic research, it is the end *product* which is of prime significance. In the case of applied research, there is a client who is looking for the end product, while in academic research, although intended to have ultimate applications, it is principally in pursuit of knowledge, the main *client* being the researcher's own *curiosity* and the academic requirements. Needless to mention, of course, that process and product are closely interdependent. What follows, though, is a brief account of the process of this research which, to the author's judgement, will help to clarify the points of interest as well as the train of thoughts leading to the approach adopted for the research.

1. 1. 2. EVOLUTION OF THE RESEARCH FOCI

The initial proposal for the present research was to study the role and significance of *geometry* in the process of designing Persian Islamic architecture. In that proposal, geometry was postulated to have a central role in the process. The proposal started with the following statement: 'Considering architecture as

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8 See chapters 3 and 5.

the *space, materialized for man*, the first and foremost element playing the crucial role in this respect is geometry... the factor of geometry - dimensions, sizes, and the comparative relation between them - cannot be abstracted from the concept of space'. The main emphasis of the study was to be: '... developing a knowledge of methods of designing, especially on the application of geometry in the process of designing'.

Referring to the author's background career which is associated with planning for higher education, the scope of research was suggested by his supervisor, Charles Cockburn, to take the educational element into account and thus make the outcome more likely to be applicable. Cockburn's critical comment reads: 'The *designing methods of your ancestors* is I grant you something worth studying from a scholastic point of view but a) I think you will find that much work has been done on this and b) very little of it seems to have any practical application, as you rightly suggest it should have'.

The proposal, though, was developed to take the issue of design process in a general sense, with more emphasis on its role in design education. It was held that design education was, to a certain extent, teaching the process of designing and the related strategies and methods. *Teaching Design*, though, proved to become the main incentive to orientate readings and writings of that stage[9].

It was at this turning point that the focus of study shifted from *Designing* to *Teaching design,* from *Architecture* to *Architectural education.* What was delivered as the final proposal at the end of the first year, was though entirely focused on education, the title of which being; *Towards a Consistent Model for Architectural Education in Iran.*

Architectural education was, clearly, an area of study, rather than a research question. What was still required to be done, at that stage, was to conjecture; 1) the research problem that was to be addressed, and 2) the approach of the study to be adopted. Methodology was believed to be conveniently definable,

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9 For the two initial proposals see appendix 1.

following those two determinants. The proceeding section renders the development of the research problem.

1. 1. 2. 1. SCOPE OF THE PROBLEM

A working hypothesis, highlighted in the research proposal reads: '... the urgent need of architectural education which, if met, will result in the coherency and integration... is a consistent model or theoretical framework in the light of which, the curriculum design, teaching methods, and educational environment could be contemplated'. That hypothesis implies a tentative problem; *the lack of coherency and integration* in architectural education.

In spite of the fact that in academic research, the problem is mainly to do with the researcher's own questions, what was set to be addressed as the research problem, was taken from a statement delivered by the highest decision-making body of curriculum design and development in Iran. The Iranian *Planning Committee for Arts,*[10] posited the question, as to what the major problems and shortcomings were, facing architectural education in Iran. The document in appendix 2, is taken from the minute of the Committee's meeting (December 1993), held in response to the author's query.

Having been a member of the above mentioned Committee during the Eighties and the early Nineties, the present author fully admits those problems as being the most conspicuous. But it should not be forgotten, though, that some (or most) of those problems are, in fact, social (economic, cultural) problems or at least, deep rooted in the social circumstances. They can, therefore, be only addressed through manipulating the social rather than pedagogic variables. As will be stated shortly, the present author took a pedagogic standpoint and thus had a selective overview of the nine problematic issues pinpointed by the above mentioned Committee. With this in mind, Item 5 of the above mentioned document, was perceived as having much to do with issues intrinsic to the educational environment and thus more compatible with the pedagogic standpoint of the author.

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10 One of the committees of the Supreme Council for Higher Education Planning.

To cite from the above mentioned document, the problem was, '... *insufficient integration of lecture courses and their inadequate influence on design projects*'. This is also reflected in the problem of 'little or no relation between architectural education and the education of other relevant professional building disciplines', as pointed in Item 4 of the document (See appendix 2). As will be further developed in Chapter 3 and Chapter 6, the above problem proves to have also been a perennial concern for educators elsewhere, throughout the life span of architectural schooling. It covers a wide range of issues on the application of learning outcomes in work situations, or in technical terms, transfer of learning[11]; issues which have stimulated a whole lot of experimentations and theoretical endeavours by educationalists and educational psychologists.

Having set the problem, although tentatively at that stage, the possible approaches were to be contemplated. The following paragraphs will tackle the alternative approaches.

1. 1. 2. 2. ALTERNATIVE APPROACHES

The *research proposal* argued that any educational system was determined by three main variables: *'The Ideo-Cultural element, the Needs of Society,* and *the Nature of the Discipline*', each contributing to shaping the educational system in a distinctive way. Providing the system with a vision, the ideo-cultural element was suggested to play '... the most unifying and identifying role', while the social needs of the time, would orientate the teaching materials towards a more appropriate role-playing of the graduates in their careers. This was postulated to affect the educational *content* rather than *process.* Finally, the discipline's inherent attributes, being by definition the least time dependent components of the system, were held to have the most decisive impact on the discipline's structure and procedures.

The above mentioned variables can best be seen in a continuum. At one end of the continuum, social factors are the most rapidly changing and time-dependent, while the nature of the discipline, at the other end, is relatively

11 See Chapter 6.

durable and timeless. It is a recurrent subject of debate in the literature of architectural education to refer to the *ever changing* needs of society and new patterns of the profession, while the Vitruvian statements of architecture and its education, to a considerable extent, still sound familiar to those involved in the field. Looking back to antiquity and to what Vitruvius said the architects ought to know, Broadbent asserts[12], 'The syllabus is pretty much the same as it is now'.

The ideo-cultural variable falls somewhere in the middle of the continuum, its pace of change being evidently slower than that of social factors. Cultural institutions seem to be more deeply rooted than being able to keep pace with social and organisational changes. Perhaps that is why the widespread cultural influence of any historical *movement* (religions, revolutions) is only manifested some decades (or even centuries) after they establish their social status and power. What is known as, say, the Christian or Islamic *culture*, with all the manifestations such as arts, sciences, and traditions, was flourished long after the foundation of the Christian or Islamic *society* or *government*, so to speak. Social life seems to be comparatively more responsive to political and economic situations, the latter being easier to manipulate.

Perceiving the case from a different perspective, the Oppenheim's model of the levels of attitude (1992, pp. 176-177), makes sense here. He demonstrates those levels in a hierarchy, with *personality* as the root and *opinions* as the leaves. (The opposite Figure).

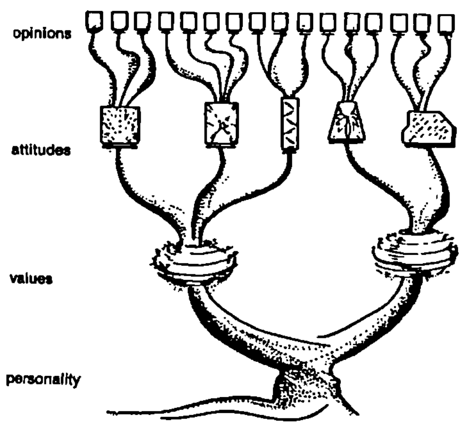

Figure 1 *The tree model of attitude, after Oppenheim 1992, p. 177*

As could be gathered from the analogy of the *tree*, used in Oppenheim's model,

12 In his contribution to the One-day Workshop on architectural education, organised by the author on 15 February 1995 at York .

these levels of attitude are not isolated units, but rather are interrelated. 'For ease of understanding', Oppenheim writes (1992, p. 176), 'social psychologists make a rough distinction between the... different levels [of attitude], calling the most superficial one *opinions*, the next one *attitudes*, a deeper level *values* or *basic attitudes*, and a still deeper level, *personality*' (his own emphasis). Further he suggests that these vague distinctions between attitudes, '... must be thought of as, more versus less enduring; deeper versus more superficial; relatively stable versus relatively changeable; and more general versus more specific'. 'At the most specific level, that of opinions', he acknowledges, 'change is relatively easy to bring about so long as the underlying attitude is not involved'. Opinions are changed in the light of social events and political manipulations while attitudes, values and personalities will hardly submit to social changes. Put briefly, the likelihood of change and manipulation is the less the lower one gets in the hierarchy. Ideology and culture seem to be associated with the deepest personal characteristics and thus they are the most resisting to conversion.

Within such a frame of reference, was the present author to decide his approach to the issue of architectural education. The above treated trio can be articulated more clearly in three distinct approaches; *the socio-economic, the ideo-cultural,* and *the pedagogic* approach, each of which having consequent implications that will influence further research steps. Following that trio, three alternative routes could be taken to initiate the research.

1. Bringing the socio-economic variable to the fore, the main issues to be taken into account would be, put briefly, the country's present socio-economic situation, its reflection on education and construction industry, and the role architects play in due course. The information about those issues could be gathered mainly through field surveys, the governmental documents when available, and relevant research reports[13]. What comes out of such a study, is a set of social requirements as well as obstacles, concerning architectural education and practice. The most needed specialities of architects, though,

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13 The latter sources are hardly existing. There are only two research reports available on that issue, Memarzia (1995, p. 4) reports.

would be identified to set the final goals towards which architectural education is supposed to be orientated.

This is clearly a *product-oriented* perception of education which at best leads to setting out a well conceived *content* of the course. It primarily touches the question of *'what to teach?'*, and leaves out the one of *'how to teach it?'*. What results from this approach, will obviously be short term, unless reliably predictive decisions are possible to be made. The author grants the merits of such an approach in its own right and admits that, no educational programme could ever get off the ground without attending to this issue (See also the next section). But what he suspects here is that, such an endeavour would be best fulfilled through procedures such as action (or evaluative) research, where participant (or non-participant) researchers are 'actively involved in planning and introducing some change in policy, and then in using their research expertise to monitor and possibly evaluate its effects'. (McNeill, 1990, p. 10). It follows that the participants, most notably educationalists, are perhaps the best who can move along with social variables and establish a rather realistic understanding of the situation. In this view, research becomes an ongoing process of reflection-in-action (or reflection-on-action). Otherwise, any research results will rapidly lose their validity against what they are trying to attend to, i.e., changing situations of the society. The rapidly changing socio-economic context calls for an ongoing, flexible research strategy aiming to further and improve education along the course of action.

2. with ideo-cultural variable as its prime focus, the study would have to start with a treatment of the Islamic vision of the subject, given that the ideo-cultural landscape of the country, both historically and at present, is mainly associated with Islamic influence. A study of this sort, though, would be mainly dependent upon reliable sources, principally *tafsir* (Qur'anic exegesis), *hadith* (Prophetic tradition), as well as the quoted narrations and aphorisms of the Prophet Mohammad[s] and his purified successors (*a'imma)*.

Albeit few in number, efforts have been made to bring the Islamic concepts to bear upon the meaning of architecture[14] an its education[15]. Granting the intellectual significance of such efforts, there is a noteworthy point here regarding the intent of the present research: What comes out of a study of the above sort, will mainly address the participants' attitude and responsibilities towards people, nature, and themselves, not to mention their responsibility towards the Creator which, in a religious sphere, obviously underlies all. It could also be gathered from the Preface (and will further be tackled in Chapter 6), that the present author holds the ideo-cultural element as being most influential on attitude formation and thus contributing to shaping mental structures[16].

The above position is partly due to the author's personal experience, particularly in the course of the Post-Revolutionary changes in the country, whereby the best ever experienced attitude of architecture staff and students towards their social responsibilities, came short of solving *pedagogic* problems. Needless to admit that the religious attitude of devotion to people, yielded invaluable results regarding the integration of schools and society, which is clearly necessary but not sufficient an aspect of architectural education.

To investigate the Islamic sources for defining clues to architecture, a unique effort was undertaken, in recent years, by a lecturer at Tehran University which was also supported by a group of religious scholars (Tusi, forthcoming). It was unique in that it was conducted by an architect who, at the same time, was taking courses in a traditional school of Islamic studies (and thus having an eye to both sides of the argument). The result is a carefully selected and compiled set of Islamic propositions, the substance of which were believed to relate architects, architecture and the built environment. Having read the manuscript

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14 Perhaps the most regorous of which are writings of S.H. Nasr. (See the bibliography).

15 Among 6 PhD theses on architectural education, as appeared from 1980 to 1995 (UMI, up to vol. 56, no. 3, September 1995; and ASLIB, up to vol. 44, October 1995, were consulted), the one by Ateshin (1987) tries to take Islam as its point of departure, hence he uses the term '*Islamic* architectural education'.

16 Interestingly enough, what Ateshin (1987) brings out of his treatment of Islamic creeds is architect's responsive attitude towards '*self, people, nature,* and *allah*'. (pp. 257-258). But in order to set his educational propositions he draws on the educational experience, accumulated in his country and elsewhere.

of the above research report, the present author was reinforced in his earlier mentioned position as to the major contribution of such undertakings being towards the formation of attitudes. Having been in charge of that research for almost two years, Tusi did himself admit[17] that the outcome of the research could not be taken as a blueprint for *Islamic architecture*, and that it could best serve to give an impression of what should not be done; what the border lines are; and how vital it is to purify and orientate the attitude in accord with Islamic thinking. This is not, of course, surprising because the core content and intent of religion is *orientation* toward the *Creator*. Professor Tadjvidi also ascertained[18] the latter view by saying, that the endogenous values and cultural identity is best (or perhaps only) enhanced through interaction with a well qualified *Ostad* (Master), who be able to put the axiomatic values in architectural terms, understandable for architecture students. It clearly implies the merits of apprenticeship, particularly in its traditional version, whereby the ethics of professional behaviour is as important, if not more so than the delivery of knowledge and expertise. (See below).

Another aspect of the ideo-cultural variable, the *cultural* bit, is the traditional way of training architects, i.e., the old master-disciple system. As will be also argued in Chapter 6, the outstanding attributes of that system are, on-the-job training and most notably, the ethical orientation of education which equally accounts for attitude formation and skills acquisition. There are certainly valuable lessons in that system, but whether it can be an appropriate model for the academic architectural schooling is a matter of questioning.

In pursuit of the above question, three interviews were conducted in Iran, in April 1994. Two of the interviews were with two old *Memars* (master builders), *Ostad Mohammad Sha'arbaf* and *Ostad Reza Memaran*. The third interview was with *Ostad Karim Pirnia* who has been among the first group of students to study

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17 In a discussion with the author, during his first field trip to Iran, April 1994.

18 In his interview with the author, April 1994. He is one of the rare scholars who enjoys a high status both in practice, as well as in the history and theory of Persian and Islamic art, through a close acquaintance with the original Islamic texts. He is, at present, the cultural advisor to the Iranian delegation in Paris, in UNESCO affairs.

architecture in the *School of Fine Arts*, then the only school of architecture in Iran, during the Forties. (See Chapter 2). He has done extensive research on Persian architecture and also worked personally with a number of *Memars* in order to record their methods of doing things as well as their special vocabulary[19]. Posed with the question, how long would it usually take for an apprentice to become a *Memar*, the three interviewees suggested an average of not less than 40 years[20]. This is quite natural, and acceptable, within the context of the building trade, given that the apprentice starts his professional career right from the beginning, as a simple worker, and approximates the status of being accredited as a *Memar* with all necessary expertise, as time goes by and experiences are accumulated. Higher education, conversely, is modeled to prepare and qualify students within the academic environment and during a limited time period, in order to satisfy the increasing social demand to relatively qualified architects, that is clearly unlikely to be fulfilled by the arbitrary outcome of the traditional model[21].

3. If the first route leads to the *whats* of architectural education, the second conducts to the *whys*. What the present author was looking for was the *hows* of architectural education which clearly calls for a different approach. It was against such a background that the author was conducted to employ a rather pedagogic approach to the subject matter and undertake a cross-disciplinary study of Educational Psychology. Thus, a search for the inherent attributes of architectural education, designated here as the *nature of the discipline*, proves to have been the ruling motive for generating further ideas and taking further steps in the subsequent stages.

There is another point which should be made here to further reinforce the above

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19 Pirnia was recently offered an honorary Doctorate, in Tehran University, due to his contributions to Iranian traditional Architecture.

20 'The course of upgrading from a novice to a master is a very long process of 40-50 years. There are few who can patiently endure the hardship of dealing with soil and bricks for such a long time', said Ostad Reza.

21 Neither Ostad Mohammad nor Ostad Reza could name as many as on the fingers of one hand, when they were asked about their apprentices who succeeded to become a competent *Memar*.

position. What constitutes the history of architectural schooling in Iran, has been the adoption of the French Beaux-Arts (lasting for three decades), and further shifting to an amalgamated system, influenced by the Post 1967 widespread movements in European Universities (See Chapter 2, under *Architectural education in Iran*). What is naturally expected to have happened in the European context, on the contrary, is a mutual influence of architectural education and developments in disciplines such as educational studies. It follows that educational developments, in Europe, have been partly pursued as an evolutionary process involving academic debates and theoretical endeavours (even if sometimes triggered by socio-political motives). This is not the case with such contexts as Iran where a process of adoption has been at work; adoption of the 'institution' without necessary awareness of the basic educational ideas and concepts underlying it. There has always been an intellectual gap between the adopted institution and the 'users', so to speak; absence of a conceptual understanding of why that institution is shaped as it is. Such a pedagogic understanding is clearly a prerequisite for being critical of that institution. The present research is a modest initiative taken along that line. More on the latter issue will follow next.

1. 1. 3. WHY CONCEPTUALISING A FRAMEWORK?

Without a conceptual framework, without theory-laden points of reference and self-assumed ideological limitations, no system of random technical devices and methods could even get off the ground, let alone be intelligible in full flight. (Daley, 1969).

Some might argue that working in rapidly changing circumstances, as we are in now, involves a continuous process of trial-and-error which obviously puts emphasis on *experience.* More, they would suggest that the amount of time spent on conceptualizing a framework for, say, architectural education could well be put on a more pragmatic basis of implementation/evaluation/improvement of a system which is already running. What underlies the above position is the conviction that *concepts* are formed and developed through experience, or to put it in brief, *action precedes theory.*

Carr (1990) categorizes positions such as the above as *the common-sense* *approach*, whereby ' the common-sense understanding of practice' underlies educational theory. Educational theorizing, though, as he acknowledges, '... is simply a matter of codifying ideas, concepts and principles embedded in practice and then using this *theory* to test practical competence and identify deficiencies in practical performance'. (his own emphasis). Put briefly, theory is seen as 'practice-focused'. 'Educational practice', he further concludes, 'is... simply a matter of acting within a given tradition'.

Experience is the essence of practice. An overdue dependence on experience as 'a means of advancement', as Cohen & Manion (1994, p. 4) put it, have resulted in what they call a 'fitful and uneven progress' of education in the Western world. This might make better sense if seen within the context of the trio they suggest as being employed by Man as a means to understand the nature of the phenomena; *experience, reasoning,* and *research.* They perceive the earlier mentioned problem as being caused by '... too great a dependence on the first... , and a corresponding reluctance to apply the principles of [the third]...' (same place). The way *experience* deals with events, they argue, is in a haphazard manner, while research is based on the inductive-deductive model of reasoning which is 'the essence of modern scientific method'. (same place). A significant contribution of the inductive-deductive reasoning is, in their view, 'the clarification and interpretation of scientific findings and their synthesis into a conceptual framework'. (same source, p. 4).

Drawing upon the *schema theory* [22], the above concern can be put in a wider perspective. Given the role of mental structures (schemata) in helping the *observer* to make sense of the *observed*, the significance of conceptual frameworks in accommodating personal experiences is more evident. This is even more true when the results of individual experiences are to produce an accumulated body of knowledge, so vital to a collective endeavour such as education.

In his treatment of the major forms of educational theorizing, of which 'the

22 For a treatment of *schema theory* see Part II, particularly Chapter 4.

common-sense approach' was mentioned earlier, Carr (1990) points at alternative approaches in due course. In a one-century historical perspective, those approaches can be put as a successive chronicle. What is presented here summarizes that perspective. (See the following table) (What appear in italics, are the present author's statements).

The Common-Sense Approach practice determines theory rather than theory determining practice. Theory is practice-focused. *action > codification > evaluation*
Philosophical Approach relating common-sense thinking to a philosophical understanding of the true meaning and purpose of education. practice as a form of reflective practice based on educational ideals. *intention > action > reflection*
The 'applied science' approach educational theory is a form of applied science, using value-free empirical knowledge as a basis for resolving educational problems and improving educational practice. educational practice is a technical activity. *theory > means of problem solving*
The 'practical' approach educational theory is to help to make morally defensible judgements. educational practice is an essentially ethical activity. *moral value judgement > action*
The critical approach educational theory is a form of 'moral science'. educational practice is historically located, culturally embedded, and shaped by ideology. *moral values > action < social forces*

Table I *Evolution of educational theorizing. Adapted from Carr, 1990*

Contrary to *the common-sense paradigm* which clearly takes practice as the prime actor, and apart from *the applied science approach,* whereby theory and application are indistinguishably interwoven, the other three paradigms hold theory as preceding action. The present author shares the latter view. The simple logic behind that view is; every human action follows an intention, be it thoughtfully or otherwise. What is inherent in any intention is a sort of tentative plan for action. That *plan* is the main constituent of what is meant by theory.

With *theory* as orientator of *practice*, the most mature paradigm of educational theorizing, i.e., the critical approach identifies a third contributing factor which influences theory and thus practice. That factor is the social reality. This paradigm recognizes how the very understanding of educational aims, '... may become distorted by various non-educational social forces'. (Carr, 1990). It follows that, '... the practical realization of... [educational] values may be impeded by institutional structures and political[23] constraints'. (same source). Methodological or pedagogical debate on the *concept* of education, thus, needs to be further complemented by a political debate on the *practice* of education.

Admitting to the above paradigm, which sounds rather compatible with the real world experience, it should be emphasized that the socio-political factors are seen either as facilitators or constraints in the course of *realization*, rather than *formulation* of pedagogic frameworks. They seem to be rather more concerned with practice than with the theory of education, albeit Carr (1990) rightly concludes that, '... in education, theory is an indispensable dimension of practice'.

Having perceived that, an idea emerges that further modifies the three determinants of educational systems identified in the research proposal, i.e., ideo-cultural variable, social requirements, and nature of the discipline. Following the critical paradigm of educational theories the above mentioned trio is reduced to two determinants; *the pedagogic,* and *the social*, with the 'social' element embracing all contextual aspects of education (social, economic, cultural, ideological, political, institutional). Put another way, the *pedagogy* of education and the *politics* of education; where the former focuses on what constitutes the effectiveness of learning and instruction, in line with aims and objectives of architectural education, and the latter contemplates the corresponding contextual influences, be they facilitators or constraints, (not to mention the interrelations between the two).

Against this background, the author set out to contribute to bringing the comparatively mature discipline of educational psychology to bear on architectural education. A question might be raised as to why the study was conducted at the scale of a general framework. Simply because this research

23 The term *political*, here, encompasses *social, economic, cultural, and ideological* concerns.

is, to be modest, among the first attempts of its kind and, therefore, had to tackle the issue at a master plan level, so to speak.

In order to bridge the gap between findings of *experimental psychology* and theoretical requirements of *architectural schooling*, it was found necessary to provide a meaningful pattern to those findings (theories and concepts) which had promising implications to offer. The necessity of such a selective approach to those findings is best acknowledged, attending to the fact that almost all experimentations by educational researchers are undertaken in primary and secondary education, although much of the findings are, to a certain extent, transferable to higher levels, in so far as they address the human learning attributes. The relevance of the peculiarities of architectural education, though, required to be contemplated. The objectives, scope, and methods of study were developed to fulfil that task.

1. 1. 4. OBJECTIVES AND SCOPE OF STUDY

... the majority of educational studies that are reported in the literature are descriptive rather than experimental. They look at individuals, groups, institutions, methods and materials in order to describe, compare, contrast, classify, analyze and interpret the entities and the events that constitute their various fields of enquiry. (Cohen & Manion, 1989, p. 70).

In a general classification, the present study stands somewhere between *basic* and *applied* research. Although inclined to the former, it tries to enjoy the characteristics of the both. In his five-type-hierarchy of research, Patton (1990) summarises some of the major characteristics of those types (pp. 160, 161).

He does himself admit that '... there are no clear lines dividing the points along the continuum. Part of what determines where a particular kind of research falls along the continuum is how the researcher describes what is being done and its purpose'. (Patton, 1990, p. 159).

Using Patton's vocabulary, the main purpose of the present research is in favour of a 'contribution to theory', meanwhile attending to its use in formulating 'problem-solving programmes'. The pursuit of a theoretical framework to explain the problem of disintegration in architectural schooling, must be seen in this perspective. Part of what Patton calls typology of research purposes, is presented in the following table.

Types of Research	Purpose	Focus of Research	Desired Results	Desired level of generalization	Key assumptions
Basic research	Knowledge as an end in itself; discover truth	Questions deemed important by one's discipline or personal intellectual interest	Contribution to theory	Across time and space (ideal)	The world is patterned; those patterns are knowable and explainable
Applied research	Understand the nature and sources of human and societal problems	Questions deemed important by society	Contributions to theories that can be used to formulate problem-solving programmes and interventions	Within as general a time and space as possible, but clearly limited application context	Human and societal problems can be understood and solved with knowledge

Table II *A Typology of Research Purposes. Adapted from Patton, 1990, p. 160.*

Focusing on the icon *Architectural Education,* or to take Sutcliff's subtle point[24], *Architect's Education*, two areas of concern will emerge; *education* in general, as the process of learning and instruction, and its particular attributes with regard to peculiarities of *architects* and what they are expected to be competent at.

In the light of the previous arguments, the above issues had to be scrutinized from a psychology-of-education perspective. To that end, the author's understanding of the subject matter, i.e., *architects* and their *education*, would serve as a primary schema, helping to identify and assimilate the relevant theories and concepts and put them in a meaningful pattern[25]. That 'pattern' underlies what is designated here as *conceptual framework.* This is, in fact, what research can do, 'it smooths out contradictions and makes things simple, logical and coherent'. (quoted in Morse, 1994, p. 1).

Grounded in scientific findings of the discipline of education, that framework will serve, as a rather more developed schema, or mental map, to drive and orientate further research and help to organize individual research findings in

24 See Chapter 3, under *Core Issues and Arguments.*

25 For more on the function of *schema*, see Chapter 4.

what constitutes a 'body of knowledge'. That framework needs to regard in breadth a review of the theories and concepts, and in depth the transfer of those concepts that exhibit compatibility with the subject and object of architectural education. In other words, the main objective would be to argue for a new analysis and make a convincing case for the interpretation of those theories and concepts, resulting from turning empirical research into a psychology of learning, within the discipline of architectural education. Needless to mention the main focus of the study, i.e., the issue of *integration*, is the final conductor.

To meet those objectives, the present research covers the following scope of issues:

1) A historical overview of architectural education, in order to enrich and reinforce the author's schematic understanding of the discipline and its historical development.

2) The present state of affairs in architectural schooling in Iran to explicate the corresponding problems as well as potentialities. This will also contribute to updating the author's, as well as the reader's, picture of the architectural education in the country, which will serve as background knowledge concerning the author's context.

3) The current issues and arguments about architectural education in a global setting and within the past decade or so. This is intended to widen the author's angle of vision and reveal the similarities, as well as differences between various contexts, leading to the core issues and arguments around the discipline.

4) An overview of the learning theories developed during the present century and the corresponding leading trends; *behaviourism* and *cognitive science.*

5) Further investigation in the discipline of education psychology to argue a case for the *transfer of learning*, identified as being the most contributory concept to the issue of integration in architectural education.

6) Bringing the previously argued theories and concepts to bear on the central line of inquiry, i.e., *integration*, and re-interpret the latter issue in the light of the previously set theoretical framework.

7) A cross-cultural *peer review* of core arguments against a number of eminent architectural educationalists and educational researchers, both in Iran and in the UK, leading to the conclusions.

Preceding to the above areas, is an opening argument on the process of the research which, indeed, constitutes the substance of the present chapter.

To develop the above lines of argument, various sources were consulted and, correspondingly, a variety of methods employed. As is usually the case, the nature of the question largely determines the proper ways of getting at the answer, '... for different types of questions require different methods, and some situations permit some methods but not others'. (Pressley, 1995, p. 12). The methods employed in different stages of the study, will be discussed next.

1. 1. 5. METHODOLOGY AND INSTRUMENTATION

The present research, in a wider perspective, can be categorised as one of *qualitative* approach. The methods, though, are utilized to 'seek insight rather than statistical analysis' (Bell, 1993, p. 6). That being so, it follows that, as Patton (1990) denotes, 'the researcher is the instrument' (p. 14). It might well be perceived as a loss of rigour, but that '... is more than offset by the flexibility, insight, and ability to build on *tacit knowledge* that is the peculiar province of the human instrument'. (quoted in Patton, 1990, p. 14) (italics added).

Given the main concern of the present research, which called for a pursuit of ideas and concepts about the fundamental attributes of architectural education, the eminent scholars of the related disciplines were the main sources of information. Getting at other's viewpoints, though, is made possible either through their impressions, most commonly in literary form, or through direct contact (if they be available). These two ways of consulting *knowledge-owners*, so to speak, generate a wide spectrum of methods of enquiry. At one end of the spectrum are the relevant literature sources (or other sorts of impressions remained from the reference people), and at the other end are the face-to-face contacts, in the form of discussions and/or interviews. It is not the object of this report to draw out the issue of methodology, but a short account of the most utilized methods in this study, may be useful. These can be put in five categories: *literature survey, correspondences, interviews, workshops,* and *questionnaire surveys.* Employed in a number of research undertakings, the last method will be tackled separately, along with the report of those undertakings.

What follows next, though, is an account of the other four methods.

1. 1. 5. 1. LITERATURE SURVEY

Since the most developed and crystallized ideas are usually reflected in literature (in the form of research papers, articles, and books), the present research, being involved with theoretical debate, had to draw heavily on literature as its main source of information. Investigation through literature is, as Cohen & Manion acknowledge, 'a kind of historical study', because the researcher is actually 'reconstructing what was done in the past in *a particular respect* '. (1994, p. 47)(emphasis added).

Two streams of literature were pursued in the course of this research. To highlight just the keywords, those streams can be put under *architectural education/design,* and *psychology of learning/instruction.* How the former was initiated and conducted, will be explained in Chapter 3, and therefore there is no need for treating it here, but only one point might be usefully noticed at this stage. The broad review of literature (partly reported in Chapter 3), was to satisfy two objectives at one and the same time; firstly, to paint a picture of the state of debate in architectural education circles and secondly, to identify the most relevant and useful literature to scaffold the main body of argument. Bibliographies and cross-references, though, were given particular attention, as networks of ideas and concepts, to spot and pursue the original knowledge owners as well as the development of the thoughts.

The latter stream of literature, i.e., psychology of learning/instruction was investigated in three steps; first of all the intention and the possible scope of study was discussed with two eminent scholars[26] in the Department of Educational Studies at the University of York. What came out of those discussions for the author, was a clearer understanding of the discipline of educational psychology and a list of relevant text books and reading material, which proved to be an effective introduction to enable the author to initiate his investigations.

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26 Professor Ian Lister and Dr. Chris Kyriacou.

The study, in the second step, was conducted to provide a critical overview of learning theories and the leading schools of thought within the discipline. It was primarily based on the latest text[27] books but was soon extended through cross-references and bibliographic notes to cover the original sources. What constitutes the substance of Chapter 4, mainly reflects this part of the investigation.

The third step was a cross-disciplinary evaluation of the theories discussed so far, to bring them to bear upon the specific issues of architectural education. The scope of the literature, though, was sharpened to cover issues such as transfer of learning, problem-solving, creativity, and designing. This part of the study drew heavily on the author's knowledge and experience of the above mentioned issues, gained through learning and practice of architecture. It was one of the most creative (and exciting) episodes of the research. The procedure and methods were squarely identical to those of designing itself. What was already revealed from the preceding investigations was the significance to architectural education of the *transfer of learning*, as the most contributing concept to what was targeted by the research, i.e., *integration* in architectural education. The procedure was, then, a spiral-like movement from a tentative answer to the above mentioned contention (integration), to testing it against two criteria, until the emergence of a convincing interpretation of the case, or as quoted earlier, 'making things simple, logical, and coherent'. Those two criteria were; a) the experience of the precedents in architectural education, and b) the relevant theories in experimental psychology, developed to explain similar issues.

1. 1. 5. 2. CORRESPONDENCE

Apart from the pursuit of literature, other methods and techniques complemented the above mainstream. Albeit time consuming, correspondence[28] proved to

27 The significance of *text books* to start such an investigation lies in their being committed to covering as many topics as possible to provide a general picture of the discipline they are dealing with. They certainly satisfy *breadth* which is essential at the outset of any investigation.

28 Although usually overshadowed by the more renowned methods, *correspondence* has been recognized by some educational theorists as a means and method of research. As Al-Boustani mentions it among other methods of learning; '... *correspondence* with scholars and research centres in order to keep abreast of the most recent discoveries and to request advice'. (See

serve as an effective instrument to meet a number of requirements: firstly, to establish a relevant data base, as a primary requirement for any further research in this field; secondly, to establish academic relationships with those involved in similar sphere of thoughts; and finally, seeking comments and criticisms in a process of constant *peer review.* The significance of the latter point is particularly evident in the case of academic research where resource limits obstruct the frequent arrangement of peer group sessions. This medium enables the researcher to test and monitor his ideas against different viewpoints through an economical and possible process of getting intellectual feedback. It is obviously true that all the correspondents would not bear fruitful results, but in sofar as it is utilized as a qualitative source of generating ideas, the very few cases which did provide an intimate academic debate were extremely productive, fruit-bearing, and ultimately paying off for all the amount of time spent in creating those relations.

In the course of the present research, some 180 separate correspondences, mostly with scholars and academics were conducted throughout the study[29]. The author should mention at this very point the fruitful correspondence he has had with Professors Broadbent, Symes, Nuttgens, and Wise, as well as with Cunnigham, Abel; Drs Aboutorabi and Teymur, and most regularly with Stuart Sutcliffe[30]. Much of the discussion with the above mentioned individuals was carried on by correspondence, some of which are part of the research documents (as *fresh literature*, so to say). A method which deserves better recognition by researchers (particularly those dealing with theoretical issues or *basic research*).

1. 1. 5. 3. INTERVIEWS

Various interviewing strategies have been developed, each having virtues as well

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UNESCO, 1993, p. 129).

29 Appreciation is due to the Institute's secretaries, particularly to Kelly Roberts, who were of great assistance in sending the extensive postal enquiries throughout the research.

30 Only those who had more than one correspondences, usually complemented by face-to-face meetings, are mentioned here.

as weaknesses. They cover a range of different techniques to satisfy the criteria of *breadth* and *depth*; *quantity* and *quality*, *measurement* and *interpretation*. Patton (1990) puts those strategies in four categories: *Informal conversational interview; Interview guide approach; Standardized open-ended interview*; and *Closed field response interview.* (pp. 288,289). A summary of the characteristics of those strategies is adapted from the above source in the following table.

Type of Interview	Characteristics
Informal conversational interview	Questions emerge from the immediate context and are asked in the natural course of things; there is no predetermination of question topics or wording
Interview guide approach	Topics and issues to be covered are specified in advance, in outline form; interviewer decides sequence and wording of questions in the course of the interview
Standardized open-ended interview	The exact wording and sequence of questions are determined in advance. All interviewees are asked the same basic questions in the same order. Questions are worded in a *completely* open-ended format
Closed field interview	Questions and response categories are determined in advance. Responses are fixed; respondent chooses from among these fixed responses

Table III *Variations in Interview Instrumentation. Adapted from Patton, 1990, pp. 288, 289.*

It should be ascertained at this point that the vices and virtues attributed to the above approaches are by no means absolute. An individual approach might prove to be highly effective in one situation, while a poor strategy in another. More, it is quite possible to retain the characteristics of two or more of those approaches in a single research undertaking.

The present research has found the first three types in tune with the objectives set for the study. Overall, 32 interviewees[31] were interviewed, a number of whom more than once. 10 out of 16 interviews in Iran and 7 out of 16 in the UK were tape recorded, all but one[32] conducted by the author.

The common aim of interviews being to explore new ideas and concepts, none of them has followed a fully structured strategy. Rather, it has always been observed that interviewees feel free to focus on *their* points of interest.

31 For the list of interviewees see Appendix 3.

32 The interview with Ostad Reza Memaran was conducted by Mr. Vahhabzadeh, Head of the Cultural Heritage Organization in the city of Tabriz, according to the author's interview schedule. For more about Ostad Mohammad and Ostad Reza see Chapter 6.

Interviews in the earlier stages fall into Patton's first category, i.e., *informal conversational interviews*; Sha'arbaf, Pirnia, and Tusi in Iran, and Broadbent, and Teymur in the UK, to mention some instances.

Interviews in the later stages of the research, most significantly those conducted as a form of *peer review*, were rather more focused and *scheduled*, although still attending to the criteria of flexibility. The latter cases will be further tackled in Chapter 7.

1. 1. 5. 4. WORKSHOPS

Another vehicle used as a method of enquiry is participating in or, more significantly, organizing workshops. The term workshop, like many other terms, is used to cover a variety of events, from focused discussion sessions to large international forums. But the common denominator of all is the provision of opportunities for interaction of diverse ideas around a set of topics in a relatively short period of time.

In the course of this study, four such events are worth mentioning here to reveal some of the properties of the method: The first, and perhaps the most fruit bearing, was the *Portsmouth Symposium*[33]. It was set to cover the following main issues: 1) Aspects of 'The Teaching Method', 2) Architecture, a philosophical pursuit or a craft, 3) Globalism vs Regionalism.

Although the discussion sessions were too brief to draw conclusions (due to the time constraints), but on the whole, the event proved to have significant influence on the development of this research. Firstly, some of the issues raised by the contributors were quite central to the author's fields of interest and therefore, generated further ideas and thoughts. Secondly, the spectrum of different contributions, provided the author with an updated sense of the state of affairs which is best possible in such gatherings. And lastly, they stimulated further contacts and correspondences, which continued to be influential in subsequent

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33 It was the Eleventh Annual Symposium of the Portsmouth School of Architecture, held on 9,10,11 February 1994.

stages of the study. Those quoted from Chris Abel are evidence of the above contention[34].

The second event to be mentioned here is the one-day workshop organised for architectural course leaders and design tutors. It was held in the Institute of Advanced Architectural Studies, University of York, 11 October 1994. Entitled *'Innovations in Teaching Design'*, the Workshop was organised as two round table discussion sessions that proved to create a lively climate. Many issues were raised and experiences reported by a peer group from different British schools of architecture. In his summing up of the workshop, Professor Worthington made a distinction between studio-based and project-based teaching which, as declared by the group, are commonly confused.

Studio, he defined, is associated with a common working place in which every architecture student has his/her own drafting board and the tutor(s), or in the relevant vocabulary 'the master', would call at each student's table for a one to one tutorial. Project, conversely, is not bound to a place and only constitutes a problem-oriented learning process which can be implemented anywhere. The project method of teaching, though, was pronounced to be inclusive of studio teaching. This issue will be further tackled in Chapter 6.

As a rather integral part of the research, the third event was a unique experience for the author, in that the whole process of planning and organising the event was his own responsibility. It was a one-day workshop on Architectural Education, held at the Institute of Advanced Architectural Studies, on 15 February 1995. It might be, thus, appropriate to give a more detailed account of that event as a developed method of enquiry, evaluation, and self-monitoring.

Professor Geoffrey Broadbent of Portsmouth, Professor Martin Symes of Manchester, Professor Hadi Nadimi of Iran, Mr. Stuart Sutcliffe of York, and Professor John Worthington, Dr. Aylin Orbasly of the Institute contributed to the

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34 The proceedings of the symposium was further published in 1995. See Bibliography and References; Pearce & Toy (eds.)(1995).

workshop. So did a number of Institute's higher degree students.

The value of this Workshop to the author can be seen in two ways: Firstly, it provided a good opportunity to review the research findings and the adopted approach at the crucial stage of starting to write. More importantly, having benefited from the contribution of experienced academics who share interests with this research, the Workshop turned out to be a forum for discussing the relevant issues of architectural education in a lively academic atmosphere. Secondly, the very organising of such an event was, in its own right, an experience of great value. The whole process of doing it was, in one way or another, associated with the elaboration and exchange of ideas. Coming to know the academics who are known as contributing to the core arguments of the research, writing letters and explaining the research subject, attracting their attention to the specific field of interest, having face to face discussions with them when and where necessary, preparing the written material such as announcements, posters, etc., and devising proper themes for the Workshop sessions to structure and orientate the discussions, all these were reinforcing to the main lines of research.

The Workshop was organised in three round table discussion sessions, each reflecting on one major area of the thesis as its theme. It started with a short presentation of the research by the author, who set out the agenda for the Workshop. Each of the sessions started with a short speech by Professor Broadbent, Professor Symes and Professor Nadimi respectively, followed by a discussion on different aspects of the issue at hand.

The first session was initially set to discuss topics such as *theories of architecture, design method studies, theories of learning,* and the ways they can contribute to a conceptual framework for architectural education. The second session was set to reflect on the key concepts of *integration* and *flexibility* and the ways an educational framework can meet the requirements of the both concepts. And the final session was to tackle the issue of *identity.*

The following points are a summary of the valuable observations obtained at this

Workshop. Firstly, the author's notion that 'the theory-practice split is associated with academic architectural education', was modified by elaboration of the fact that even the old system of apprenticeship had its own textbooks and theoretical teachings along with 'on the job training'. The latter point generated another line of thinking as to why the separate theoretical teachings were not problematic in the old system, as is the case in modern architectural schooling. Perhaps the close link between *education* and the *real world problems*, which were inherent in the old system, could be a clue to the above question. 'Reality' seems to have served as a catalyst, integrating theoretical knowledge and practical skills.

Secondly, the idea of adopting 'architectural practice' as an alternative model for architectural education reinforces the line of thinking which came out of the first point. More, there seems to be a need for a new paradigm either for schools or for practices. This line of thought was further developed in the author's contribution to the EAAE[35] Workshop (Appendix 5), where he put forward the concept of the 'academic practice' as a possible paradigm for education/practice. (See below).

Lastly, the notion of identity was discussed as being central to the culture-specific characteristics of architecture. The latter point accentuates the need for a close relationship between education and its cultural milieu. The latter line of thought found its expression in the debate on *attitude formation* (See Chapter 6).

As could be gathered from the preceding paragraphs, the author's Workshop elaborated a number of issues which stimulated further developments. One of those developments was the author's contribution to the earlier mentioned EAAE Workshop. Albeit time consuming, the preparation of a paper for an international event of that scale was a valuable experience in its own right.

Held at Weimar, 31 May- 4 June 1995, the workshop was hosted by the successors of the renowned Bauhaus. Around 90 participants from more than 20 countries were there to discuss architectural education in relation to the *reality*

35 *European Association for Architectural Education.*

of the past, industrial reality, urban reality and the *reality of the future*; the four themes of the Forum. Some observations can be drawn to give a general picture of the event.

One of the preoccupations voiced by some contributors was the so-called dichotomy of theory *versus* practice; the lack of research in schools, on the one hand and the loose relationship of architectural education with the realities of society and profession on the other. The author's contribution fell into this category and found companions among other contributors. The author elaborated the plea for integrating the real needs of society (practice) with educational activities (theory) within a hypothetical institution[36], designated there as the *academic practice*, eventually with both educational and professional components fully integrated.

Apart from a number of deficiencies[37], the overall outcome of the event for the author was an experience of lasting significance. It provided a clearer understanding of the state of affairs in Western architectural education, as well as in architectural education circles on an international scale. Regarding the objectives and approach of the present research, the Forum had reinforcing implications in two ways: First, it was corroborated that setting a theoretical framework was vital in order to organize current and further research into architectural education. Diverse individual experiences need to be put in a pattern to complement one another and build up a whole body of knowledge. Second, given the extensive research findings and theories developed in the field of educational psychology, although mostly biased to focus on the primary and secondary levels of education, interdisciplinary studies, to bridge the gap between architectural education and educational psychology, seemed to be among promising approaches[38]. This latter point is rarely attended to in

36 Or in a sense *network*, as Cunningham rightly called it later on. (in an interview with the author on 5 December 1995).

37 For a short report of the event, see Appendix 4.

38 Interestingly, there is a growing interest in 'apprenticeship' as a successful mode of learning even for the primary levels of education; so familiar a term in the context of architectural education. See for example Collins, A., Brown, J.S. & Newman, S.E. (1989).

architectural education circles such as the one in Weimar. Albeit Donald Schon's works[39], for instance, are heavily referred to, but interestingly enough, Schon himself, was originally based in the discipline of education, not architecture.

As mentioned earlier, the last family of methods, i.e., questionnaire surveys, will be tackled along with a short report of the research undertakings where those methods have been utilized.

1. 1. 6. RESEARCH UNDERTAKINGS

Four such enquiries were undertaken throughout this research following a variety of objectives. These will be reported here briefly, aiming to show their process as well as main findings. Despite the overlapping features of the terms *enquiry* and *survey,* for ease of reference, the research undertakings will be entitled hereafter as; *the pilot enquiry, the enquiry,* and *the survey.* The fourth one, which was aimed to assess the entrants to the Iranian schools of architecture in 1995-96 academic year, will be explained separately in Chapter 2. It was a questionnaire survey, though, that was implemented during one session in each of the target schools.

1. 1. 6. 1. THE PILOT ENQUIRY

The pilot enquiry was limited to the heads of the British and Irish schools of architecture. The instrument was a brief questionnaire/letter consisting of three questions (plus an open quest for any additional comments). The questions were open-ended but the lay-out of the questionnaire was designed to suggest a brief response (one paragraph or two) to each question. It was addressed to 39 heads of schools of architecture in the UK and the Republic of Ireland, the list of which was taken from SCHOSA[40].

16 out of 39 replied, some sending their relevant handbooks or brochures, but only 9 responded to the questions. Those 9 respondents are mentioned in the following list:

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39 Donald Schon's arguments on 'design studio' and 'reflection-in-action'.

40 Standing Committee of the Heads of Schools of Architecture.

1. Arvanitakis, Panos;	*The University of Greenwich,*	*Kent.*
2. Balfour, Alan;	*Architectural Association,*	*London.*
3. Edwards, Brian;	*The University of Huddersfield,*	*Huddersfield.*
4. Henderson, George;	*De Montfort University,*	*Leicester.*
5. Mallinson, Helen;	*University of North London,*	*London.*
6. Napper, Adrian;	*Herriot-Watt University,*	*Edinburgh.*
7. O'Neill, Cathal;	*University College Dublin,*	*Dublin.*
8. Webster, Robin;	*The Robert Gordon University,*	*Aberdeen.*
9. Symes, Martin;	*The University of Manchester.*	*Manchester.*

Respondents from *University of Wales* and *Royal College of Arts*, declared that they were unable to treat the questions in the requested short statements.

The 9 responses from the above scholars, however, are used in the analysis. Although this number (less than 25% of the questionnaires), is too small to serve as a reliable sample for making generalizations, but considering the survey as being heuristic rather than statistic, the available responses bear some useful implications which will briefly delineated here.

Responses to the first question (on what the impacts of the Beaux-Arts and Bauhaus were on their school), indicate much less concern about those models, than was the case with the Iranian context. Only one respondent, Arvanitakis, perceives those influences as 'of great importance in terms of teaching history and theory'. He believes that, 'many of the concepts are reflected in students' designs'. Two respondents, Edwards and O'Neill, hold the Bauhaus as being rather more prevalent than the Beaux-Arts. Edwards further adds a statement which is supported by further evidence to be a true picture of the present state of affairs (at least in the West). He writes: 'Since 1990, greater design pluralism has weakened allegiance to any single theoretical position - now variety is the norm, with Beaux-Arts and Bauhaus co-existing'.

Apart from the above three, the rest of respondents were sceptical of a noticeable impact of the Beaux-Arts and Bauhaus on their schools. Balfour goes further to assert that the Architectural Association, 'has clearly established a third model in the last thirty years', and that it draws little on the Beaux-Arts and the Bauhaus models. Henderson perceives the impact of those models 'very marginal, almost nil', and Napper holds the Arts and Crafts Movement as being more influential on his school. Symes and Webster both admit that those models can be observed in the background of the developments of their schools. Symes attributes the 'tendency to look at the *plan as the generator*' to the Beaux-Arts, while he holds the influence of the Bauhaus 'more in theory than in practice'. 'New solutions and new techniques are an ideology for the staff', he writes.

The second question (on how the school dealt with the existing lively tendencies), revealed another aspect of the current attitude towards diversity of positions; an attitude which is further evidenced by the schools' prospectuses. Apart from Henderson who expressed some reservations, in saying that they 'encourage *rigour* in all pursuits', but 'discourage *superficiality,* however *lively*' (which is of course by no means against plurality). All the respondents showed a positive attitude to current architectural tendencies. They believe they encourage that pluralism by 'discussions', and 'open crits' (Napper, Edwards, and Arvanitakis); by 'devising a variety of *units*' which explore 'a wide range of positions in architecture' (Balfour); or by choosing their teaching staff from among practising architects who reflect 'a wide range of opinions' (O'Neill). Symes is the only respondent who denotes the little extent to which the staff are concerned with those tendencies at the theoretical level, although he admits that, 'students' work... shows much evidence of influence, from rationalism and deconstruction'.

The last question was about the respondents' opinion of the most crucial problems facing architectural education today. 19 items, mentioned by the respondents, can be classified into three categories; *socio-economic, educational,* and *ideological* (or intellectual). 11 out of 19 items fall into the first category, covering a range of issues from resource reductions (in funding and staffing as proportionate to the number of students and the increasing complexity of professional requirements), to oversupply of graduates. (Arvanitakis, Henderson, Mallinson, Napper, O'Neill, and Webster).

6 items are of *educational* nature, referring to issues such as lack of 'cross disciplinary respect and learning collaboration' and 'technological competence' (Edwards); need for a multi route education (Henderson, Mallinson); 'the need

to develop a research base in schools of architecture' (Webster); and lack of a proper knowledge base (Symes). 'We need to show we have information we can use which others cannot, but ... there is no agreement on how to present this information', Symes writes. The latter view has some points in common with the last category, that is, ideological. Two respondents, though, directly bring the ideological (or intellectual) element to the fore in their judgements. Napper enumerates 'a vision of the society of the next decade', as a lack. He further adds: 'Our society has no programme for what needs to be done next'. Balfour gives but only a concise statement in due course: 'the loss of a sense of future'.

The significance of this survey to the author was in two ways; first, it helped him to develop his practical skills of conducting a survey in a European context; second, it provided the necessary data for the author to modify a number of his basic assumptions regarding architectural education (at least in the UK). One of those assumptions was the overestimated importance he held for the Beaux-Arts and Bauhaus influence on the present architectural education. The responses well indicated that those models were rather a matter of history, than a noticeable factor and/or *actor* at the present time. It gave the necessary clue to conduct the author towards rather more fundamental concepts of education, which underlie both the historical and current developments; the concepts of *learning*, *designing*, and *learning to learn and to design.* These will mainly be expanded in Part II.

1. 1. 6. 2. THE ENQUIRY

Reflecting on the pilot enquiry findings, the first two questions, on historical models and current tendencies, were excluded in the design of the enquiry letter. The former question was perceived to be rather irrelevant or at least marginal, and the latter seemed to enjoy little sensitivity in the European context. The exclusion of those questions provided the enquiry letter with a brief and straight forward content which was hoped to attract more responses. It was designed to address only two key issues which were concise, general, and as Professor Nuttgens put it[41], 'challenging'. The questions were open-ended but unlike the

41 In his reflection on a draft of the enquiry letter.

pilot questionnaire there were no space limitations for answers. But to facilitate further analyses, the respondents were asked to put in brief statements, their opinion of the two issues raised in the letter. The main body of the enquiry letter reads:

> This letter is part of the enquiry being undertaken within the framework of a PhD research, concerning future developments in Architectural Education. It aims to go beyond the published literature and will attempt to portray the state of the thought around the issue by directly posing the key questions to the most distinguished thinkers involved with architectural education studies. The respondents are among the most eminent educationalists, academics, and researchers in their particular field.
>
> I would be most grateful if you could provide me with a *short statement* of your viewpoint based on these two issues:
>
> *1. Three major attributes of architectural education.*
> *2. Three major problems and dilemmas facing architectural education today*
>
> A short report of the main findings will be presented for your information.

The enquiry letter was addressed to a sample of 120 eminent scholars of 27 countries. Respondents were mostly the heads and/or senior academics of schools of architecture, of which those in Europe, were among member schools of the *European Association for Architectural Education (EAAE).* The target schools were located in the following countries (in alphabetic order); *Austria, Belgium, Canada*[42], Denmark, Egypt, Finland, France, Germany, Greece, Iran, Ireland, Italy, Japan, Jordan, Malaysia, Malta, Netherlands, Norway, Pakistan, Portugal, Russia, Spain, Sweden, Switzerland, Turkey, and *the United Kingdom.* The selection of countries was due to two criteria; relevance and accessibility. The variety of architectural courses in the European schools of architecture could obviously represent the Western or, even to a certain extent, the world wide architectural education. The Islamic countries of Egypt, Jordan, Malaysia, and Pakistan were selected[43] to represent similar situations to that of Iran, due to

42 Although Canada was not among the target countries, the enquiry letter was voluntarily sent to Carlton University by one of the target respondents in Britain.

43 Turkey was among the EAAE list.

both the above mentioned criteria, ie. relevance and accessibility. Japan, though, was hoped to add to the degree of diversity of the subjects, given the peculiarities of their system of education and profession (see Happold, 1984). The European schools were chosen from the updated list taken from the EAAE Secretariat, and other scholars were traced either through the cultural attaches of the respective countries in London, or through the author's personal connections[44].

It was expected to have a final sample of around 50 responses (40%), to be able to draw some generalizations. But despite follow up letters which were delivered after one month[45], only 12% responded to the questions. This might be partly due to the challenging nature of the questions which required precise and careful answers and, thus, more time to think, not to mention the problems attributed to postal questionnaires (e.g., the unwillingness of people to respond questionnaires from anonymous researchers). Another reason for the comparatively low percentage of responses, was probably the simultaneity of posting the enquiry letter and the *survey* questionnaire (to be treated shortly). Perhaps it would have been more effective, had it been sent separately. However, the 15 *respondents*, from 8 countries, were:

1. Peter Medway;	Canada,	*Carlton University*
2. Jorma Manty;	Finland,	*Tampere University of Technology*
3. Constantine Spiridonidis;	Greece,	*University of Thessaloniki*
4. Latif Abolghasemy;	Iran,	*University of Tehran*
5. Darab Diba;	Iran,	*University of Tehran*
6. Akbar Zargar;	Iran,	*Shahid Beheshty University*
7. E.R.M. Taverne;	Netherlands,	*Instituut voor Kunst-en Architectuurgeschiedenis*
8. Van Zeyl;	Netherlands	*Eindhoven University of Technology*
9. Birgit Cold;	Norway	*The University of Trondheim*
10. Edward Hiorthoy;	Norway	*The University of Trondheim*
11. Naeemullah Khan;	Pakistan	*Mehran University of Engineering and Technology*
12. Charles D.;	UK	*De Montfort University*
13. John Kirwan;	UK	*University of Central England (UCE)*
14. Patrick Nuttgens;	UK	*University of York*
15. Martin Symes;	UK	*The University of Manchester*

44 List of the target schools is presented in the Appendix 6, for the possible reader.

45 This enquiry was conducted along with the survey which will be reported shortly.

What is used in the analysis, though, is the 15 sets of responses from the above scholars. Since the respondents were asked to suggest three points regarding each of the *two issues*, therefore, the responses seem to be best classified under the same categories; *attributes*, and *problems.*

Issue 1) *Three major attributes of architectural education:* In order to grasp what the sample responses imply, however small in number, they 'need to be recorded, analyzed and interpreted'. (Bell, 1993, p. 127). The purpose of any analysis would be clearly to look for 'similarities and differences, for groupings, patterns and *items of particular significance*'. (same place, emphasis added).

The 15 respondents declared 44 items as the major attributes of architectural education. In a first analysis, a number of recurrent themes emerged that will help to classify the 44 items under 21 headings, of which 14 were declared only once. It needs to be asserted here that those views which do not recur, should not be assumed as unimportant. Rather, some of them (e.g., student-centredness, simulation of practice, or relatedness to daily life) will be further maintained in the present study, as significant features of architectural education. But to suffice to the 'items of particular significance' in the responses, seven recurrent items are presented here along with their number of recurrence. It might be usefully noticed here that, given the small size of the sample and also the open-ended questions, the *data* reduction process was done through devising *keywords* for responses instead of *coding* them (See Cohen & Manion, 1989, p. 117). Those keywords are presented bellow along with their recurrence:

Major attributes of architectural education	*Recurrence*
Competence oriented (decision, action, design)	7
Multi disciplinary / Collaborative	5
Comprehensive (art ~ science)	4
Creative	4
Environment sensitive (cultural / natural / built)	4
Technology dependent	2
Symbolic output (drawings, models, not real construction)	2

Albeit small in number, the sample views proved to mirror a reasonable picture of the current debates on what the nature of architectural education is. These attributes will be articulated further throughout the dissertation. Thus, there is no point of treating them individually at this stage. But under further scrutiny, there still seems to be some overlapping points. Comprehensiveness, for instance, which maintains the discipline being inclusive of *art, social and natural sciences,* and *technology,* can be conveniently taken as a basis for the interdisciplinary characteristics and also for technology-dependentness of architectural education. 'Symbolic output', which marks architectural education as exclusive of the real construction process, which is indeed the case, is complementary to competence-orientedness of architectural education, whereby the act of *designing* is the final goal of the learning process. Following this logic, the items could probably refer to still more general characteristics. But to retain the maximum subtleties, the list of seven items seems to present an optimum (and useful) classification of the respondents' views.

Issue 2) *Three major problems and dilemmas facing architectural education today:* Similar to the first issue, the responses are processed through the following steps; first they are recorded together, second, the keyword(s) of each item is derived, third, the keywords are categorized due to their similarities and differences, four, the set of categories are revised until a satisfactory pattern emerges covering the items in a comparatively meaningful order.

Overall, 40 items are recorded in the responses as the major problems and dilemmas. Following the above procedure, these items were initially grouped in five categories; *cultural orientation, economic constraints, educational hesitations, social/professional difficulties,* and *incompatibility of the discipline with university conventions.* But further analysis lead to a more consistent classification based on different contextual relations wherein architectural education is perceived. That classification involves: *educational deficiencies, institutional misfit, professional uncertainties, socio-economic constraints,* and *cultural/intellectual suspense.* Each of the categories can be divided into sub-categories, for instance educational problems might be associated with content, methods, entrants, structure or length of the course, and/or objectives. This, of course, did not seem to be appropriate, given the relatively small number of responses. Although there were no sharp lines between the above categories and they exhibit overlapping elements, the above classification seems to be a useful elaboration of various dimensions of the dilemma. A brief account of the above concerns will follow, while they are also treated throughout this dissertation.

a) Educational deficiencies: Three respondents[46] point at *fragmentation* of discrete courses as a problematic aspect of architectural education. Referring to the '*fragmentation* of issues taught by different professionals', Cold highlights the lack of what she calls, 'close co-operative work between teachers with different professional background'. Zargar puts a similar concern to the above in different words; '*sectoral* teaching of subjects for a *comprehensive* subject. Lack of horizontal exchange between disciplines'. (emphases of the original). The short statement by Abolghasemy further exacerbates the significance to 'design' of the above problem: 'Detachment of *design projects* and *theoretical courses*'. (emphasis of the original). The point Spiridonidis raises, is to a certain extent, complementary to the above pronouncements. He writes: 'The re-definition of the role of theory and its relationship with the practice remains in our days an open question'. That question is, in his view, translated to a certain *distribution* of influences (and power) between professors of theory and practitioners as professors'. (emphasis of the original). There are also expressions of hesitation as to whether architectural education 'should be more generalized and/or specialized' (Hiorthoy). Nuttgens points at the inefficient 'teaching of technology', while further declares that the length of the courses are 'too long' and that they are 'surely possible to condense and improve'. Kirwan, in due course, draws on the overloaded curriculum of architecture courses, resulting from the introduction of new fields of study 'without a matching reduction in any other fields'. Cold further touches another tricky problem which needs to be contemplated both in the course design and in the wider context of secondary education; the problem of *entrants* and their low qualifications in artistic capabilities. She writes: 'In the first years it takes too much time and energy to make the students, who have never before worked artistically, do creative work and communicate using tools as pencils, pens, brushes etc'. A

46 Two of whom are, interestingly enough, from Iran.

similar concern is pronounced by Douglas Wise[47], as being the case with the UK schools of architecture. It is also a drastic worry in the Iranian schools of architecture. (See Chapter 2).

b) Institutional misfit: 'Squaring allegiance to the traditions and integrity of architecture as an autonomous discipline'(Medway), has probably made architects 'notorious for their isolation, not playing a part in the life of the university or college'. (Nuttgens). But Symes pointed at one of the possible reasons of the above misfit. He writes: 'The idea of education requiring symbolic actions which are likely to be incoherent is one which is difficult to fit into the normal expectations of a University'. Upon such a basis does he further pinpoint the question how 'to make architectural education credible', as a 'major problem'.

c) Professional uncertainties: A number of preoccupations regarding the above category were clearly expressed from the rapidity of the changes in the profession as well as technological developments. 'Changing professional perspectives' and 'Changing professional environment' (Taverne), are among the key expressions. These are also recurrent in the recent literature on architectural education. (See also Chapter 3). 'How to teach design relevant to the present rapid change taking place concerning nature, society, technology and the built environment', Hiorthoy worries. 'What the roles of architects in society are and will / should be' (Hiorthoy), is also a point of anxiety. The earlier mentioned question of generalized and/or specialized architectural education, stems from the above anxiety. Medway perceives that developments such as those related with the notion of 'virtual space' as opposed to 'physical space', as a challenge to architectural education, so is coping with architectural avant-garde, in Spiridonidis's view.

All the above challenges have raised a rather fundamental 'doubt about the real *professional knowledge* of architects'. (Kirwan)(emphasis of original). The perennial concern, which is perhaps as old as academic architectural schooling, is pronounced by Abolghasemy as being the 'gulf between *architectural*

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47 In an interview with the author on 23 November 1995.

education and *construction*. (his emphasis).

d) Socio-economic constraints: The most recurrent problem is the resource shortages. It is voiced in various ways; 'the lack of time and money for doing... experimental work in a full scale laboratory', Cold asserts, 'and the difficulty of getting deep enough into the knowledge of construction, materials, and details'. 'Limited time/resources' (Charles D), *'cut-down* of funds and resources' (Manty), and schools facing 'a continuous downward trend in their budget' (Taverne), are other pronouncements of the same concern. Some respondents go further to mention economic problem in a wider context. 'The overwhelming power of the *economic life*', (Manty's emphasis), and 'material and economic constraints' (Diba), are two expressions in due course. Increasing oversupply of architects (Medway), is another dimension of the problem which is particularly evident in the developed countries, so to say. Naeemullah Khan highlights the non professional interference of government authorities in education which, in his view, is problematic.

e) Cultural/intellectual suspense: A number of the respondents acknowledge the issue of identity as a point of suspense. 'Misfit architects; misunderstanding of Western culture, incomprehension of their own culture. Lost personalities through anonymous design', is Diba's statement of the case. He also adds, '... loss of dedication, passion, love and humanity' (or to give just the key words, *low moral values*). Abolghasemy calls the phenomenon, 'Separation of *architectural education* from *culture*'. The recurrent argument on 'global versus local' is along a similar lines to the above. 'One of the most outstanding questions of contemporary architectural education ... is the search of teaching the particularities of 'local', without loosing contact with the main international trends', Spiridonidis declares. Albeit in different contexts, a similar concern is voiced by Naeemullah Khan, who writes: '... the overwhelming spread of modernism in architecture has completely obliterated and uprooted the regional forms of architecture creating a sense of profound confusion... This dilemma has created a profound impact on today's architectural education. Zargar perceives the same issue in a rather wider perspective; 'lack of a well defined *school of thought*' is the major problem in his view. The latter view is able to cover probably all the issues involving a clear vision of the present and the future, so essential in solving the 'complexity' and 'confusion' pronounced by Naeemullah Khan.

As could be gathered from the short treatment of the *enquiry*, a wide range of issues were raised by the respondents. These could be perceived as *fresh literature* or, in technical terms, *primary data* (McNeill, 1990, p. 99), complementing what was found through investigation of existing literature. It fuelled the subsequent undertakings by providing a means for testing / modifying / reinforcing the author's perceptions of the case against the fifteen views from different backgrounds. What is more, being from diverse contexts, the sample could, *cautiously*, of course, be treated as a representation of at least part of reality. The latter point is further supported by evidence from literature as well as the author's personal observations. The recurrence of the above categories have also some implications. Those are:

Major problems and dilemmas facing architectural education today.	*Recurrence*
1. socio-economic constraints	10
2. cultural/intellectual suspense	10
3. educational deficiencies	9
4. professional uncertainties	7
5. institutional misfit	4

It should be noticed that the categories 1, 2, and 4, to a large extent, refer to wider contextual issues while the categories 3 and 5 are perceived within the confines of educational environment. Put briefly, the source of problems could be seen in two terms; *from within* (with recurrence of 13), and *from without* (with recurrence of 27). This implies that the problems and dilemmas facing architectural education, in the respondents' views, were 70% rooted in the society at large and 30% in educational environment. (The present study is mainly concerned with that 30%).

1. 1. 6. 3. THE SURVEY

The survey was initially conducted to test the problem of disintegration or *fragmentation*, as referred to in the *enquiry* results. The assumption underlying the survey was the existence of little relationship between various subject areas and, more importantly, between *Design activities* and complementary taught courses on *Science, Technology,* and *Humanities.* Needless to say that, the development of the database on schools and academics was also followed as an objective.

Intending to directly send the questionnaires to target respondents, a list of individual teachers was required. There were two alternative ways of attaining such lists; 1. through a primary enquiry from the heads of schools whose addresses were available, and 2. through documents such as *European Faculty Directory* (1991). Each of these ways involved practical problems. The previous experience with the *pilot enquiry* suggested that, due to the large number of schools, the first alternative would take at least two months (if not more) to be fulfilled. That process, though, did not seem to warrant the time and trouble it involved, particularly in regard to the limited objectives that were conceived for the survey. The problem facing the second alternative was, but, the very fact that directories such as the one mentioned earlier, were not available for the non-European target schools. More, even if the above problem could be overcome, it was thought that the delivery of questionnaires through the heads of schools would have another advantage over using the directory. That was the possibility of recognising the most eminent faculty members, which was clearly impossible through directories[48]. Nevertheless, a third possible alternative was conceived for delivering the questionnaires. It could be usefully remembered here that the list of target schools was the same as that of the *enquiry.*

The instrument was a questionnaire, addressed to the architecture faculty members. It consisted of two sections. Section A, mainly was to get background information about the respondents, the area of their teaching, and their corresponding course contents, objectives, and methods. Section B consisted the core question on the levels of relationship between different components of architectural curriculum. That question was a scale type

48 The maximum information available in those directories, was an index for the different subject disciplines, e.g., *Architecture.*

question[49], whereby the respondents were asked to demonstrate how often their course interacted with other courses in terms of programming, implementation, and assessment. In order to facilitate answering the questions and also the subsequent data analysis, the curriculum components were divided in three broad categories; *Design activities (D), Science & Technology (S),* and *Humanities (H)*[50]. The above categorization was based on three sources:

1) The current national curriculum of architecture in Iran, where four curricular areas are identified; *Architectural design, Construction technology, Human settlements,* and *History & Conservation,*
2) The 'Course Handbook' of the School of Architectural Studies, Sheffield (Second edition, 1993/94), wherein taught courses are divided in four categories; *Communications, Humanities, Science & Technology,* and *Professional,* and
3) Archer's *The Three Rs* (1979a), where he demonstrates the areas of human knowledge in a triangular spectrum, with *Design, Humanities,* and *Science* at the apexes. (see the following Figure).

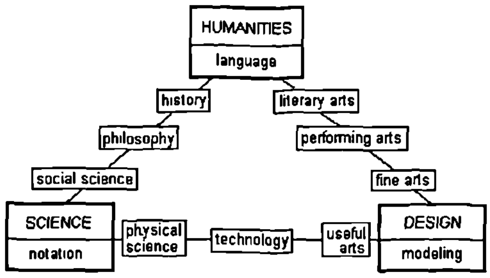

Figure 2 *Areas of human knowledge, after Archer (1979a).*

The initial design of the questionnaire was commented on by two professors of architecture, one research conductor, two practitioner/teachers, one art historian/teacher, a course director, a psychologist, and a social scientist. The final draft, being a 6-page document, was piloted with a limited available sample of respondents in Turkey and the UK. The pilot examination of the questionnaire suggested that the layout could usefully be redesigned in less pages to be more encouraging. The final version of the questionnaire, though, was a 4-page

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49 The *category, verbal, list,* and *scale* question types were used. (See Bell, 1993, p. 77).

50 For a short definition of the categories, see the front page of the questionnaire; Appendix 7.

document (including a front page). It should also be mentioned that since 'the wording of the self-completion questionnaire is of paramount importance' (Cohen & Manion, 1989, p. 112), the text was edited several times by native speakers to ensure minimum misinterpretation[51].

A copy of the questionnaire was sent to each Head of School of Architecture accompanied by a *covering letter* (Cohen & Manion, 1989, p. 113). The covering letter was to indicate the purpose of the survey and to appeal for distribution of the questionnaire among their senior members of faculty in the three areas (D, S, H). Meanwhile, they were also asked to send their latest course documents.

A hundred schools from 27 countries were addressed. Given the three defined areas of curriculum (D, S, H), a minimum of three respondents from each school was expected. Therefore, to take Cohen & Manion's '40 percent response rate' to postal surveys (1989, p. 114), around one hundred and twenty responses were expected. It should be also mentioned that the questionnaires were followed by a reminder letter, 4 weeks later, to those who had not responded until then.

From the first run (questionnaires and followups), 49 responses were received, wherein, only 30 responses included questionnaires, 5 of which were form Iran[52]. Given the low percentage of the responses, further attempts seemed to be necessary. An assessment of the case suggested a number of reasons for the low response rates: first, as mentioned before, the simultaneity of sending questionnaires and the enquiry letter (a number of recipients had responded to one and overlooked the other); second, the recipients (heads of schools) were expected to take the trouble of distributing the questionnaires among their faculty members, which seems to have been too much to demand. Few of them, however, actually did[53]. And last, or perhaps the most important, the length of Section A, which, although useful in generating complementary data, had

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51 See Appendix 7, for the final version of the questionnaire.

52 Being known to the author, the respondents in Iran were addressed individually.

53 Most of the questionnaires were filled in only by the recipients themselves.

overshadowed the core question in Section B.

Drawing upon the above considerations, a second run was implemented in two ways; a) pursuing the previous targets, this time using the author's personal relations, to encourage more responses, and b) targeting a group of 43 Iranian doctoral candidates in the British Universities, who were mostly lecturers from the three largest schools of architecture in Tehran. A revised version of the questionnaire was produced for this group, comprising fewer questions in Section A about the respondent. Needless to say that the core question in Section B was retained exactly the same as the previous version to maintain the validity of the responses. The first attempt generated 16 completed questionnaires, and the second attempt resulted in a further 22 responses, out of which 5 declared that they were unable to fill in the questionnaire.

Given the number of recipients, i.e., 41[54], the result indicated a response rate of over 50% which went well with Cohen & Manion's prediction: 'A well-planned postal survey should obtain at least a 40 per cent response rate'. (Cohen & Manion, 1989, p. 114). The following Table summarizes the results as well as the size of data gatherings. It indicates that personal relations, although almost impossible unless the sample is small, are far more effective than anonymous questionnaires.

Stages of data collection undertaking	ratio of received responses	questionnaires (received)	questionnaires (properly filled in)	(faulty)	response rate
questionnaire followed by reminder letters	49 / 100	30	**18**	12	30%
(followup) personal relations with academics	17 / 17	17	**16**	1	100%
revised questionnaires (new sample group)	22/ 41	17	**14**	3	50%
		64	**48**	16	

Table IV *SUMMARY PROFILE OF THE SURVEY*

Patton rightly points that research 'like diplomacy, is the art of the possible'. It implies that in evaluation research which is his main concern, there are 'no rigid

54 Out of 43 questionnaires, 2 were not delivered, due to change of address.

rules that can be provided for making data-collection and method decisions'. (1990, p. 13). It is highly dependent on specific situations. Although there is no 'single best way', but there are always 'best *possible* ways'. Nevertheless, the author had to content himself with 64 responses for data analysis. In a first content analysis, 16 questionnaires proved to have deficiencies such as incompatibility of the data in Section A and B (which in some way signaled misinterpretation of the questions), and missing points or confusion in the respondent's answer to the main question (Section B). The latter case indicated that the respondent had confused his or her dual role in conducting courses in two areas of curriculum.

However, those 16 responses were excluded and, therefore, 48 questionnaires were used in the analysis. The fact that almost half of the sample are from Iran (26 from Iran and 21 from other countries), will help to draw some comparisons between the Iranian and non-Iranian contexts. Needless to say that any statistical conclusions should be regarded with caution, due to the fairly small size of the sample. The questionnaires were received from the following 47 respondents (one respondent in two areas):

NAME	QUALIFICATIONS	INSTITUTION	COUNTRY
1. Alai, A.	Arch.	Shahid Beheshty University	Iran
2. Abolghasemy, L.	Arch. / Archeo. / Restoration	University of Tehran	Iran
3. Abu-Dayyeh, N.	PhD	University of Jordan	Jordan
4. Amiri, H.	Arch.	University of Tehran	Iran
5. Arbabian, H.	Arch.	Elm-o-San'at University	Iran
6. Adibzadeh, B.	BED / BArch E / Arch.	Shahid Beheshty University	Iran
7. Barati, N.	Urban Planning	University of Tehran	Iran
8. Boddington, A.	Arch.	Oxford Brookes	UK
9. Diba, D.	Arch.	University of Tehran	Iran
10. Edwards, F.	Arch.	University of Sheffield	UK
11. Eslami, S.Gh.R.	Arch.	University of Tehran	Iran
12. Etezadi, L.	Arch. / Town Planning	Shahid Beheshty University	Iran
13. Farzanyar, H.R.	Arch.	University of Art	Iran
14. Fayaz, R.	Arch.	Elm-o-San'at University	Iran
15. Harper, R.	Arch.	University of Sheffield	UK
16. Harper, R.	Arch.	University of Sheffield	UK
17. Heap, L.J.	MPhil, Civil Engineering	University of Central England (UCE)	UK
18. Hiorthoy, E.	Arch.	University of Trondheim	Norway
19. Hussain, M.	PhD	University of Eng. & Technology	Pakistan

20. Jahedi, F.	Urban Design	Shahid Beheshty University	Iran
21. Khabazan, M.	Urban Planning	Shahid Beheshty University	Iran
22. Khorasanizadeh, M.	Arch.	Shahid Beheshty University	Iran
23. Kirwan, J.	Arch. / Conservation	University of Central England (UCE)	UK
24. Mallinson, H.	Arch.	University of North London	UK
25. Memarian, G.H.	Arch.	Elm-o-San'at University	Iran
26. Mofidi, S.	Arch. / Eng.	Elm-o-San'at University	Iran
27. Motawef, S.	Regional Planning	-----	Iran
28. Mozaffar, F.	Arch.	Elm-o-San'at University	Iran
29. Nadimi, H.	PhD	Shahid Beheshty University	Iran
30. Namazian, A.	PhD	Shahid Beheshty University	Iran
31. Nefedov, V.A	Urban Planning	St Petersburg Inst. of C. Engineering	Russia
32. Oven, V.A.	Arch. MPhil Eng.	-----	Turkey
33. Ozsoy, A.	-----	Istanbul Technical University	Turkey
34. Padidar, M.	Arch.	Shahid Beheshty University	Iran
35. Pour-Deihimi, S.	PhD	Shahid Beheshty University	Iran
36. Priyaleen, S.	Arch.	School of Planning & Architecture	India
37. Razjouyan. M.	Arch. / PhD	Shahid Beheshty University	Iran
38. Salamati, A.A.	Arch.	University of Tehran	Iran
39. Shonfield, K.	Arch. / BA Soc / MA Hist	South Bank University	UK
40. Tregenza, P.R.	Arch. / Eng.	University of Sheffield	UK
41. Uluoglu, B.	PhD	Istanbul Technical University	Turkey
42. Watt, K.	MA Conservation / PhD	University of Hull	UK
43. Wooley, T.	PhD	The Queen's University of Belfast	UK
44. Yurekli, F.	PhD	Istanbul Technical University	Turkey
45. Zakavat, K.	Arch. / PhD	Shahid Beheshty University	Iran
46. Zargar, A.	Arch. / PhD	Shahid Beheshty University	Iran
47. Zerrin, A.	PhD	Istanbul Technical University	Turkey

The data collected from the above respondents were handled by using the 'Ledger method (or Mark-book method), given the 'small numbers... involved and little statistical analysis ... expected'. (Nisbet & Entwistle, 1970, pp. 54-55). Following the three-fold design of the question, the data were organized due to three items of *relationship between the three areas of curriculum (D, S, and H), i.e.,* coordination sessions, cross-referencing, and joint projects / programmes. Another criterion of data classification was the grouping of sources due to Iranian and non-Iranian respondents.

Four series of graphs are generated from the gathered data, focusing on the three items of relationship, and also on a combination of those items to indicate the *relationship* in general sense. What is explicated in these Graphs is the different scales to which the two sample respondents from Iran and from other countries are committed, either in attitude or in practice, to what has been defined in the questionnaire as *relationship.* The Table of data and its corresponding Graphs are presented next.

ITEMS OF RELATIONSHIP	*SAMPLE GROUPS*	RESPONSES	SCALE				
			NEVER	SELDOM	SOMETIMES	OFTEN	ALWAYS
ITEM 1 co-ordination sessions	*OVERALL*	91 100%	22 24%	19 21%	27 30%	17 19%	6 7%
	IN IRAN	51 100%	19 **37%**	10 **20%**	13 **25%**	6 **12%**	3 **6%**
	OTHER	40 100%	3 8%	9 23%	14 35%	11 28%	3 8%
ITEM 2 cross references	*OVERALL*	89 100%	5 6%	13 15%	21 24%	32 36%	18 20%
	IN IRAN	52 100%	4 **8%**	12 **23%**	11 **21%**	16 **31%**	9 **17%**
	OTHER	37 100%	1 3%	1 3%	10 27%	16 43%	9 24%
ITEM 3 joint projects / programmes	*OVERALL*	88 100%	39 44%	12 14%	12 14%	18 20%	7 8%
	IN IRAN	51 100%	30 **59%**	8 **16%**	3 **6%**	7 **14%**	3 **6%**
	OTHER	37 100%	9 24%	4 11%	9 24%	11 30%	4 11%
ITEMS IN TOTAL	*OVERALL*	268 100%	66 25%	44 16%	60 22%	67 25%	31 12%
	IN IRAN	154 100%	53 **34%**	30 **19%**	27 **18%**	29 **19%**	15 **10%**
	OTHER	114 100%	13 11%	14 12%	33 29%	38 33%	16 14%

Figure 3 *Frequency of relationship items between different curriculum areas (D, S, H)*

To highlight the above consideration, each of the following Graphs demonstrate the response rates in three sample groups from Iran, other countries, and all respondents. Those are referred to here as, *in Iran, other,* and *overall* respectively. These sets of data, transferred onto graphs, demonstrate the tendency of responses to the rating scale items (*never, seldom, sometimes, often, always*)[55].

It should be mentioned here that although the organisation of the data is capable of generating more detailed analyses regarding each of the areas of curriculum, but the size of the sample is not large enough to make it possible. More, the

55 *Radar graphs* were used to better visualize those tendencies.

distribution of responses in three different areas are not proportionate. Therefore, the author will suffice it to present one of the possible analyses concerning the items of relationship between three areas of curriculum (D, S, H).

Response rates; item 1:
How often do you have joint sessions with tutors or lecturers of the other two areas to co-ordinate the synopsis or assess the results of you courses?

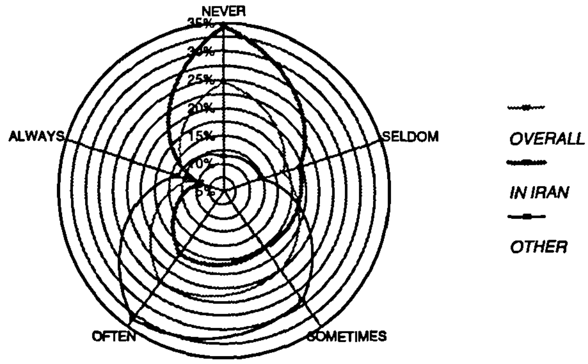

Figure 4 *Frequency of co-ordination sessions, three samples.*

What is implied from the first graph, is the considerably different, if not opposite, tendency towards the *never* option in the rating scale. Bearing in mind that the question involves the degree to which faculty members are committed to *cooperate* and *coordinate* among themselves (which is the first and least institutional attempt to *integrate* the fragmented subject disciplines), it suggests that such schemes as *coordination sessions* are much less accomplished in the Iranian schools (near 40% *never*).

Response rates; item 2:
How often do you address the other two areas in your teaching process (such as in examples and experiments, case studies, etc.?

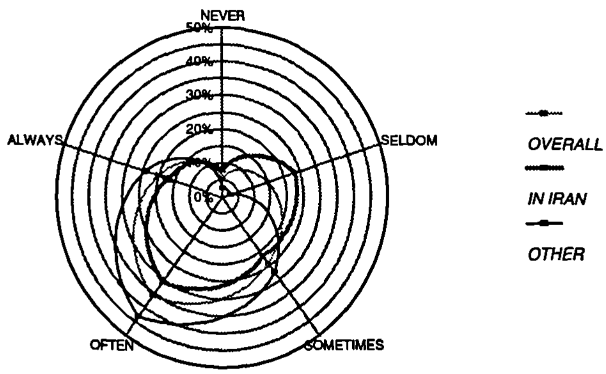

Figure 5 *Frequency of cross referencing, three samples*

The response rates to question 2, exhibit less difference between the two sample groups. This is, of course, quite understandable given that the question draws on the easiest to achieve item of relationship, i.e., cross referencing. This is obviously the least dependent on interpersonal and/or organisational coordinations and thus more easily achievable.

Response rates; item 3:

How often do you implement joint projects and/or joint programmes with the other areas?

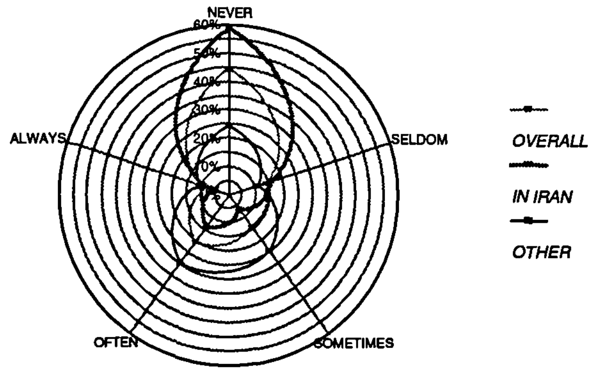

Figure 6 *Frequency of joint projects / programmes.*

The third question examines the most difficult and yet the most promising item or relationship of courses (leading to integration); that is *joint projects / programmes.* As could be predicted from the previous results, the response rates to '*never*', demonstrate a still greater increase for both groups; although for the Iranian group being much more dramatic (up to 60% of responses).

The final graph incorporates all the items of relationship and draws a general map of the status quo.

Response rates; in total

This opposite graph sums up the response rates of sample groups, to questions 1, 2, and 3 altogether.

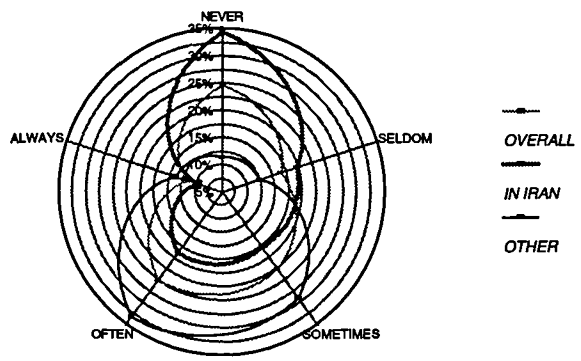

Figure 7 *Frequency of relationship items in total*

The comparatively lower degree of relationship between courses exacerbates the problem of disintegration in the Iranian context and thus highlights the value of any attempt aiming to find possible resolutions. Even if with McNeill's 'nagging doubt about any survey-style research' which perceives the collected data as 'people's answers to questions... not necessarily a true picture of their activities' (1990, p. 15)[56], the response rates still bear some seeds of reality. At least they picture the attitude towards the problem. It follows that even the low response rates of non-Iranian respondents to item *never*, be interpreted as being exaggerated, or in McNeill's words *answers to questions*, it shows a degree of awareness of the significance of such coordinations. What is more, there are no evidence suggesting that a similar bias has not been influential on the Iranian respondents, bearing in mind that the common sense beliefs are in favour of values such as coordination and cooperation. The latter phenomenon, which is quite likely to have been active in both sample groups, does reinforce the results. Nisbet & Entwistle (1970, p. 157) acknowledge the fact that, 'people check those responses which they think socially acceptable'. That being so, then what is declared by the respondents, which clearly shows little tendency towards coordination and joint programmes, could be interpreted as a minimum scale of the real state of affairs.

What was examined by the survey was the rather measurable aspects of *disintegration*, i.e., little coordination and cooperation of teaching staff in different curriculum areas. It should be ascertained here that the problem also involves philosophical and methodological dimensions which seem to need much more effort to be recognised and overcome. (See Part II).

1. 1. 7. CONCLUDING REMARKS

Presented in this Chapter, was a rather process oriented statement of the research, with this in mind that in academic research, the significance of *process* is no less than that of end *product*. It was argued that research, analogous to designing, is an evolutionary process whereby the question and the hypothetic answers develop through a *spiral-like* process of research undertakings. The scope of the research problem as well as the alternative approaches were also discussed, leading to a treatment or justification of the research topic;

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56 Nisbet & Entwistle express a similar concern: 'Questionnaires show what people say, not what they do or are (1970, p. 53).

conceptualizing a framework for architectural education.

The objectives and the methodological peculiarities of the research were also covered. It was acknowledged that the present research would fall in the category of *basic* rather than *applied* research, meaning that its aim is more of a contribution to theory rather than to problem-solving. *Literature investigation, correspondences, interviews* and *workshops* were noticed as the main methods employed in the theoretical development of the argument, and a number of research undertakings were reported to have used survey methods of enquiry. Those undertakings were maintained to have been mostly concerned with the development of research problem and putting it in a wider perspective.

What was reinforced by the survey results was the significance of tackling the problem of *disintegration* or *fragmentation* in architectural education of Iran. The prime step towards solving that problem is clearly to raise, among the teaching staff of various subjects, the level of coordination and cooperation (which are comparatively low in Iran, according to the survey results). But there is more to it than that. It was argued that the most enduring aspect of the problem (and perhaps the most difficult to handle) lies in the pedagogic debate. Integration of discrete courses has been a perennial concern ever since architectural education was isolated from *building guilds* and was incorporated in universities. The latter issue will be treated in more details throughout the dissertation.

To close part one on *background concepts*, the proceeding Chapters will cover an historical overview of architectural schooling to perceive the developments underlying the present state of affairs, both in a global and a local scene; and a panorama view to the issues and arguments raised by the authors during the Eighties and the Nineties. The latter portrays the problematic points of architectural education in a wider context and provides the ground for the treatment of the *core concepts* in Part II.

CHAPTER 2.

ARCHITECTURAL SCHOOLING, PAST AND PRESENT

1. 2. 1. INTRODUCTORY POINTS

The origins and evolution of architectural education which has lead to the present system of schooling will be followed, bearing in mind that elements of different evolving periods are still present, here and there in schools of architecture around the world. History, though, is looked at as a rather alive thing evidencing the ideas in practice.

Before embarking on that argument, it must be made clear that a minute historiography is not central to the present study. Each of the issues treated below is obviously worth historical scrutiny in its own right, but the main intention here is to perceive what constitutes architectural education in its historical landscape.

Another noteworthy point is that, the academic tradition of architectural education has been originated from and remarkably influenced worldwide by the European (mainly French) model (see below). Therefore, the evolution of architectural education in Europe is inevitably part of the historical background in other places. Given the above fact, the section on the *global scene* is more of a historical survey, whereas the section on *Iran* will mainly deal with present state of affairs in the architectural education of Iran.

A central concern of this Chapter, though, would be to perceive the problems facing architectural education, in a historical perspective. Part of those problems being of a global nature, evidently pointed at in the current literature (see Chapter 3), and part of it specific to the context of Iran. The latter problems, expounded within the context of the research statement (Chapter 1), will be further argued in this Chapter in more detail, drawing upon a brief account of the past and present state of architectural education in Iran. What follows is a brief history of architectural education, in a global scene.

1. 2. 2. GLOBAL SCENE

Architectural education today, is identified by several strands borrowed from 25 decades or so of practice in different climates. Each strand, having originated from a particular time and context, needs to find its alternative meaning at the present time.

As suggested earlier, much of the world's modern architectural schooling has proved to have been established and developed on the basis of the Western European models. Thus, it could be said to have one common *history* explaining its general evolution and, evidently several *sub-histories*, so to speak, explaining the local or regional particularities in the ways of interpretation, adoption and/or adaptation of those initial models. Having perceived that, the following pages are an attempt to provide a brief overview of the historical background of architecture schools, to pave the way for a better interpretation of architectural education. It will start with the *academies*, and will follow the different stages of their evolution, as well as the contributing strands and tendencies up to the present state of affairs.

1. 2. 2. 1. ACADEMIA

The present concept of architectural education, in the academic sense, is believed to have its roots in 17th century France, where the establishment of the *Academie Royale d'Architecture* in 1671 by Louis XIV, '... signalled... the beginning of the end of apprenticeship'. (Cunningham 1993). In his opening address to the Portsmouth Symposium[57] 1994, Professor Broadbent traced the history of architectural schooling back to the 15th Century Lorenzo da Medici's

57 XI Annual Symposium of the Portsmouth School of Architecture; Education in Architecture, 9,10,11 February 1994. The event was set to cover the following main issues: 1)Aspects of 'The Teaching Method', 2)Architecture, a philosophical pursuit or a craft, 3) Globalism vs Regionalism.

Academia Platonica in Florence. In the above mentioned address[58], Broadbent draws on the '... famous *Disputation,* of 1460, between Leon Battista Alberti and Lorenzo da Medici...'. His discussions with Alberti, in Broadbent's view, led Lorenzo, who thought of himself as a practical man, to understand the importance of theory. So in the middle 1470's, he set up his private school, the *Academia Platonica.* The purpose of the School, in Broadbent's words was '... to counter what Lorenzo- and no doubt Alberti- saw as the baleful influence of the Craft Guilds which still survived from the Middle Ages'. "An Academy, in the sense of Plato's", he asserts, "proved a more than viable alternative to simply working on the job with a master by which architects, painters and sculptors had been taught up to then". To give some idea of the quality and status of the School, he draws on its outcome: "... graduates from the Academia included Leonardo da Vinci, who entered in 1475, Michelangelo, there from 1480...".

It seems to be the Italian Renaissance and Post-Renaissance models that inspired the French and led to the establishment of the Academie Francaise in 1635 and finally of the *Academie Royale d'Architecture,* acknowledged by Collins(1979) as the root of 'the present concept of architectural education'.

Despite the implied intention of the Academy's royal founder[59], it was only after the grant of a Charter in 1717 that the pedagogical responsibilities were taken into consideration.

The *Academy School,* which developed from the *Academy of Architecture* (after 1717) in order to take over its pedagogical duty, inherited most of the methods experienced and perfected in *J.F. Blondel's* school[60], after his appointment as Academy professor in 1762. So this period, which lasted until *Blondel's* death in

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58 Broadbent(1994) is quoted from his paper to the Portsmouth Symposium, February 1994, Education in Architecture, before publication.

59 Proces-Verbaux de l'Acadmie Royale d'Architecture, as referred to in Collins (1979)

60 Jacques-Francois Blondel founded the then first full-time school of architecture in 1743 with the Academy's permission. His private school was of great influence on the subsequent architectural education through transmission of its findings to the *Academy School,* after *Blondel's* appointment as the Academy professor.

1771, proved to be the most important phase in the school's development.

The Royal Academy of Architecture must be seen in the social cultural setting of the aristocracy dominating Europe, and its identical intellectual tradition looking back to Renaissance Rome as its origin and source of inspiration. Risebero[61] (1983, p. 11) illustrates the architect's situation at that time as a 'gentleman, ...educated, cultured, enjoying a high social status and willingly assisting in this process of class expression by designing palaces, great houses and public buildings.... His education was theoretical and antiquarian rather than practical...'. In the meantime, the bulk of building activity was performed by the craftsman architect, who inherited skills from the Middle Ages, through oral teaching and practical example.

This is the very point in time where the unfortunate gap between the 'academic architect' and the 'craftsman architect' originated. A gap from which the building industry has been suffering ever since.

1. 2. 2. 2. THE ECOLE DES BEAUX-ARTS

The French revolutionary government dissolved all the Academies in 1793 (Collins,1979), and it was not till 1819 that the Academy was refounded as the 'Ecole des Beaux-Arts' (Hansford & Smith, 1980).

The late 18th century Revolution in France declared the dawn of bourgeois domination, leading to the 19th century industrial revolution in Britain. Being an anti-monarchy movement, the early revolutionary ideas tended to adopt a pre-Roman past of sublime simplicity as its source of inspiration and to avoid any association with the aristocratic period. This movement partially resulted in the Neo-Classical and Romantic spirit of the early 19th century in Europe.

The substitution of the Royal Academy of Architecture by the Ecole des Beaux-Arts in post-revolutionary France and the Ecole's tendency towards Classical aspirations must be understood in this context.

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61 Third printing (1989) consulted

Cunningham(1993) lists seven strands as the methodological characteristics of the Ecole des Beaux-Arts[62]:

1. Division of students into ateliers run by a patron;
2. Teaching of young pupils (*Nouveax*) by older students (*Anciens*);
3. Teaching of design by practicing architects;
4. The design exercise as the core of the educational programme;
5. The beginning of design studies immediately upon entering an atelier;
6. Systematic resolution of design problems starting with the *esquisse*;
7. Development of a competitive spirit as a pedagogic tool.

Having design projects or *Concours* at its core, the Ecole provided eighteen lecture courses on history, theory, and various branches of science and practice (Davey, 1989), which basically consisted of a trilogy; Statics and Strength of Materials, Descriptive Geometry, and Stereotomy (the art of cutting solids) (Carlhian, 1979). Other courses were ; History of Architecture, Mathematics, Physics, Chemistry, Surveying, Construction theory, Building Practice and Legislation, Theory of Architecture, Ornament, Decorative design and Sculpture (Hansford & Smith, 1980).

Design projects, at the Ecole, had to be executed following a systematic procedure which can be summarised as *esquisse* (sketch design), *plan/section/elevation study, project rendu* (finished project). The *esquisse* was carried out *en loge* (in a private and isolated alcove), within 12 hours. The resulting sketch or *parti* presented the creative initial solution of a student to a given programme. The next stages were carried out in the *Atelier* under the auspices of the *Patron* and *Anciens* over a period of six-weeks. Every student would start with the *analytique* (the initial design project), which was an exercise aiming at the introduction of the Greek classical elements and orders. On

62 Gulgonen (1982), mentions treating building types as '... abstract objects in abstract contexts', as another strand in the Beaux-Arts tradition, evidences to which is given by Carlhian (1979). Walter Cook's 1901 statement of the best features of the Beaux-Arts system is cited by Esherick (1983) as follows : '*1st. The division into ateliers. 2nd. the tradition of the older pupils helping the younger. 3rd. The teaching of design by practicing architects...4th. the beginning of the study of design as soon as the student enters the atelier. 5th. The system of the "esquisse"*' .

completion of each project the student had to retrace his esquisse and if the final design departed from this in any significant aspect, he was disqualified. Broadbent (1994) presumes that approach to the design process, '... a much greater source of weakness at the *Ecole* than anything to do with an emphasis on Classical formalism'.

The Beaux-Arts tradition dominated for almost 150 years and was the primary influence on modern architectural education (Cunningham 1993, Esherick 1983, Wakely 1983, Verschure 1983, Danby 1983, Hansford and Smith 1980, Stirling 1978, Carlhian 1976). The case of the Beaux-Arts in America, though, is significant evidence in support of the above.

Carlhian (1976) evaluates the Ecole's American student as being an 'especially well suited receptor of its teachings', and in his view the United States has been 'an exceptionally rich field for application of [the Beaux Arts]... principles'. In the late nineteenth and early twentieth century France, job opportunities were very rare[63], while the American architects, conversely, enjoyed a golden period of construction activity. The Beaux Arts graduates played a central part in putting up the overriding number of new buildings which were constructed during the period. From State Capitols to Post Offices, Train Stations to Public Libraries, Sky Scrapers to Memorial Monuments were among the wide range of building types experienced by the American Beaux Arts architects. Albeit Carlhian admits that the American version of the Ecole des Beaux-Arts 'was less academic', but it proves to have been a major contribution to the widespread realization of the Ecole's way of thinking. Perhaps Carlhian couldn't have put it better when he wrote: ' ... while it was the French who invented and perfected the educational techniques of the *Ecole des Beaux-Arts*, it was in fact the Americans who splendidly demonstrated the effectiveness of its methods...'.

There have been other movements contributing to the formation of the present day architectural schooling. The German Bauhaus appears to have been the

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63 Mainly due to bad economic conditions caused by regional conflicts as well as the two World Wars (Carlhian 1976).

most influential in worldwide dimensions.

The point which is worth mentioning here is that, '... there were two kinds of teaching at the Ecole des Beaux-Arts; theory in the classroom and design in the ateliers. Quite separate things, taught by very different people' (Broadbent, 1994). The above mentioned issue is perhaps the most enduring legacy of the Beaux-Arts tradition, which appears to be still on the agenda as a bold line of argument in architecture educational debates; the question of integrating taught courses or the given knowledge with design exercises.

1. 2. 2. 3. PUPILAGE

Before embarking on the Bauhaus movement, it seems quite opportune to have an overview of what was happening in Britain during the 18th, 19th and early 20th centuries namely pupilage; a system of architectural education which in Gradidge's words(1990) was 'British and successful'.

While the French, having developed an academic system which led to Ecole des Beaux-Arts, dominated Europe as well as America in all artistic domains, the British retained the *pupilage* system. In that system, the student, or *pupil,* actually paid to work with a *master* and occasionally attended lectures on the related subjects. The studies were frequently followed by a trip abroad which almost always included Rome. 'It is significant that architectural pupilage arose when apprenticeship... was declining, ...' (Crinson and Lubbock, 1994). Although *apprenticeship* and *pupilage* are used interchangeably, Crinson and Lubbuck (1994) maintain that '... the two categories could be differentiated along the lines that while the pupil paid for his instruction, the apprentice, in the manner of the medieval craftsman, exchanged his labour for instruction'.

Pupilage is believed to have been an immensely successful system(Gradidge, 1990). To substantiate his view, Gradidge draws on the 'talent of the architects' trained in that way: '... most of the eighteenth century architects, including Soane and the Adams, and all the towering masters of the nineteenth century, the great academics, like Cockerell and the Gothic Revivalists, like Street, right on up to Lutyens and the Arts and Crafts designers'. He adds: 'Great *family trees* developed; Street, himself from Scott's office, taught William Morris, Philip Webb and Norman Shaw, who in turn taught Lethaby and Newton, and the office of Ernest George turned out a whole galaxy of stars, including Lutyens and Herbert Baker'.

By the end of the eighteenth century, the Industrial Revolution and modern science rendered the dawn of the age of the specialist profession and education.

During the nineteenth century, pupilage, whereby young pupils[64] from the age of fourteen or so were bound to a master from two to five years, flourished. Meanwhile, events moved towards 'professionalism' and more formalized educational programmes.

The Architectural Association (AA), which turned out to become the only independent architectural school to survive, was launched in 1847 and after 9 years, in 1856 the Royal Institute of British Architects (RIBA), which had grown out of the 'Architects Club' and had been granted its Royal Charter in 1837, agreed to recognize the AA Diploma in practical subjects such as construction, surveying, etc. In 1863 the RIBA's first voluntary examinations were held to test for professional competence. As the voluntary examinations proved to be unpopular, by 1877 the Institute decided to set up an obligatory examination for membership, aiming at a minimum standard of competence. This was started as late as 1882.

In 1891 the evening course at the AA was intensified and the Schools of Art in Sheffield and Nottingham decided to start similar courses in architecture. In the next year, a three year full-time course was launched at King's College, London. The Liverpool School of Architecture was established in 1895 and when, in 1902, the honors degree of the School was recognized as the RIBA's intermediate examination, architecture as a vocational discipline had finally gained its academic status.

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64 "...as articled pupils (if their father could afford it) or as assistants (if they couldn't)"(Gardner, 1974).

Albeit the advent of formal architectural schooling in Britain dates back to the turn of the century, but the old system survives as an important stream of training architects, to the extent that in 1957- one year before the Oxford Conference-, '... the number of students attending recognized schools still represented barely half the total'. (Gardner, 1974). The three-route system of registration, as corroborated by the 1931 Registration Act[65], indicates the existence and explains the survival of the old system, along with the formal architectural schooling in Britain. The short period after 1900 is believed by Davey(1989) to have witnessed a thrown away opportunity for Britain to invent what he calls, 'a kind of training which incorporated the best of both the pupilage system and academic education' which lead to, 'the general pattern of interwar British architectural education slumped into rather lackadaisical Arts and Crafts based courses or an American academic interpretation of the Beaux-Arts'.

At the turn of the century, the Germans had developed their elaborate system of training in architectural technology in technical high schools. The course was offered in four years, of which the first two were focused on drawing, history, science and technology, while design activities started as late as the third year.

The British critics, though, were very hostile to the architecture which resulted from that system of technical training, and thought it was more successful in branches of applied sciences than in architecture. So it is understandable that Britain's first recognized school of architecture in Liverpool was under the influence of the French Beaux-Arts (Stirling, 1978), and in 1924, 5 years after the German Bauhaus was established, the most notable contributions to the RIBA-organized *First International Congress in Architectural Education* 'came from the French and Americans, whose accounts of Beaux Arts Schools and ateliers stole the show' (Gardner, 1974). It does make sense, though, that Arthur Cates, a campaigner for formal architectural training in Britain, drew on the excellence of American schools when criticizing the problems of pupilage in Britain (Davey,

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65 'The Act provided two main routes into registration apart from the... [formal education]... one rout [was] to... have been practicing in the UK as principal, or as an assistant for ten years, and produce documentary evidence to prove it... the other stream [was to be]... qualified by examination'.

1989). Six years before the RIBA Visiting Board was established, while ten schools had already gained their exemption[66] from the RIBA examination, Gropius started the German Bauhaus.

1. 2. 2. 4. THE BAUHAUS

Founded in 1919 at Weimar, Germany, the Bauhaus was an amalgamation of two former establishments, the Academy of Arts and the School of Arts and Crafts. Walter Gropius, the founder of the Bauhaus, states his purpose as being to establish the idea of 'the fundamental unity underlying all branches of design' through the school's pedagogic system (Cross, 1983)[67].

The first proclamation of the Weimar Bauhaus reads: '...Architects, Sculptors, Painters, we must all turn to the crafts'. (Bayer, et all, 1959, p.16). This emphasis on crafts stems from the *Arts and Crafts* movement of the 1880's in Britain (the first country to experience the effects of the Industrial Revolution). It was a reaction against the artistic confusion of the time caused by the new industrial developments. 'The Arts and Crafts Movement sought to stem the threat to craftsmanship and individual expression of progressive mechanization and to reunite the creative arts ...'. This tendency towards craft training and seeking to relate theory to practice is obviously seen in *'Lethaby'* in London, *'Van de Velde'* in Weimar and *'Cizek'* in Vienna. (Cunningham, 1980)

John Ruskin and William Morris, among the British reformers, 'were criticizing contemporary society and campaigning in their work for a return to preindustrial standards, to individuality in craftsmanship and good design'. Their activities 'played a large part in initiating similar reaction in Europe'(Cross, 1983), like the German Werkbund movement.

'The Werkbund was formed in 1907 in response to widespread feeling among

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66 Gardner(1974) provides a timescale showing the dates when each UK school of architecture gained exemption from RIBA's intermediate as well as final examination, up to 1974.

67 quoted from: Gropius (1935), "The new architecture and the Bauhaus", Faber and Faber Ltd.

educated Germans that the rapid industrialization and modernization of Germany threatened German culture' (Cross, 1983). It was an effort to synthesize the romanticism of the Arts and Crafts movement and the realities of mass production and the on set of the industrial age. 'Perhaps the main value of the Werkbund lay in the opportunities it afforded for general discussion of broad educational theory to be introduced to professional levels of teaching. The role of the Werkbund in creating the conditions and the intellectual climate from which the Bauhaus was to emerge was therefore important' (Cross, 1983).

The notion of coordinating the revival of traditional 'arts and crafts' with the new 'machine style' by '...absorbing ... the spirit of engineering into art' (Bayer, et all, 1959, p.11) might be counted as the most important contribution of the Bauhaus to modern design education. *Gropius* criticizes the Academy tradition as being '...the typical embodiment of the *l'art pour l'art* mentality' (Gropius, 1935)[68]. He also accuses the academies of having deprived the handicrafts and industry of the informing services of the artist, and consequently caused the artist's complete isolation from the community.

Cunningham (1980) explains the educational climate of the Bauhaus as being anti-academic, mistrustful of theory, based on practical experiments and above all, conscious of social need.

The curriculum of the Bauhaus consisted of two main parts;

1. Practical instruction in the handling of different materials and tools.
2. Formal instruction under the following heads: *Aspects*, the study of nature and of materials; *Representation*, the study of plane geometry, construction, draughtsmanship, and model-making; *Design*, the study of volumes, colours, and composition. Lecture courses of different branches of art and science were also provided.

The full course was performed in three stages; Six-month *preparatory instruction*; three-year *technical instruction* leading to the pupil's *Journeyman's Certificate*;

68 quoted in Architectural Education, 1983, 1

building sites and theoretic training in the Research Department of the Bauhaus', leading to a *Master-Builder's Diploma* (Gropius, 1983,1923). Perhaps the most innovative and influential component of the Bauhaus tradition, which still appears to be taken into account in pedagogic systems, was the 'foundation' or 'basic' course in design, devised and conducted by *Johannes Itten*[69]. 'The projects and exercises of the course aimed at freeing the students from preconceived notions of *art* and *design*,..., by exploring basic properties in materials'. (Cross, 1983).

The dominant tendency in the Bauhaus way of teaching was the emphasis on the experimentation of abstract forms. Although the conflict between the Itten's approach to abstraction and that of Gropius's, which called for an equal involvement in industry and the crafts, eventually resulted in Itten's resignation from his position at the Bauhaus, but it was his approach which proved to be more influential on architectural schooling ever since.

The significant point here is that Itten's abstract manipulation of form, colour and material, could not even satisfy the Bauhaus students and they 'floundered', as Broadbent once put it[70], '... until *Theo Van Doesburg*, of the Dutch de Stijl group, actually set up a pirate course at his apartment in Weimar to teach, literally, that *style'.* This tension between Gropius and Itten which, to a certain extent, symbolizes the dichotomy of *scientific abstraction-practical competence*, appears to be a generic topic for decades of architectural debates. This issue will have to be tackled later.

Cunningham (1993) enumerates History and Architecture as the two prominent omissions from the teaching programme of the Bauhaus. It was only after 1927, however, that the architectural issues; environmental relationships, district planning, and *inter alia*, preliminary studies to identify space 'needs', were introduced to the curriculum. The school established a rational approach towards architectural planning and design, which reached its apogee in the 1960's and still survives in many present-day architecture schools. It appears to have been

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69 For biographical notes on the Bauhaus people sea Bayer, et all, (1959)

70 In a letter dated 27 July 1994

still survives in many present-day architecture schools. It appears to have been an approach opposing the classical formulation of the Beaux-Arts and the empirical tradition which was followed in England (Cunningham, 1980).

When the school was closed by the Nazi authorities, several of its leading members of faculty emigrated to America to go on working for the same goals. After the Second World War the Bauhaus ideas were introduced in several countries, while at the same time critical voices also began to be heard. (Norberg-Schultz, 1963). One of the critiques to the Bauhaus education is voiced by Norberg-Schultz (1963, p. 221): 'The programme of the Bauhaus surely contained a basic contradiction, in wanting simultaneously to free the *self-expression* and to create a new common formal language'. He understands the wish for self-expression as 'a reminiscence of the first expressionistic phase of the school' and evaluates the latter ideas as stemming from the Dutch De Stijl movement.

Even if we take the Bauhaus as being a 'poor model' for *architectural* education, as *Cunningham* put it[71], but it is conceivable that the Bauhaus, as in *Mies van der Rohe*'s words, '...was an idea,...[and] the fact it was an idea, ..., is the case of this enormous influence the Bauhaus had on every progressive school around the globe'. (Giedion, 1954)[72].

1. 2. 2. 5. AFTER THE BAUHAUS

The initiation and development of architectural schooling can be associated with the Modern Movement. The growth and domination of the middle class and the realization of the Industrial revolution resulted in the rise of the new professionalism and the architectural pilgrimage from Renaissance Roman influence, the Classicism and Romanticism of the early nineteen century, to the rationalism and functionalism of the early twentieth century. It also transformed the architect's status from the craftsman-architect as a *master builder on the site*, to the specialist architect as a *designer on the board*, only a member of the whole

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71 in an interview with the author, on 3 November 1993.

72 quoted in 'Educating Around Architecture',(Cunningham,1980,p. 139)

profession. A history-oriented climate gave way to a trans-historical one and a cultural/contextual interpretation of architecture to an industrial/transnational position which implies a 'globalizing view that industrialized Western countries constitute a *legitimate centre*' (Giroux, 1991).

To quote Norberg-Schultz's statement of the Modernism in architecture seems opportune here. In his *Intentions in Architecture* he acknowledges: 'After the teaching of style in the academies came the Bauhaus, and a complete break with all historicism. The history of art and architecture was dropped from the curriculum. Instead, a free experimenting with materials and forms was introduced; everything should be invented anew. The purpose was not to create a new style, but to establish a *free* approach to tasks. It was said that this implied a new contact with reality'. (Norberg-Schultz,1966).

The *modern* concept of design, intensified by the Bauhaus tradition, dominated architectural schooling up to the 1970s, when the *Postmodern* movement began to emerge as a strong influence on the intellectual climate in America, challenging assumptions that were central to the discourse of modernism.

The term *Post-modernism* should be restricted, as Charles Jenks (1987) suggests, to hybrid, "impure" buildings that are designed around historical memory, local context, metaphor, spatial ambiguity, and an intense concern with architectural linguistics. If we consider post-modern architecture as 'one-half Modern and one-half something else' (Jenks, 1987), the latter "half" will be of great influence on the current architectural education. It will introduce alternative references for architectural design such as tradition, locality, symbolism, and historicism, those issues which were overlooked by the Modernists.

After the breakdown of Modernism in the 1970s, architectural education lost its modernist dogmas, which at any rate, served as a strong theoretical background for the world' s pedagogic systems. It still continues to be the subject of constant debates, anxiety and hesitations among those who are involved in education. The post-Bauhaus period still needs more time to develop from an architectural style or movement to a noteworthy educational system in its own right.

Despite the contradictions among the various trends in architectural education, they have actually proved to have useful lessons. To learn those lessons, a thorough understanding of the actual context and social needs, matched to a consistent theoretical model combined with appropriate techniques and local knowledge, are among the prerequisites. Today the academic community involved with architectural schooling accommodate quite a large number of faculty members throughout the world, all of whom must shoulder the burden of providing the above prerequisites. To give an idea of the present dimensions of the architectural education community, two figures are mentioned here; nearly 6000 names are recorded in the *European Faculty Directory*[73](1991) as faculty members in the European associations for architecture and planning, and almost twice as many names are listed in the *National Faculty Directory(1990)*[74] as the teaching staff in the North American schools of architecture and planning, not to mention the comparatively larger number of students who, in one way or the other, are interested in and/or are the role players of architectural education.

So far, in the preceding pages, architectural education has been treated, due to its historical background, in a global view. Architectural education in Iran, in the academic sense, is seen as influenced by the same historical perspective.

1. 2. 3. ARCHITECTURAL EDUCATION IN IRAN

Architectural schooling in Iran, like other branches of higher education is the outcome of a time period when the country was fascinated by the late nineteenth century progress in the industrial world (the then European countries), and thus, set out to assimilate into the new movement by adopting and importing the Western institutions one after another.

1. 2. 3. 1. WESTERN STYLE HIGHER EDUCATION

Although the Western style higher education in Iran is said to have started in the

73 The first edition of (EFD), in two volumes, contains an alphabetical and subject-classified listing of 315,000 names and addresses for faculty at nearly 1,400 institutions of higher learning in East and West Europe.

74 This source book records the names and addresses of 588,000 faculty members in the USA and Canada, nearly 11,000 of whom in the disciplines of architecture and planning.

mid-nineteenth century with the establishment of *Darolfonoon*[75] (Karimian, 1976, pp. 215-216), the real movement, in its nationwide scale, can be traced to the turn of the century and the inauguration of the School of Political Science in 1899. The establishment of *Tehran University* in 1935 (Karimian, 1976, pp. 310-313), was an influential step in this respect.

There are obvious differences between higher education in the West and that in Iran, and presumably in other Third World countries. In Iran, unlike in the Western countries, higher education has not been developed as the natural evolution of the traditional education. It has been imposed on the society's cultural sphere, and thus, is not in harmony with the society's growth and development. Architectural education is by no means an exception. Bearing in mind that the adoption of a foreign social institution, puts the receiving society in a dependent and passive status, it could be expected that the adopted institution necessarily stop developing, unlike any living thing. This argument might find an example in the case of 'adopted' or 'imposed' languages[76]. When a language, is a sign of power, or a segment of society is separated from the main mother land[77], the speakers would loose their creative status towards the language, and the language, in turn, stops evolving at its ordinary pace. That is the case with architectural education in Iran, and perhaps in other Third World countries too.

In the academic sense, architectural education in Iran finds its starting point in the foundation of the School of Fine Arts[78] of Tehran University in 1940[79]. It was

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75 *Darolfonoon* is the first higher educational institution in the Western sense. It was founded in 1850 with the encouragement of *Mirza Taghi Khane Amir-Kabir*, the intelligent and popular Chancellor of *Nasereddin Shah* of the *Ghajar* dynasty. After the assassination of the Shah in 1896, in the reign of his successor *Mozaffareddin Shah*, it was gradually overlooked and transformed to a high school.

76 Like the case of English language in the colonial societies.

77 Like the case of Farsi speaking people in Pakistan, India, Afghanistan, Tajikistan.

78 School of Fine Arts (first entitled *Honarkade*), was a substitute for the School of Arts and Crafts (*Madrese-ye Sanaye-e Kar-o-Pishe*) and also the 'High School of Architecture' (*Madrese-ye Ali-ye Memari*). The latter was newly established to offer a two-year course in architecture, when it was merged in *Honarkade*. Before moving to the main campus, *Honarkade* was first launched in the basement of a religious school (Marvi), in one of the oldest quarters of Tehran. (Momayez, 1990).

established and run, for some years, by *Andre Godard*[80]. It seems timely at this point to summarize the major historical establishments of architectural schooling in a chronicle. Note the one-century sequence of events; *Academy Royale, Ecole Des Beaux-Arts, Bauhaus.*

▸	(MID 1470'S)	ACADEMIA PLATONICA, FLORENCE
▸	(1717)	ACADEMIE ROYALE D'ARCHITECTURE, ACADEMY SCHOOL, PARIS
▸	**(1819)**	**ECOLE DES BEAUX-ARTS, PARIS**
	(1847)	ARCHITECTURAL ASSOCIATION, LONDON
	(1895)	LIVERPOOL SCHOOL OF ARCHITECTURE
▸	**(1919)**	**THE BAUHAUS, WEIMAR**
	(1940)	*SCHOOL OF FINE ARTS, TEHRAN UNIVERSITY*
	(1958)	OXFORD CONFERENCE, OXFORD

Table V *A brief chronicle of architectural schooling*

1. 2. 3. 2. THE BEAUX-ARTS MODEL

The school was moulded according to the Beaux-Arts model. The atelier system, esquisses, project rendu, peer education and the curriculum of the Ecole des Beaux-Arts were assimilated. Even the title of the school(Fine Arts...) was a translation of "Beaux-Arts".

The ateliers, each run by a professional architect, were the main component of the school's structure. The professional background, artistic trend, and

79 As the School of Fine Arts has been the leading, and for two decades the only, school of architecture in Iran, a study of its origin and evolution will give a general understanding of the sub-history of architectural education in Iran.

80 *Andre Godard*, a French architect and archaeologist whose name is associated with a number of events during the Pahlavi I. The Museum of Iran-e-bastan in Tehran, and the tomb of Saadi in Shiraz are among his works, the former one counted as one of the most successful designs of that period (*Radjabi, 1976, pp. 48, 72*)

personality of each patron decided the characteristic tendency of the atelier[81], as was the case with the Beaux-Arts ateliers (Carlhian, 1979). Peer education, i.e. the advanced students' helping the new ones with their projects oriented the students towards each atelier's direction. This method would give duration to the atelier's trend, *and* result in different streams in the architectural profession. These streams can be observed in the remaining buildings of that period.

The currency of the French words and expressions in the vocabulary of architectural profession as well as education, indicate the influence of this school in the formation of the new architectural profession in Iran. The fact that architectural education in Iran has been an imported institution from a totally different social context, can help to explain its being insensitive to the real needs of society and the history/tradition of Persian Architecture[82]. It should not be neglected, that this story happened when the society was affected with a general surrender to the West and a belief in the superstitious equation of "progress" and "assimilation with the West".

In such a social context, the foundation of the School of Fine Arts, like other undertakings of the Westerners or those influenced by the West, was fulfilled while ignoring the existing traditional components of profession and education. It, thus, remained completely isolated from the essential members of the profession i.e. the traditional *Memar*s (architects) and *Banna*s (masons)[83].

With modernisation, the social climate became unfavourable for the traditional building professions. The various craftsmen associated with the building industry are said not to have the prestige they had in the past. They are often regarded

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81 All the ateliers, unlike in the Ecole des Beaux-Arts, were accommodated within the school's confines and the patrons were employed by the school. Some of the ateliers in the Ecole des Beaux-Arts (called *atelier exterieur*) were rented spaces, the tenancy fees paid by the students (*Carlhian, 1979*).

82 In the 1969 curriculum of one of the two top schools of architecture (*The National University of Iran*), the synopsis of the course 'Technology' ignores more than one thousand years of Islamic Architecture in Iran while discussing the Greek Architecture in details (*Written Regulations of the School of Architecture* approved by the University Council, 1969)

83 Even at present time the bulk of building activities in the urban and rural areas are built by *Memars* and *Bannas*.

as inferior to *white-collar* workers. 'Western educated architects and modern professional bodies', are noticed by Memarzia (1995) as 'conduits for Western influence', then he asserts, '...perhaps the most influential body, however, has been the modern school of architecture'. The graduates of the school had a feeling of superiority over the mass of the society. This feeling was in tune with the general psychological characteristic of the so-called 'westernized educated group'. They did not attempt to inform themselves of the work and skills of the traditional Memars and saw their role as being to compete with them by bringing 'modern' knowledge and skills. The majority of the graduate architects proved to be agents of a particular layer of the society. Their 'clients' were either among the so-called Westernized groups or those who, through social rivalry, thought it prestigious to consult architects. In such a climate architects counted themselves as being an intellectual 'elite'.

The question of adopting or importing the Western pedagogic systems is only one aspect of the argument. On the other side, the reference model, i.e. the Beaux-Arts, proves to have been problematic in itself. The undue emphasis on the stylistic and aesthetic aspects of design was, perhaps, the most serious criticism of the Beaux-Arts theory of design in the Modern period. The system tended to produce architects who, as Violet-le-Duc puts it, '...erect costly edifices to their own honour, ignoring the needs and habits of the day' (Llewlyn, 1961, p.118, in Hansford and Smith, 1980).

The Ecole des Beaux-Arts fences art and artists in a closed world of regulations and academic requirements and thus promotes an intellectual elite based on the repetition of certain established models (Musy, 1980). The late James Stirling, who counted himself as a product of the Beaux-Arts system in the Liverpool School of Architecture in the late 1940s, described it as follows : 'Object-fixated the Beaux-Arts surely was : the building in isolation, free-standing, with little reference to urban context'. (Stirling, 1978).

The major short-comings of the Beaux-Arts system are reflected in its 'reproduction', i.e. the School of Fine Arts, as the leading school of the time in

Iran. Other schools, the largest of which located in the capital city of Tehran[84], are in some way or another suffering from similar problems. Special features of each school would be a function of the pedagogical conventions of the countries from which the majority of the teachers have been graduated[85]. The thought provoking point is that the major changes in the pedagogic system of the School of Fine Arts occurred within a year after the 1968 students' uprising in Paris and the division of the Ecole the Beaux-Arts into several pedagogical units (See Gulgonen & Laisney, 1982).

During the 1970s, after the Beaux-Arts system was abandoned, the Fine Arts faculty experienced various tendencies through the new generation of teachers graduated from various Western countries. New courses were introduced such as *Urban Design/Planning* and the focus of the school shifted from an artistic/romantic status to "something else". This "something else" would indicate a state of suspense and hesitation. The strong emphasis of the former system on presentation skills was rejected and the atelier work was not the great pleasure and delight it used to be. The reduced creative output of the new system resulted in an intellectual vacuum for the more serious contemplation of architectural theory, particularly among the younger students. One of the livelier trends in those years, albeit weak but flourishing, was the tendency towards Persian architecture and its related social/cultural and climatic dimensions. There were a number of seminars, mostly offered by visiting lecturers concerning the history, theory and practice of Persian/Islamic Architecture. The present author has experienced (or suffered from) those years as a student of architecture.

1. 2. 3. 3. POST 1979 CHANGES

After the 1979 Revolution, which resulted in the dissolution of the Pahlavi

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84 Apart from the School of Fine Arts, Schools of *Shahid Beheshty* (former *National University of Iran*), *University of Elm-o-Sanat (Science and Technology)* and *Open University* are located in Tehran; International University of Qazvin near Tehran, Guilan University in Northern Iran, *Pardis* in *Isfahan* , and *Yazd School of Architecture* in the city of *Yazd.*

85 In the School of Fine Arts, University of Tehran, the majority of teachers were graduated from France, while in the Architecture School of the National University of Iran, a great majority of the teaching staff (some two thirds) were graduated from Italy (*Written regulations of the School of Architecture,* the National University of Iran, 1969).

Dynasty and its replacement with an *Islamic Republic*, all aspects of society were subjected to major changes, orientating towards Islamic values and the major needs of the post-revolutionary society.

Higher education was assigned by the leader of the Revolution, *Imam Khomeini*, to an appointed Council comprising of a number of distinguished scholars. This Council was later called *The Supreme Council for Cultural Revolution*[86]. The above-mentioned Council established a number of sub-Councils for different affairs, among which was *The Supreme Council for Higher Education Planning* (SCHEP). The latter undertook the revising of university curricula through organizing specialized Planning Committees for different disciplines. Among these committees *The Planning Committee for Arts* (PCA) was responsible for art and architecture disciplines.

Having set the basic directives for planning, the above-mentioned Committee invited several specialised groups in different fields of art and design[87] to concentrate on the curricula of the various art and design courses.

In early years of the Revolution, the isolated status of education in the society and lack of responsibility of the schools towards the real world problems were removed to be replaced by the people-oriented climate brought about by the Revolution. Majority of students as well as staff tended to work as voluntary workers in the revolutionary institutions such as Jihad-e-Sazandegi (development army). Such institutions mainly targeted vulnerable people of the more remote areas. The cultural rupture of higher education and society was reduced in the light of the revolutionary climate, but the system of education proved to require much more than a change in attitude.

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86 The Supreme Council for Cultural Revolution was appointed by the Religious leader of the Revolution to contemplate the cultural and educational aspects of the society according to the Islamic values and principles.

87 *The Planning Committee for Arts* (PCA), covered the following disciplines: Architecture, Urban Planning and Design, Industrial Design, Handicraft Design, Painting, Sculpture, Music, graphic Design, Illustration, Textile and Clothes Design, Cinema, Animation, TV Programmes Production, Photography, Performing Arts, and Puppetry.

After a period of closure, universities started with a transient programme of up to 25 credit units to graduate the finishing students before the revised curricula was introduced by the corresponding planning committee in the early Eighties.

A point that should usefully be made here is that, schools of architecture in Iran, follow a common curriculum, although a portion of the programme is left to their choice and preference. More, the selection of entrants is also done through a centralized entrance examination which is held once a year by the Ministry of Culture and Higher Education throughout the country. The examinations comprise of *general topics* such as literature, language, and IQ tests, which in the first phase, all the applicants have to pass. The second phase would be on *specialized topics* which mainly relate to each discipline. In a number of fields such as music, painting, and theatre there is also a third phase of practical tests or interviews in due course.

The remainder of this chapter renders an account of the new architecture curriculum issued by the *PCA*, paints a picture of the existing schools of architecture, and shortly examines the attitude towards the discipline of the entrants to schools of architecture in their very first week of the academic year 1995-96. But before moving on to the architecture curriculum, an account of the mainstream architectural education in Iran would seem to be necessary.

1. 2. 3. 4. MAINSTREAM ARCHITECTURAL EDUCATION IN IRAN

The mainstream architectural education in Iran is a 'continuous' 6-year course, whose entrants enrol for the MArch degree right from the beginning. Graduation at BArch level is but a subsidiary stream permitted to solve the problem of those who, for any reason, have to leave their education before completing the MArch. The idea behind this system is that the amount of teaching material, perceived by the curriculum designers as the least necessary for architects, is so great that is impossible to be covered in less than 6 years. Given that, unlike in the UK system, there is no distinction between *Degree Course* and *Diploma Course* in

Iran[88], BArch level is thus held as being an insufficient qualification for architects.

A glance at some general figures would be useful here. The first set of figures, provides an overall picture of the volume of architectural education in the country, and also shows the significance in the number and proportion of students in, what was called earlier, as being the mainstream architectural education, i.e., the Masters Course in Architecture, or to use the vocabulary of the UK system; the Masters Diploma Course in Architecture

An average of 80% of enrolled students, over the last five years, have been doing the MA. If the *Technicians* Diploma Course (who are not, in any case, accredited as architects) be excluded from the total number of students, the above percentage would increase to 96%. The average number each year of MA students in Urban Planning & Design is about twice as many as that of BA students. These figures indicate that the Masters course in architecture is the mainstream education of architects in Iran. It is not surprising, though, given that the only legal course, which is offered officially through the national curriculum, is a six-year MArch course whose graduates are registered as "architects"[89].

As mentioned earlier, BArch is not recognized as a separate degree course. Graduation at that level, though, is only permitted to facilitate unavoidable drop outs either due to students' preferences or to other restrictions caused for any reason. Those who hold BArch will have a rather limited range of creditability, although they can start careers as architects in municipalities, private offices, or for a rather limited scale projects, as responsible designers[90].

The following table and its corresponding diagrams demonstrate the percentage

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88 All students are, in fact, enrolled in a *diploma* course, in the sense that they become professional architects.

89 After one year of professional practice.

90 According to the accreditation regulations, BArch graduates (graduated inside or outside the country) should have two years of practical work in architecture firms or state architecture departments, while MArch graduates are accredited as architects after one year of professional experience.

of MArch students as compared to those of Technicians and BArch students.

academic year	STUDENTS IN DIFFERENT COURSES			
	Technician	B Arch	**M Arch**	total
1990-91	389	78	**1847**	2314
1991-92	396	74	**2045**	2515
1992-93	338	15	**2176**	2529 + 8 (PhD)
1993-94	573	160	**2033**	2766 + 9 (PhD)
average	424	82	**2025**	2531
percentage	3.25	16.75	**80**	100

MA, urban planning / design
160
180
172+ 8 PhD
137+ 6 PhD
162

Table VI *Students in the Iranian schools of architecture.*

Source of figures: Institute of Research and Planning on Higher Education (IRPHE)[91]

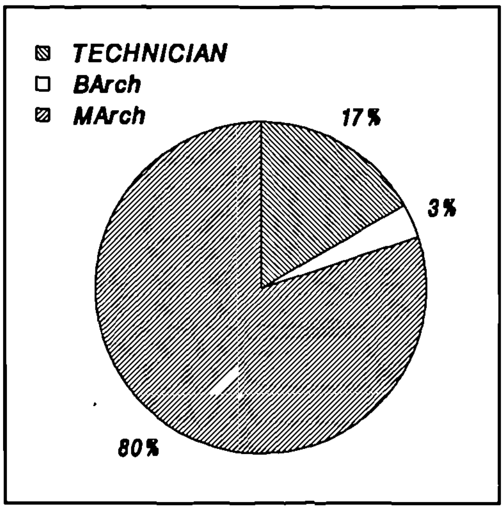

Figure 8 *Students, including Technicians*

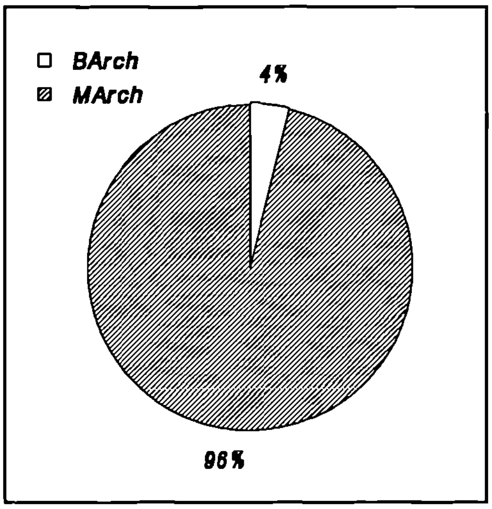

Figure 9 *Students, excluding Technicians*

Given the long time period of the main architecture course, there was a boom of applicants for leaving as BArch graduates in certain circumstances, such as the early years of the country's involvement in the imposed war, when a number

91 Figures are taken from issues of *Statistics of Higher Education in Iran*, annually published by *IRPHE*: Academic year 1990-91 (*IRPHE*, 1991, vol. 2, p. 143); year 1991-1992 (*IRPHE*, 1992, pp. 65, 69); year 1992-93 (*IRPHE*, 1993, Table 23); year 1993-94 (*IRPHE*, 1994, pp. 254, 278).

of students were either at military service or engaged in reconstruction activities[92]. The present research will mainly relate to the general course in architecture as its main area of reference.

Another set of figures indicating the significance of MArch course within the context of architectural education in Iran, is the percentage of graduates at different levels. The same source is consulted here to provide the following Table, wherein, as well as in the previous one, MA courses in *Urban Planning* and *Urban Design* are put separately. This is due to the fact that those are post-graduate courses whose intake is selected among graduate architects as well as graduates from a number of other disciplines, such as Social Sciences and Geography, through separate examinations[93].

academic year	GRADUATES FROM DIFFERENT COURSES				MA, urban planning / design
	Technician	B Arch	**M Arch**	total	
1990-91	72	14	**84**	170	9
1991-92	99	25	**72**	196	1
1992-93	186	79	**94**	359	6
1993-94	80	32	**173**	285	28
average	109	37	**106**	252	11
percentage	43	15	**42**	100	

Table VII Graduates from the Iranian schools of architecture.

Source of figures: Institute of Research and Planning on Higher Education (IRPHE)[94]

The higher percentage of the graduated technicians compared to the percentage

92 The Iraqi invasion to the western borders of the country started in September 1980 (less than two years after the establishment of the Republican government), and lasted for eight years.

93 *Urban Design* option is offered to graduate architects. Therefore, the graduates from these courses have been already architects and they will not be accredited separately, unless their new qualification is mentioned in their accreditation licence.

94 Figures are taken from the same source: Academic year 1990-91 (*IRPHE*, 1991, p. 293); year 1991-1992 (*IRPHE*, 1992, pp. 138, 141); year 1992-93 (*IRPHE*, 1993, Table 39); year 1993-94 (*IRPHE*, 1994, pp. 380, 399).

of the number of enrolled students is mainly due to the shorter time duration of their course, which is some one third of the Masters course. Given that the BArch students have been graduated within four years which is two third of the minimum time period for graduation as MArch, still the ratio of the number of MArch to BArch graduates (106/37), highlights MArch degree as being the mainstream architectural education in the country.

It is possible, though, for technicians to continue their studies for MArch degree, but to achieve that goal they have to sit the entrance examinations first. Although some of the credit units they have passed will be accepted and transferred to the new course, they will be counted as new students[95]. The content of education, regardless of the school, is determined by a common curriculum, a short account of which is given next.

1. 2. 3. 5. THE COMMON PROGRAMME OF ARCHITECTURE COURSES

The curriculum for the Masters Course covers a wide variety of areas that mean the time can not be shorter than 6 years[96]. What is currently implemented in schools of architecture is the latest revision of that curriculum, delivered by the aforementioned *PCA*, in September 1995. Before pointing at some noteworthy aspects of the programme, it seems useful to give an account of the philosophy behind it.

The introductory part of the programme document contains a section entitled *Definition and Goals*, which covers the main lines of thought mentioned by the programmers as underlying the curriculum design[97]. Referring to the lexical meaning of the Persian term for architecture (*Memari*[98]), and the Arabic root of

95 Given the vital role of technicians in construction industry, the Ministry of Culture and Higher Education, in recent years, has encouraged architecture schools to establish technician courses.

96 National curriculum of architecture, under the Section *Length and Structure of the Course.*

97 As underlying concepts, those 'lines of thought' can be *partly* traced in the introduction to curriculum of new structure and components.

98 'For more information refer to the same entry in *Loghat Name-ye Dehkhoda* (Dehkhoda Encyclopedia), Dehkhoda Foundation, Tehran'. (footnote of the main source).

the word (*Amara*[99]), the above mentioned document points out that all the words of the same root enjoy a sense of 'development', 'bringing into existence', or 'to extend the life-time'. On this basis the document argues that the term *Memari* holds a wider interpretation than mere *building*. 'It deals not only with the physical existence of the building', it ascertains, 'but also with notions of *life* and *spirit*. It is to provide the built environment with *soul*'.

Taking *design* as the necessary issue leading to a better understanding of the relations between architecture and different branches of the arts and sciences, the document divides '*design activity*' into three domains; '*the domain of values, the domain of knowledge,* and *the domain of synthesis*'. These are the lines along which the variety of components in the architectural curricula are orientated. 'If sciences contribute to the domain of *knowledge* [as natural, as well as human sciences]', the document concludes, 'arts are influential on the domain of *synthesis*'.

Despite many similarities with the conventional architecture curricula elsewhere, the Iranian curriculum can be identified by a number of particularities. It is overloaded with numerous courses; on the whole it covers 184 credit units[100] comprising five groups of courses. Those are called *general, foundation, main, professional* and *optional* courses (23, 31, 76, 44, and 4 credit units respectively), not to mention the *final project and thesis* with 6 credit units. To make this programme more comprehensible for the European reader, perhaps it can be paralleled to the Spanish system of architectural education, in terms of being long and overloaded. (See Orbasli & Worthington, 1995, p. 49)[101]. A survey of course duration was conducted on all the graduates of Shahid Beheshty School of

99 'The Qur'anic interpretation of the word is also the same. See *Tafseer-e Almizan* by Allameh Tabatabai'. (footnote of the main source).

100 Each credit unit takes one contact hour per week, if it is a theoretical lecture course; and takes three contact hours if it is a practical course, requiring projects, practical works or field trips.

101 'The study of architecture as set by legal curricula length, ranges from four years in the Netherlands to over six years in Spain. Additionally, professional organizations may require up to two years' professional experience prior to professional registration'. (Orbasli & Worthington, 1995, p. 49).

Architecture ever since its establishment in 1960, up to 1993 (some 1340 graduates). The result suggests that the average time of graduation is some 8.5 years (8.48 to be more precise)[102]. Part of the reason behind this is that nearly all students start their careers while they are at school. Available job opportunities in different levels, is also encouraging the above tendency.

Apart from the earlier mentioned classification from general to professional courses, that indicates the degree to which a group of courses is specific to the discipline or vice versa, the curriculum elements are grouped differently from a pedagogic point of view. Under the title of *Constituting realms of study in the discipline of architecture*, the curriculum document reads: '... four realms of study emerge, of which, ... *architectural design* acts as the main trunk or backbone of the whole course'. The remaining three are the *realms* of *construction technology, architectural history & conservation,* and *human settlements.* (See also chapter 6, under *Alternative Proposals*).

This graph demonstrates the ratio of credit units allocated to the four *realms* of study, in the current architectural curriculum in Iran.

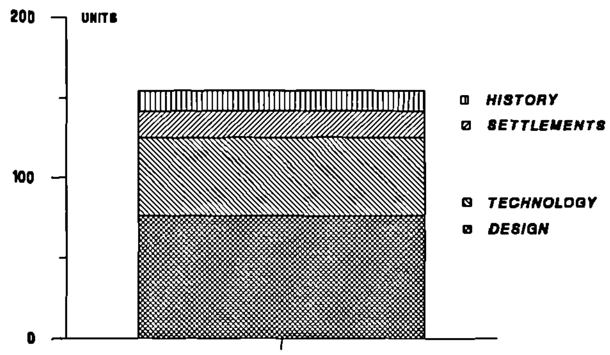

Figure 10 *Realms of study in the Iranian curriculum for architecture*

Added to the above, are 4 *optional* units, some 23 *general* course units[103], and 6 units as the *final project / thesis.* To take the final project into consideration, architectural design activities extend to over 44% of the curriculum units which

102 The same survey also indicates that graduation as BAs, in four years time, has manifestly increased among those enrolled in 1985-1989, which coincides the country's engagement in the result of war damage.

103 General courses include: *Persian Language, Foreign Language, Islamic Sciences, Physical Training, Ethics in Islam, History of Islam,* and two options out of the following four courses; *Islamic Revolution and its historical roots, Islamic texts, Biology,* and *Introduction to Computing.* These courses are obligatory for all university students regardless of their disciplines.

seems to be a conventional norm. See the preceding graph, with this in mind that the *general* as well as *optional* course units have not been demonstrated there.

Before closing this Section, there is another feature of the current programme which is worth mentioning. That feature is the introduction of three curriculum components within the realm of architectural design which is prompted to be an attempt towards making design projects more effective. Those components are: *Tarkeeb* (synthesis)*; Man, Nature, and Architecture,* and *Village.* Offered in three semesters, *Tarkeeb* is intended to prepare the ground for design projects, by unifying the necessary knowledge and skills of designing in one composite course which is due to be run by a board of tutors. (See also Chapter 6, under *Alternative proposals*).

Man, Nature, and *Architecture* is offered in two semesters through a number of lectures, seminars, and also students' research works. It is defined by the curriculum document as aiming to generalize the notion of architecture to the wider scene of *Creation*; to gain a divine perception of the natural world in macro and micro scales focusing on the concepts of *order* and *meaning*; and to contemplate the relation between *system of beliefs* and the act of *designing*. These issues are proclaimed by the document to be able to provide a basic understanding of human environment and various implications of designing within that context.

As will further be referred to in Chapter 6, a concept of curriculum componentization underlies such features as those mentioned above. The putting together of related subject disciplines in composite courses, is held by the above document, as providing a better understanding of those subjects towards their identical objectives. To run such composite (and multidisciplinary) courses calls for a higher degree of coordination and harmony among the corresponding teaching staff. This is the very point where serious obstacles stop the idea from being fully realised.

Introduced in the social climate of post 1980s[104], *The Village* course is offered in two semesters. The objectives of the course are stated in the Curriculum Document as follows: 'This course is intended to give a general acquaintance with the identical features of life and architecture of the village. Different factors (geographical, cultural, economic, social, ...) contributing to the physical form of the village are explored and, thus, the relationship between form and content is drawn to the attention of the students'. Building on the above, the course continues with an individual design project aiming to apply the findings of the survey in designing within the context of the same village.

The importance and necessity of designing in rural areas, little acquaintance with the issues of village and rural design in educational institutions, the importance of recognizing the built form as the result of natural environment and social cultural characteristics and circumstances of the people, and an awareness of various aspects of architecture are among the issues mentioned to justify the introduction of *Village* course to the curriculum of architecture.

Although the system of architectural education is modularized and there is no compulsory sequence of courses issued in the official programme, but schools of architecture tend to *pattern* the credit units in order of succeeding semesters[105], and nearly all students prefer to follow the same sequence of courses as offered by the schools. This reflects the conventional system of education in the lower levels of schooling; highly programmed and institution-centred.

Albeit the curriculum is officially the same everywhere in the country, diverse interpretations and ways of implementation, differentiates schools/departments of architecture from one another. Part of this diversity is clearly welcome, but a right interpretation of the objects and subjects of the programmes is a

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104 In early years after the Revolution, there was a powerful tendency among students and younger members of staff to devote themselves to the provision of services to the deprived groups of society, particularly the villagers. Popular organizations such as *Development Army* or *Literacy Movement* are, in fact, the institutionalized manifestations of such social concerns.

105 For instance, the 1992-93 Bulletin of the School of Fine Arts offers such a sequenced programme by grouping the elements of the official curriculum. (SFA, 1992, pp. 19-21). See Appendix 9.

fundamental step toward coordination. This calls for a debate between the Planning Committee and the schools/departments. Curriculum design and the revision of programmes have enjoyed the lion's share in the time spent by the *PCA*. Little effort, though, has been undertaken so far to *monitor* the quality of implementation of those programmes in different schools.

From eight schools of architecture that are running the above mentioned curriculum, five have been established after 1989 and thus, their first group of students will graduate in and after 1996. A brief profile of the existing schools, as in the 1995-96 academic year, is presented in Appendix 10, to provide a reference. The remainder of the Chapter, though, is a treatment of the target group, i.e., the entrants to schools of architecture in Iran, which is clearly a defining determinant in any educational setting.

1. 2. 3. 6. THE STATE OF THE ENTRANTS

Those who enter architecture schools, like all other entrants to higher education in Iran, are selected through a national entrance examination which is annually carried out by the *Educational Assessment Organization*, affiliated to the Ministry of Culture and Higher Education. A large number of university Professors and lecturers co-work with the Organization to determine the necessary items to be tested and also designing the corresponding questions each year. The whole system of testing and sorting the results is computerized.

During the first week of the academic year 1995-96, the author conducted a survey among 207 entrants in four schools of architecture in Tehran and the one in the city of Yazd. The survey intended to examine the entrants' attitude towards the discipline they had chosen. After a period of anxiety, which may be part of the psychology of the last year of high school before entering university[106], the students answered a questionnaire deliberately designed not to resemble an examination test[107].

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106 Only some 9% of applicants would have the opportunity to enter university.

107 For an English translation of the survey questionnaire, see appendix 8.

In answer to Question 1, asked for *their view of the architects' main competencies*; 351 notions, were pronounced by 181 respondents. A large number of those notions were, in one way or another, pointing at the architects' talent, taste, imagination, and creativity; clearly better interpreted as *gifts* rather than *competencies.* Added to the above should be notions like *social/cultural commitment, personal characteristics (such as patience, carefulness and perseverance),* and *general knowledge,* all of which can be categorized as a common sense view. These notions constitute some 270 out of 351 of the total responses (77%). The follwing Table gives a summary of the categories.

architects' main competencies, as mentioned by 207 respondents	*recurrence of notions (out of 351 notions)*	*percentage*
talent/ good taste/ imagination/ creativity/ personal characteristics/ socio-cultural commitment/ general knowledge	270	77%
specialized knowledge	*25*	*7%*
communication skills	*25*	*7%*
identification of needs	*10*	*3%*
miscellaneous	21	6%
total responses	351	100%

Table VIII *Summary of the responses to Question 1: architects' main competencies.*

As shown in the above table, architects' particular competencies such as specialist knowledge and ability to identify needs, enjoy a very low percentage of the total mentioned items (10% altogether). One of the points indicated by the above percentage rates is the entrants' lack of acquaintance with the discipline.

The response to Question 2, *how did they come to know about architecture?,* was to be ticked from among seven given answers. The data indicate that a significant percentage of entrants are encouraged either by their relatives and friends (some 50%), or through TV programmes (some 30%). Given the very few informative TV programmes on architecture, the breadth and depth of acquaintance with the discipline through such programmes should be considered with suspect. Therefore, the main source of information about the discipline seems to be the entrants' relatives and friends, which is clearly an ad hoc and uncontrolled influence on the target group of architectural education. This problem is exacerbated by the fact that what the secondary education provides in due course, is also next to nothing. The above lack is partially compensated for by high IQs, but this state of affairs causes many problems concerning the course curriculum, especially in the early years, when it seems to conflict with the expectations of the new entrants. The following Table demonstrates the percentage rates of the responses:

Question 2. Please tick the way(s) you came to know the discipline of architecture, leading to your applying for it.	
Possible responses	%
a) through relatives or acquaintances who are in this field (please mention cases).	**51%**
b) reading books or articles on architecture (please mention the cases).	8%
c) preparatory entrance-exam courses (please mention the duration).	2%
d) working in architectural offices (please mention the type and duration of work).	2%
e) working in construction sites (please mention the type and duration of work).	1%
f) watching TV programmes dealing with architecture.	**28%**
g) other ways (please mention).	8%

Table IX *Summary of the responses to Question 2: ways of getting to know architecture.*

Answers to Question 5, suggest that despite all the efforts undertaken in the process of selecting the most suitable entrants, perhaps a high percentage of them are misplaced. Out of 180 responses to the question, *which discipline(s) would have been their real choice had there been free opportunity of transferring to other departments?*, the following results emerged. Over 43% of the entrants seem to have had other preferences, while some 22% of the rest are also hesitant in their decision. There are only less than one third of the entrants who express they are determined in the choice they have made.

A point which can usefully be appended here is that the above percentages are very much likely to be still greater, given the reservations which psychologically exist for a first year entrant to express his enthusiasm for changing their department. The latter point is best interpreted if considered within the context of the heavy competitive situation in Iran for entering the higher education, where to *enter* is the first priority. The following table summarizes the response rates to the above question (Total number of respondents, 207):

Question 5. If you were allowed to change your discipline, what other course(s) would you prefer to transfer to? (please mention three cases in order of your preference).	*responses*	%
	No response	13%
	No preference	34%
	Other preference(s)	44%
	Not certain	9%

Table X *Summary of responses to Question 5: Students' desirable discipline.*

The lions share in students' preferences is with Construction Engineering (28%), Computer Engineering (13%), and Mechanical Engineering (11%). This is mainly because of the recent strategy (from 1991) in entrance examinations of putting architecture as a parallel option with engineering courses such as the above. Given that all the engineering courses initially admit students for BSc degree while architecture is a connected MA course, top students of the secondary education tend to chose architecture as their main choice. This would give them exemption from another entrance examination for their post graduate course. The above mentioned strategy has been effective in attracting higher IQ students to architecture schools, but the artistic background of the entrants is believed to have dropped down compared to the entrants of the previous period when they had to pass tests (both theoretical and practical) in art issues. Although the new strategy was taken after an analytical report by the earlier mentioned Organization, but to satisfy both artistic as well as engineering aspects of architecture course it needs to be further contemplated.

Question 3 tries to examine the degree to which the entrants are prepared to manipulate an architectural space. In 166 responses to this question, 279 suggestions are made in terms of changing the *architecture* of the very room wherein they were filling in the questionnaire. Little courage to suggest major construction changes, is of course quite logical for the beginning students of architecture. The results are demonstrated in the following Table:

Question 3. If you were to determine, with complete freedom, changes in the architecture of the very room you are sitting in, to make it more comfortable and correct, what would you wish to change?		
Sorts of suggestions	*Number of suggestions*	*Percentage*
Interior / decoration changes, furniture changes	133 from 279	48%
Minor construction changes	103 from 279	37%
Major construction changes	43 from 209	15%

Table XI *Summary of the responses to Question 3: Manipulating an architectural space.*

A point raised by the responses to Question 4, is helpful in better interpreting the situation. In responses to the question, *what their hobby have been during their secondary education*, only 1 out of 204 has pointed to have experienced drawing in a practice office. *Sports and recreations,* and *reading* enjoy the lions share among activities during their leisure times (with percentages of 23% and 22% respectively). Needless to say that reading, particularly in the last years of high school, is to a large extent related to curricular subjects, aiming to reinforce students' ability to compete in the university entrance examinations. After the rather lengthy account of the present state of affairs in architectural schooling of Iran, it is timely to draw some concluding remarks.

1. 2. 4. CONCLUDING REMARKS

'Architectural schooling' in Iran was maintained to have stemmed from what appeared to underlie, for quite a long time, the historical tradition of the discipline worldwide. Most significantly, and at least for the first three decades of its development, architectural education of Iran was influenced by the French Ecole des Beaux-Arts, of which a brief history was given.

Against that background, the present state of affairs in Iran was observed by rendering an account of the developments that occurred in the 1980s and after, in terms of making the content and context of architectural education more endogenous. The current curriculum was reviewed, and finally, the state of entrants to architectural education was examined to unfold the low level of acquaintance with the discipline of architecture. It followed that little provision is made and few opportunities exist to familiarize the applicants with what counts as architecture and architectural education.

A note worthy point here is that although the adoption of the French system of architectural education by the Iranian schools, was an unwelcome one, but it should not be deduced that the *problem* is exclusively resulted from the act of adoption. The history of mankind is overflowing with numerous instances of adopting ideas, institutions, and products. The problem actually arises when adoption is made without understanding of what is going to be adopted, and an awareness of what the underlying principles are. The above issue was treated in the previous Chapter to justify the importance of the line of enquiry taken as the focus of the present research, i.e., the concepts and theories which, consciously or otherwise, underlie the present systems of education in the West. The present author firmly holds that a "thorough understanding" is a vital prerequisite for either *adoption* or *rejection* of any idea, institution or whatever.

Another point which can usefully be noticed here is that, drawing upon the author's personal experience, despite invaluable efforts and experiments undertaken by educators, schools, and authorities, general improvements are not persuasive proportionately. This is, to a certain extent, due to too little exchange of ideas and experiences which is a first requisite for a cumulative and constructive movement. This is perhaps a consequence of the staff being overloaded with educational and professional work. It follows partially from the economic situation of the country which calls for the citizens' more commitment and endeavour.

The next Chapter, will discuss the current debates on architectural education, in a global context, to review the core issues and arguments which have preoccupied the academic debate over the last decade or so.

CHAPTER 3.

PANORAMA OF ISSUES AND ARGUMENTS

Years and thousands of pages can go by before there even begins to be a resolution of a mystery tackled by educational researchers.(Pressley, 1995, P. 22)

1. 3. 1. INTRODUCTORY POINTS

To have a wider perspective of the ongoing debates on architectural education in the recent decades, a survey was conducted of the articles that appeared in the architectural periodicals from 1970 to 1994. These were mainly spotted through the *Architectural Periodicals Index (API, vols. 1-24)* as well as its predecessor; the *RIBA Annual Review of Periodical Articles (vols. 4-6).* As one of the world's greatest collections of architectural information accessible to architects and all those working in or interested in the built environment, the API has been constantly published from 1972 by the Royal Institute of British Architects[108]. It covers some 300 periodicals, published in Britain and elsewhere. About 10,000 articles/papers, in English, are indexed in API every year.

According to the 1993 annual culmination, the criteria for deciding to index a periodical in the API includes: 'The presence of an appreciable number of articles of reasonable length on the built form. The presence of adequate illustrative material where relevant, especially in foreign language material. Periodicals of peripheral value to the scope of the subject scope and which are indexed in The British Humanities Index and The British Technology Index, are excluded'.

Around 2000 articles, issued from 1970 to 1994, are categorized by API under

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108 The API is published quarterly (the fourth issue constituting a culmination of the year's content. It is published by RIBA Publications Limited, Finsbury Mission, 39 Moreland Street, London EC1V 8BB.

the general title of 'architectural education'[109]. An initial selection was made out of these articles, using the main concerns of this research as the selection criteria. Those criteria indicated the attributes of architectural education as a university discipline; content, context, process and structure of the courses and the theoretical issues concerning education and architecture. Articles dealing with local or trivial problems, journalistic issues, exhibition reports and non-English articles were excluded.

Having been selected through a closer review of the contents, the most relevant to this research of articles, provided the basic material for this chapter, which illustrate a general perspective of the propounded issues and arguments concerning architectural education in the past two decades.

Before embarking on the main argument, some rather marginal observations and inferences seem to be worth mentioning here, needless to say, they all need to be examined in their own right, which is not intended in the present study:

1.The majority of periodicals published in Britain mostly tend to tackle professional aspects of education and day to day problems such as funding cuts, career development issues, and the like. Considerably less emphasis is put by them on the theoretical aspects of education. This phenomenon is most likely to be the result of the close relationship between the profession and education in this country. This could also be interpreted as demonstrating the domination of the profession over its education, an issue which, needs to be scrutinized, somewhere, for its negative as well as positive consequences.

2.The great majority of articles contemplating the theoretical and conceptual dimensions of architectural education appear to be issued in the American Periodicals, the most informative of which is the *Journal of Architectural Education (JAE).* It has been constantly being issued since 1945.

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109 The articles dealing with other aspects such as architectural design, architectural profession, etc. which, in one way or the other, have educational implications are also mentioned under the same general topic.

3.In one of its special issues (vol.14 no. 2, 1959), JAE reports the 'Fourth Annual ACSA-AIA Seminar on Teaching Architecture', and thus, tackles the then major problems/dilemmas of and arguments around architectural education. With those in mind, if we look at the present preoccupations and anxieties of our time, in a global perspective; the similarities prove to be dramatic. Broadbent (1994) gives a clear statement of the above issue when he concede: '... So what's new? Nothing much; our problems are as they were in Roman times!'.

The question arises as to whether those problems are inherent in the discipline of architecture or that the endeavours made to sort out the proper resolutions have not been steady and rigorous to meet the scale of the problem. This suggests that, mistakes have continued to be made over and over and the achievements have often been neglected or overlooked. To have a general idea of the sorts of approaches towards the above issue, a quick overview of the various definitions of architecture will be set out next.

1. 3. 2. ABOUT ARCHITECTURE AND ITS EDUCATION

To define a term, it is natural that one starts with Encyclopedias and Dictionaries. In fact the most concise definition of any issue is likely to be found in such source books. Three short definitions of architecture, though, are cited here to give a start to the argument;

1. Harris (ed., 1975) draws on the scientific as well as artistic aspect of architecture when he defines architecture as: ' The *art* and *science* of designing building structures, or large groups of structures, in keeping with aesthetic and functional criteria'. (italics added).

2. Upjohn (1985) parallels architecture with 'art of building'[110]. He asserts: '... virtually all architecture is concerned with the enclosure of space for human use... architecture must do more than meet the physical requirements of strength and space, it must also content the spirit of man'.

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110 Longman Dictionary of Contemporary English (1991) defines 'architecture' as 'the art and science of building...'

3. The New Encyclopedia Britannica (1985), though, defines architecture as being: '...the *art* and *technique* of building, as distinguished from the skills associated with construction. As with other arts, the practice of architecture embraces both aesthetic and utilitarian ends that may be distinguished but not separated... thus, at one end of the scale are purely functional structures, while at the other are purely decorative ones'. (italics added)

These definitions and the like could be counted as paraphrases of the Vitruvian view of architecture as the achievement of 'strength, utility and grace'- or 'firmness, commodity and delight'. Many of the definitions like the one by Vitruvius, though, perceive architecture as the end *product*, ie. buildings, rather than the *process* of designing and building of buildings, which is of prior significance to education.

To cover the main attributes of 'architecture' in a single statement, has been a challenging task handled by many thinkers. Plenty of aphorisms, obviously from different viewpoints, can be quoted to define architecture. These aphorisms, albeit short and inadequate for today's world, generally help to highlight the major characteristics of architecture, and their diversity reflects the multilateral nature and complexity of the discipline as such.

There is a common tendency to define architecture by analogous statements, comparing or contrasting it with other disciplines (Davey, P., 1989). Further, some have even questioned architecture as being an academic discipline (see Gradidge 1990, Porter 1979, also Cunningham[111]).

Conceiving architecture as 'science' and or as 'art' has been among the most frequently used similes, which appear in most definitions. Dittmar(1984) draws on what he calls, 'the rift between the two 'modern' worlds of art and science', as initiated in the Renaissance; and on the fact that architecture found itself in the middle. He adds that, 'It has oscillated between art, science, engineering, and

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111 In an interview with the author on 3 November 1993, Allen Cunningham asserted architecture as being an 'activity' rather than a 'discipline'

the humanities; that is, it has attempted to define itself through others. The commonly used cliche that architecture is the union between art and science exemplifies this very well...'.

Perhaps the most familiar analogy to define architecture is the architecture-music one. Friedrich Von Schelling's comparison of architecture to music is cited by MacGilvray (1992) as the most famous. Schelling's statement[112] reads: '... architecture, as the music of the plastic arts, thus necessarily follows arithmetical relationships... It is music in space... in a sense solidified music'. The same aphorism is cited by Knevitt (1986); 'Architecture is music in space, as it were a frozen music'. Goethe, possibly earlier, calls architecture 'petrified music'. He asserts: 'Really there is something in this; the tone of mind produced by architecture approaches the effect of music'.[113]

Bright quotes a music/architecture analogy from G.F.Bodley, who argued that architecture is like music because '... it expresses abstract ideas, such as power, simplicity, grandeur and beauty'.[114]

There are other ideas that are expressed to support the music/architecture analogy. Architecture and music are both thought to *enclose a created dimension*, architecture in space and music both in time and *becoming*. The musical score is also likened to the design drawings, they can be easily reproduced to convey the original idea to individuals who are familiar with the author's symbols and conventions. Both architectural and musical concepts remain quite flexible throughout the process of production (MacGilvray 1992).

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112 In his *Philosophie der Kunst, first* appeared in 1859. see bibliography under 'Schelling'. Quoted from Stott, Douglas W. (1989), trans. and ed. *The Philosophy of Art*, p. 165. He posits, in the same book, other relationships between architecture and music: 'architecture = music' (p. 164), and '[architecture is] the music within the plastic arts'. (p.163)

113 Taken from MacGilvray (1992).

114 Bodley, G.F., "Architectural Study and the Examination Test," quoted in Bright, *Cities Built to Music*, p. 277, note 17.
The quotation and footnote is cited in MacGilvray, D.F.(1992)

Although the dimensional similarities of architecture and sculpture are rather obvious, they are distilled by Brancusi[115] in his short statement: '[A]rchitecture is inhabited sculpture'. This analogy is pronounced in the well known works of Antonio Gaudi, where sculptural values are dominant in architectural designs.

Before going further, the point which seems worth mentioning here is that the definitions cited above, and some more afterwards, have little to do with totality of architecture . They all tend to highlight specific aspects of architecture that they hold as central to the subject. These are, the author understands, complementary rather than contradictory definitions and a holistic view of architecture will attend to them as parts of a multidimensional whole.

If the music-architecture analogy is the most popular, the linguistic one could be counted as the most referred to in the academic discussions dealing with meaning in architecture. Some have taken the lyric dimension of architecture contrasted with the general notion of 'building', categorizing it as the counterpart of poetry in the realm of literature. Richard England's aphorism, cited by Knevitt (1986) reads: 'Tradition is the alphabet, Form is the language, Architecture is the poem'.

In his article *Towards a new pedagogy*, Oxman suggests that the pursuit of the linguistic analogy or in other words, the study of the built forms as a language, has been a unifying motive to both research and design, and can be applied as the foundation of the discipline of architecture. He thus proposes the application in the studio project, of what he calls 'syntactic language', to express the syntax[116] of the architectural concept. (Oxman, 1986).

Broadbent (1980) draws upon *semiotic*, or the theory of signs, and its 'three inter-related matters'; *Pragmatics* (study of the uses and effects of signs), *Semantics* (study of relations between signs and reality) and *Syntactics* (study of the

115 Constantin Brancusi quoted in Igor Stravinsky's 'Themes and Episodes' (1966). Taken from Knevitt (ed.)(1986).

116 'The way in which forms are put together by the designer is treated as related to the syntax of language'. (Broadbent, 1980)

relations between signs themselves)[117], which stem from linguistics and have found applications in describing the built forms.

By doing so, he argues that: '... in thinking of architectural design, the whole range of semiotic studies... is of very considerable relevance. Not only does it help us to understand how architecture 'works' as a series of sign systems but there are indications already that *some* architects have found some semiotic approaches of considerable value in the generation of their own designs'.

The spirit of the Post-modernism debate, by its emphasis on 'meaning', as believed to have been disregarded by the 'form-function' paradigm of the Modernism, punctuates the validity of the linguistic analogy as well as the semiotical dimensions of the built form.

Architecture is perhaps unique in being defined by a variety of analogies and similes. This might imply, as stated before, the multi-lateral nature of architecture, although not justifying the insufficient effort made so far to provide a self-definition of the 'discipline'.

A delicate distinction can be made between the interpretation of the term discipline in the context of profession with that in education. The former constitutes 'a body of knowledge that differentiates between architecture and cookery and teaching and so on' while the latter refers to 'the methods used to study and develop a body of knowledge as in the discipline of Science or the discipline of History. So this meaning is more to do with the academic rules set up to explore the subject and is more to do with process than content'[118].

Drawing upon the discipline of architectural education McKellar (1975) raises the question as to whether architecture could be seen as an ordinary discipline or

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117 To define the three portions of semiotic, ie. Pragmatics, Semantics and Syntactics, Broadbent cites Morris's definitions (1938) as the most comprehensive ones. The same source is cited by Norberg-Schulz (1963, p. 59) in his argument on 'symbolization'.

118 The author owes this point to Stuart Sutcliffe in his feedback of 14 December 1994, to the earlier draft of this Chapter.

should it otherwise be defined as what they calls a meta-discipline[119]. They conceive the difficulties confronting the architectural profession and education today, as being 'analogous to those that confronted certain aspects of the natural sciences in the 1950's and 1960's, when faced with a host of environmental issues; namely, the inability of the traditional disciplines of biology, chemistry and to a lesser extent physics, to independently or through collaboration, understand new aspects of the environment and new environmental problems which are related to, yet different from the traditional disciplines'. This issue called for a new framework leading to the advent of a meta-discipline, now called ecology.

Having the idea (or ideal) of 'meta-discipline' in prospect, McKellar & Stein (1975) draw on the 'multi-disciplinary' and 'inter-disciplinary'[120] alternatives. They enumerate the practical short falls of the multi-disciplinary approach and reflecting on the inter-disciplinary one, introduces it as an alternative, which 'attempts to alleviate some of the fundamental difficulties with the multi-disciplinary approach'. This alternative approach, in their view, 'should enable the architect to communicate with others, understand and evaluate the contributions of other disciplines, cope with the intellectual and ethical issues shared by the disparate disciplines and begin to approach the ideal of understanding man-environment-building relationships in a holistic manner.'

Whatever approach is adopted to facilitate the contribution of different disciplines in the course of architectural design, the necessity of those contributions stems from the very characteristic of architecture's subject matter. Human environment, or *reality* in a sense, is a *multi-dimensional* whole and architecture does have to take a proper approach to cope with it. This issue will be further tackled in Chapter 7.

Taking the inter-disciplinary nature of 'education for the built environment' as

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119 He has adopted this term (meta-discipline) from William Alonso's 'Beyond the Interdisciplinary Approach to Planning', *Journal of American Institute of Planners*, May 1971, 169-173.

120 William Alonso(1971) ironically defines the traditional inter-disciplinary approach as follows: 'Take a physical planner, a sociologist, an economist; beat the mixture until it blends; pour and spread'.

being self evident, Stonehouse (1992) reflects on what he names as the two models of inter-disciplinary education; 'the tree' and 'the wood'. The tree model, '... starts from a common core course and leads to increasing specialization into separate disciplines'. The wood model, '... starts from the basis of the separate and promotes greater relationships between the disciplines as education progresses, allowing specializations to be developed within and, in particular between disciplines'. To use Alonso's terms, the wood model is rooted in separate *disciplines*, promotes *interdisciplinary* collaboration between disciplines and leads to *multidisciplinary* specialisation in the profession. The latter view sounds more reasonable (and practical), since the educational objectives of the early stage of education, which is of defining importance, can be defined more clearly, whereas with the former model (the tree), the early stage of education is bound to leave out any emphasis on a certain discipline; a fact that inevitably makes it vague, superficial, and less motivating.

Despite all differences, there seems to be a generic understanding of architecture as being the sort of creative activity, associated with the act of *designing*. Although the definitions of design as well as those of architecture draw, to a great extent, on the time they are made, there are still elements in common which makes the study of those definitions valid and useful. Therefore, putting a separate emphasis on the design aspects of architecture seems opportune here.

1. 3. 3. DESIGN AND ARCHITECTURE

It is widely believed that design is a central activity of doing architecture. This can frequently be seen, either explicitly or implicitly, in the relevant literature, of which some examples will be cited bellow. Moreover, the experience of being an architect provides the evidence to corroborate that point.

The above perception of design and architecture has been supported by many authors, to give random examples; Groak (1988) reckons design as being central to architecture, and Burchard (1959), as such, considers it as the foundation of architecture. Design has been regarded by Newton (1985) as the 'heart of architectural education' to the extent that he suggests that the 'development of the skills of design' is of prime importance to education.

There are, of course, exceptions to the above generalization; Anson (1980) reckons that 'design is not the main ingredient in architecture', particularly in terms of education. To support his idea, he points at the creative nature of design and it having 'its roots in inspiration'. Then he goes on to question whether design is even teachable.

There could be other reservations to the generic idea of 'design is central'. Bearing in mind that the goal of architecture is to shape the built environment, we are apparently forced to make many 'non-design' decisions which contribute to patterning the built environment, social initiatives, economic plans, policies, so on and so forth. Particularly when decisions are made by or within a group or community, the central role of 'design' and 'designer' will lose their rigorous position.

It should not be forgotten, though, that the above argument is dependent upon the conventional interpretation of the term 'design'. Architectural design is mostly associated with image making, and as Dittmar (1984) suggests, '... the only expertise readily conceded to architects is in the area of 'styling' and aesthetics. Thus architects are primarily conceived as image- and form-makers'. This notion of architecture and architects could be largely associated with the Beaux Arts tradition, that dominated architectural education around two centuries.

Design could be the core of architecture if it is interpreted in the broad sense of the word. The Longman Dictionary of Contemporary English (LDCE,1991) gives the following definition for the term 'design': '.... to plan or develop for a certain purpose or use'. The latter definition associates 'design' with the notions of 'planning/development' and 'purposefulness/usefulness'. Having this rather broad interpretation of the term 'design', we can, more confidently, admit the conjecture that 'designing' is at the core of the 'architectural activity'. It embraces all the purposeful activities that end with producing the built environment tailored to human beings' demands and needs.

The advent of 'design method' studies in the late Fifties and early Sixties, and the generic presumption of its fundamental application in structuring architectural courses, indicates the very founding belief in design as the main component of architecture. This issue has engendered a wide scope of literature as well as other sorts of initiatives in the fields both of the profession and education. 'Many architects in the early 1960's, particularly those in the academic world, were enthusiastic about the capability of design methods to demystify the design process and so provide an ideal framework for the teaching of *how to design*'. (Fowles, 1979). (his emphasis).

Although some would argue that even folk builders enjoy a 'rigorous' and 'highly structured' design methodology of their own- which seems quite logical, but their design method is 'circumscribed by habit and tradition' (Hubka, 1979). 'Design methodology', as a special theoretical interest area and a rather conscious enquiry emerges when the design professions are in a crisis[121]. 'Important design problems have changed their character from almost professional problems to the type of problem where this approach does not seem satisfactory any more, and therefore they have begun to talk about methodology'. (Rittel, 1973). The main function of design method studies, in Rittel's view, '... is to clarify the nature of the design activity and the structure of its problems'. The educational effects of the above issue is of great significance. As Ledewitz rightly acknowledges: 'By conceiving of teaching as itself a process of design, we may be able to inform the way we teach through our understanding of the design process'.

Taking a similar line to Ritell and Ledewitz, this author will tackle the issue of the design process and methods in order to investigate the nature of the discipline of architecture. Briefly, the development of design method is identified by examining the three 'generations' it is suggested they fall into. (see Broadbent, 1979).

Known as 'Analysis-Synthesis' models, the first Generation Design Methods were founded, according to Hillier, et al. (1972), on rationalist-empiricist assumptions

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121 Having said that, Rittel considers it as principally true in any field. He notes (1973): 'When they talked about methods and methodology in mathematics it was due to the difficulties they had run into with the development of set theory; when the social sciences talked about methods it was when the field was in a crisis'.

about the *necessity of objectivity in problem-solving.* Dividing the process of design into a rational, systematized *analysis* (problem-defining) stage and a creative, intuitive *synthesis* (problem-solving) stage, this Generation of Methods takes a Cartesian approach, as Broadbent notes (1979), of breaking down design problems into elements or sub-problems to be solved through *scientific* enquiry.

It took about two decades until these early theories of systematic design method were refuted against reality, to the extent that Broadbent regards the first Generation Design Methods as producing little in the way of architectural design hardware. (See Broadbent, 1979). Bruce Archer who was among the pioneers of design methodology studies in the early 1960's[122], designates (1979): 'My present belief, formed over the past six years, is that there exists a designerly way of thinking and communicating that is both different from scientific and scholarly ways of thinking and communicating, and as powerful as scientific and scholarly methods of enquiry, when applied to its own kinds of problems'. The discontinuity between analysis and synthesis stages, between the analytic diagrams and the final design proposal is frequently voiced by design teachers as among the deficiencies of these methods. (Ledewitz, 1985).

While the first Generation perceives design as a *science*, the second Generation calls for *participation* in design. It intends to bring the building users actively into the decision making process. The underlying assumption of these methods, according to Rittel (1973), is that '... the expertise is distributed ... over all participants and that nobody has any justification in claiming his knowledge to be superior to anybody else's'. Rittel acknowledges (1973) the consequence of this assumption as being '... to attempt to develop a maximum of participation in order to activate as much knowledge as possible'.

If the First Generation Design Methods assumes that 'the expert knows best', the Second Generation denies the skills and knowledge of the expert designer. Having admitted the above, Broadbent(1979) points to a Third Generation in

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122 In 1963-64, Archer published his widely referred series of articles titled *Systematic Method for Designers* in *Design* magazine (see References). These articles can be taken among the early literature that appeared on the analysis-synthesis model of design.

which the expert makes the design conjectures that others may refute. The latter which seems to enjoy a vast subscription in present academic circles, is based on a Popperian theory of 'Conjectures and Refutations'. These methods conceive design as a developmental process that interconnects the activities of 'conjecturing' and 'testing', following a similar pattern to the scientific development. Although this Generation also, '... no doubt, will have its faults and its successes', (Broadbent, 1979), to paraphrase the three quotations Broadbent cites(1983) to accentuate his belief in the validity of the conjecture-refutation model, seems opportune here:

Paul Valery, 'It takes two to invent anything. One makes up combinations, the other one chooses'.
T.S. Eliot, 'Writing poetry consists of combining words and then choosing between the combinations. Of these two activities, the more difficult by far is the choosing'.
Karl Popper, 'The building of scientific theories is a matter of Conjectures and Refutations, that is of having ideas and then submitting them to test'.

Having argued the major aspect of architecture, ie. design, there seems to be a lot more to be said about the discipline. It seems to be an inherent attribute of architecture that it is always seen, and thus defined, within a spectrum of diverse statements. Further definitions of the discipline of architecture, though, are categorised next under the subtitle of dichotomies.

1. 3. 4. DICHOTOMIES

The multi-lateral nature of the discipline of architecture/design evokes a diversity of positions taken by authors and educators on what the core of architectural education is. The above mentioned 'diversity' manifests itself in the dichotomies, widely found in the relevant literature, a number of which are catalogued below:

art/profession, art/craftsman-like practice, art/science, science/artistry, vocational training/intellectual activity, education/training, pupilage/formal education, apprenticeship/schooling, , university discipline/ professional activity, theory-knowledge /practice-action, classroom/studio, *knowledge/application, science/technology, designing/building, explicit learning/tacit knowing, arts-crafts/industry, local/global, creativity/tradition, regionality/internationality, function/meaning,* etc.

The succeeding paragraphs will try to give a brief coverage to the above dichotomies, which are associated with what is called by Schon, 'a bimodal' (1982) and 'anomalous' (1984) profession, i.e., *architecture.*

What enables Schon to call architecture 'a bimodal profession' is the inherent dichotomy embedded in architecture, as to whether it is an *art* or *a craftsman-like practice.* He writes: 'Architecture lives in two worlds. It lives in the world of art and in the world of craftsman-like practice, which ante-dates the scientific revolution, and at the same time it lives in the world of critical human functioning, because architecture is the business of designing the structures in which we carry out our essential human activities. And it is the only profession which is bi-modal in that way'. (Schon 1982).

In Burchard's view, architecture is neither an art nor a profession, which would obviously imply that it is the both. His statement reads: 'Though architecture is both more and less than an art, it is nothing if it is not an art ... Architecture is not really a profession in the sense of most professions, and not quite an art either in the sense of most arts. It is more responsible than the professions, if I may use the word responsibility here only in a narrow sense of practical matters'. (Burchard 1959). Davey (1989) points at the same dichotomy when he compares the formal and informal education of architects.

The training/education dichotomy is another preoccupation of those who have been dealing with the nature of architectural schooling at a theoretical level. Davey (1989) tries to clarify the notions of *training* and *education* which, in his view, are mostly confused with each other. He asserts: 'By education I mean a system or facility that provides for a student to acquire independence of thought and action, and a spirit of intellectual inquiry which we might call philosophy, in order to maintain an ethical position that is free from dogma and pedagogy...'. Then he defines training as, '... the bringing of a person to a desired state or standard of efficiency by instruction and practice. Given the emphasis on efficiency, that is the ratio of *useful* work performed to the total energy expended, its contradictory position vis-a-vis the moral ambition of a true educator becomes clear. Industry might wish to train, but if a school or college adopts this position, especially in response to the idea of a *vocational* subject, it is all too easily the pawn of political expediency and industrial self-interest'. (Davey, 1989).

Taking a similar line to Davey, Phillipps (1990) concedes that architectural education is not *training,* but is an *intellectual activity.* The latter points take the same position as the RIBA's 'Framework for Degree Level Courses', 1968, when it defines the objective of architectural courses as follows: '...the objective must be to educate a thinking man capable of growing intellectually and of dealing with complex and changing situations rather than a man trained in a particular set of skills, however elaborate. It is this need more than any other that is producing the emergence of architecture from a *vocationally based* training to a *university-based* intellectual discipline'. (italics added).

There is much more on this issue to be found in literature. In his final paper to the Cambridge Conference, Sir Leslie Martin asserts (1970): 'What I have been talking about is not *training* but *education.* It is the effort to extend and stretch the mind, to deepen the level of thought about architecture and to extend its range, to build up, if we can, something which can be described as a *school of thought* around the subject. And if we do that successfully, we extend the capacity of the future profession'. (emphasis added) He then contrasts the limitations of conventional training to the open nature of higher education and its mission to go beyond the limits of what has already been developed as conventional knowledge and skills: 'It is not the job of education to work within the conventional limits. It is its job to recognize and develop the unique nature of the subject as an educational process; to accept the realism on which the process can be based; to encourage the skills that can be built up around it, and the contribution which architects can make to the problem of improving the physical environment in which we live'. (Martin, 1970).

Discussing what he calls 'the dilemmas of architectural education in the university context', Porter (1979) contrasts the image of architectural education with that of the university as an institution. Dominant goals of the university, in his view, are '...the pursuit of knowledge, the production of those who will continue that pursuit, the production of educated people for society, and the preservation and transmission of society's values... Major themes in the university environment include its intellectual tradition, membership in and development of its faculty, its spirit of criticism and inquiry, and its independence from other institutions in society'. He then states: 'Architectural education by contrast draws from an artistic and professional tradition and has had as its dominant goal the production of design practitioners. It introduces its students into the profession of architecture, instilling interpersonal, intellectual, and political skills appropriate to membership in that profession, and imparting design and other skills sufficient to function effectively in that profession...'.

The training/education dichotomy leads to the argument of 'pupilage vs. schooling', which has arisen after the institutionalizing of architectural education as a higher learning discipline in the this century. Davey(1989) has rightly noted the fact that none of the extremes will totally fit the exact nature of architectural education. He quotes the rationale behind the failure of pupilage from a report submitted to RIBA by 1903. Produced by a group, including leading Arts and Craftsmen like Lethaby, the report pointed out that pupilage alone was failing because, '... it does not provide a thorough grounding in practical construction; ...that it leaves too much to individual initiative...[and] that owing to lack of preliminary training the pupil does not derive the full advantage obtainable from training in the schools... *A combination of the two systems is desirable'.* (author's emphasis).

Higgs (1990) advocates formal architectural education because; it is economical (60 students in one class), it provides the professional lecturer with more up-to-date knowledge and thus enables them to theorize on subjects and principles. It also ensures a higher standard of knowledge and skills, and, with long term goals in mind, contributes to the spread of certain divisions of knowledge, vital but not found in an architect's office, like architectural history.

Gradidge (1990), on the other side of the argument, draws attention to the advantages of the pupilage system as showing more sympathy with the nature of architecture and the training of architects. He values the way that the pupil was taught by an architect in a real-world context, not by a theoretician and in a simulation of the real world. 'The pupil is taught what he needs to know', he asserts, 'not how to design- as that is unteachable- but how to get clients and how to keep them'.

The above arguments on the education/training and pupilage/ schooling dichotomies stem from a rather more fundamental discussion of the dichotomies of *theory/practice* and *science/artistry.*

Theory is defined by Vaughan (1987) as being 'a systematized abstraction of knowledge which informs and prescribes action', whose 'ultimate value lies in its prescriptive capability'. The main concern in theory is the question of 'why?' and 'what?' rather than that of 'how?'. To substantiate the importance of theory, Vickery (1980) cites Frank Lloyd Wright as saying- when he would hold up his thumb: 'I am not interested in this thumb; I am interested in the *idea* of thumb'. Vickery also paraphrases a similar concept heralded by Louis Kahn that designing a building is not difficult after one first learns 'what the building wants to be'. Questioning (*theory*), as Vickery concedes (1980), should precede doing.

Teymur (1983) points at the unwelcome separation in architectural education of theory and practice: '...the commonly held distinction between practice and theory is an inadequate and often counterproductive tool in a discussion on education. For it must be recognized that the hands that draw and the eyes that see do so on the basis, or under the dominant presence, of those ideas, knowledge, etc. which are inaccurately, but conveniently, called theory'.

To present, '... the nature of the educational problem, which was attempted to be worked out in the Bauhaus during the Weimar period, 1919-1923', Cross cited (1983) Dewey as saying (1936): 'In spite of all the advances which have been made throughout the country, there is still one unsolved problem in elementary and secondary education. That is the question of duly adapting to each other the practical and the utilitarian, the executive and the abstract, the tool and the book, the head and the hand. This is a problem of such vast scope that any systematic attempt to deal with it must have a great influence upon the whole course of education everywhere... Utility and culture, absorption and expression, *theory and practice*, are indispensable elements of any educational scheme. But as a rule they are pursued apart'. (italic added). This statement of the educational situation of his time proves to be still valid, particularly in the context of professional education debates.

Spreckelmeyer, et al (1985), reflecting on the curricular orientation model, comprehend the essence of architecture as being '...the presence of an underlying structure that divides the task of the designer into the opposing camps of the sublime and the practical'. They add: 'In terms of architectural curricula, this structure has typically resulted in a philosophy of education that reinforces *the dichotomy between the sublime and the practical.* An analysis of most university and apprenticeship training programmes in architecture will indicate a sequence of courses split along the polarity of theoretical knowledge on the one hand and applied knowledge on the other'. (italics added).

Having deliberated *theory, practice,* and *education* as the components of a discipline, Dittmar (1984) notes that the, '... unity between these three was lost after the Gothic period, during the Renaissance.' He then calls for reunification of the three through what he calls a 'practice arm' for universities, 'a form of 'clinical' extension to... architectural programs..., the foremost mission of which is not to compete with private practice but as a laboratory to test new knowledge and ideas and to experiment with new methods, technologies, and organizational structures'. (Dittmar, 1984).

'The disjunction of the teaching of theory and the teaching of practice' has, in Vaughan's view (1987), resulted in an '...insufficient correspondence between form and meaning and a failure to link knowledge and action'. He asserts(1987): 'Students [in architecture schools] are *trained in* descriptive theory and *learn about* prescriptive theory. The confusion of description and prescription inhibits the evolution of a vital architecture'.

Donald Schon perceives (1988) the argument from a different angle. He attends to the dichotomy of science/artistry, and suggests that a marriage of the two would be quite possible if we took what he calls 'the *prospective* view of science' instead of the dominating *retrospective* one, and thus approached science as 'a method of inquiry' rather than 'a body of research results'. 'The prospective view of science', he mentions, 'reveals a kind of inquiry that is close in spirit to designing'. He asserts: 'It is when we see science and art only retrospectively, through their results, that art and science seem most disjointed. When we are exposed to their before-the-fact processes of inquiry, they seem much more like each other'.

Despite the common properties of design and science inquiries, some have reservations about equating design with science. Cross (1981b) suggests an alternative understanding of design. He proposes that '...it will be more fruitful to view design as a technological rather than a scientific activity'. Science, in his view, is analytic in search of finding out the nature of what exists, whereas design is rather constructive intending to invent things which do not exist.

There is another line of argument, worth mentioning here, which underlies the above. Distinction should be made between the notions of *science* and *knowledge* when being applied in design debates. The concept of 'science' is commonly associated with that of rational[123], systematic and explicit knowledge, while design experience proves to be based on and using different sorts of knowledge, be it or not scientific in the common sense of the term.

Schon (1984) draws on this issue when commenting on what he calls 'the dilemma of rigor or relevance'. Rigorous professional knowledge, to his view, '... does not consist only in the application of *science* to practice. There is also *knowledge*, or better yet, *knowing in practice.* People have in their doing a tacit kind of knowing. They know more than they can say...'(italics added). He then puts up his well known theory of reflection-in-action upon the people's capacity

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123 rational in the common sense of the word, associated with a restricted mode of deductive reasoning.

of what he calls 'knowing-in-action'. To his belief, people are able to reflect on what they know but cannot say[124]. (See also Chapter 6, under *We know more than we can tell*).

Chris Abel criticizes (1981) the various attempts to rationalize architectural design by attending to the relevance to design of the Polanyi's theory of tacit knowing in human sciences (Polanyi, 1966). He questions that the explicit knowledge [ie. science] in design is either attainable or even desirable. Having admitted Polanyi's explanation of how the transference and development of knowledge will be mostly by tacit means, Abel asserts (1981): 'Instead of directing research and theory in architectural education on the assumption that all will eventually be made clear and unambiguous we might well recognize learning for the tacit process it is,...'.

He then draws on the educational application of what he calls 'exemplars' in studio projects. He develops this idea by attending to the Kuhn's theory of scientific development (Kuhn, 1970), where the use of historical exemplars, rather than any reference to explicit rules or principles, is suggested to serve to initiate the student of science into the discipline. (Abel, 1981).

The idea of learning through examples, as suggested by Abel (1981), can be categorized as a form of activity learning, which appears to be a common belief among the educational theorists of our time and is of wide application in the field of professional education. Real life experience proves that when the need to learn precedes the process of learning, the acquisition of knowledge is more effective and efficient.

Building upon the above line of argument, Ledewitz (1985) introduces his 'beginning backwards' method of studio projects, the pedagogical purpose of which, he explains, '...can also be seen as helping create for students the perception of a need for knowledge. Perceived need, as we know from studies

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124 To develop this idea, Schon seems to have benefited from the Polanyi's theory of tacit knowing

of the learning process is a critical motivating factor'. To support his alternative method of 'beginning backwards', he cites Donald Schon's statement of the issue (1981), which involves starting with giving a design problem[125] to students and then moving on to the transfer of required knowledge: 'The learner cannot really understand ahead of time what it is he needs to learn, nor can he understand the meaning of what his teachers tell him, until he has immersed himself in various experiences that those who do understand make available to him.'

In their attempt to devise what they call the 'Case Problem Approach', Marmot and Symes (1985) adopt a problem oriented method of teaching based on the methods used by other professional disciplines- law, medicine, business management and industrial design. They still go further in providing links between education and real architectural problems, by their carefully designed cases as short term projects. They give (1985) the following statement to define their *cases*: '...Cases selected for the course are all grounded in daily architectural practice but provide opportunities for developing insights of a general theoretical nature concerning the task of the professional in the wider social context'. One of the celebrated gains of the case method approach, seems to be the students' experimenting with 'Contextual Studies', in the very process of designing, the result of which would be integrating *theory* and *practice*[126]. The above issue will be tackled again afterwards from the conceptual point of view and as a teaching vehicle as such.

In a similar sphere of thought, Gelernter highlights the issue of 'theory/practice' as being the heart of the problem, which he calls' the curricular split between lectures and studios'. He remarks (1988): 'Almost every school of architecture today makes a basic curricular split between lectures and studios. In the

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125 The terms 'problem' and 'problem solving' is defined by Thomas Shuell (1990) as follows: 'Typically, we say a problem exists when someone tries to achieve a goal, the(ir)* initial attempts prove unsuccessful, and several alternate courses of action are available... problem solving is a *goal directed* activity that requires an *active search* for and generation of possible alternative actions and *decision making* as to which course of action to follow next'.

126 A parallel effort is taken place at MIT University in the United States. It is recorded in Joroff, M.L. and Moore, J.A. (1984). Its main concern is the management aspects of design, whereas Marmot and Symes's approach aims at the social context of architecture.

lectures, it is assumed, students will first learn the general principles and fundamental bodies of knowledge which guide and inform all aspects of the designing activity. Later, in design studios, the students are expected to apply this universal information in order to solve a particular design problem'. Contrasting the above assumption with real experience, he asserts: '... the abstract principles offered in the lectures do not seem to be generating or shaping the students' architectural forms in the studios with any reliability'. (Gelernter, 1988).

Gelernter takes a Piagetian view to the acquiring of new knowledge and developing new skills. In both of the processes, in Piaget's view, the mind starts from 'a repertoire of mental schemata- programmes of conception or action- which in the past have enabled the individual to negotiate problems successfully' (Gelernter, 1988). Having faced a new piece of information or a physical problem, the individual first tries to solve it with one of his/her existing schemata, or in Piaget's vocabulary, to *assimilate* the problem by the schema. If no existing schema copes with the problem, then a new schema will develop through a process of searching for the closest schema to the concept or action at hand, testing it against the problem, adjusting and testing it again until it enables the individual to solve the problem. The new schema which in Piaget's words is *accommodated* to the problem, '... is put back into the repertoire for possible future use, and in this way an individual's understanding and skill grows ever more extensive.' (Gelernter, 1988) (See also Chapter 4).

A similar understanding of the problem to the above, underlies Teymur's(1979) proposal of 'experimental integrated education'. Among his prepositions he calls for: '... replacement of fixed design studios, lecture hours and timetables by a combined, integrated, non-hierarchical and intensive re-organization of learning, ...'. The latter issue will be further expanded in Chapter 6.

The points that Abel makes in his article (1981), will lead to another issue so crucial to the academic debates on architectural education; the creativity/tradition dichotomy.

Chris Abel (1994) questions the Itten's[127] approach to design education, which appears to be as well known as the Bauhaus Basic Course. In that approach, the major emphasis of the exercises was put on the manipulation of abstract form, shape and colour, and even materials were seen in abstract compositions. In the Bauhaus view the *Self*-exploration and *self*-expression of the students were the main objectives and thus clearing the mind of all cultural preconceptions was most appreciated. He also contrasts Itten's perception of creativity with that of Arthur Koestler's (1964), whereby he acknowledges that creativity comes about not from a blank mind but from making new connections and combinations between previously known and unrelated ideas (Abel, 1994). This idea embodies a clue to the reconciliation of the concepts of 'creativity' and 'tradition', propagated as being dichotomous concepts by the Modern Movement. According to the prevailing dogma of Modernism, the architecture student, even in the first year, must strive to be as original as s/he can. 'Only recently', Abel asserts (1981), 'has this dogma been seriously questioned'.

The above has been the reality of the Modern Movement, despite Gropius' declaration (1923)[128] shows another direction. It reads: 'No one who has explored the sources of the movement I have called the New Architecture can possibly subscribe to the claim that it is based on an anti-traditional obsession for mechanistic technique *qua* mechanistic technique, which blindly seeks to destroy all deeper national loyalties and is doomed to lead to the deification of pure materialism'. Then he adds: 'This in itself helps to convince me that my conception of the role of the New Architecture is nowhere and in no sense in opposition to *Tradition* properly so-called'. (his emphasis).

Gropius's statement of the 'respect for tradition' sounds logical. He defines it (1923) as meaning 'the preservation of essentials in the process of striving to get at what lies at the back of all materials and every technique, by giving semblance to the one with the intelligent aid of the other'. But the real consequences of the

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127 Johannes Itten, *Design and Form*, Thames and Hudson, London, 1975.

128 Quoted from the abridgement of his 1923 essay,'*Idee und Aufbau des Staatlichen Bauhauses'*, appeared in *'Architectural Education', 1,* 1983, pp. 53-79. The essay was originally published in Gropius's *The New Architecture and the Bauhaus,* Faber, London, 1935, Modern Movement indicate little 'respect for tradition', given the idea of internationality. The Modernist bias towards internationality and overlooking the local traditions is evidenced by the bulk of uniform glass towers of the period which grew, and even keep growing, in dramatically diverse contexts; from North America to South Africa, from India to Scandinavia and from United Kingdom to the United Arab Emirates[129].

In his *Pioneers of the Modern Movement* (1960 edition, p.214), Nikolaus Pevsner draws on the new style, in the form Gropius gave it, and notes: 'The *warmth* and directness with which ages of craft and more personal relations between architect and client endowed buildings of the past may have gone for good'. He then declares that the architect who represents this century of ours 'must be colder, *cold* to keep in command of mechanized production, cold to design for the satisfaction of anonymous clients' (italics added). The targeted 'anonymous client' does obviously imply a total disregard of tradition, which is associated with 'known client' and 'known context'.

Having its references in the 'previously known ideas', creativity is no more at variance with history and tradition. Furthermore, creativity would involve referring to history, tradition and all those things which go to provide architecture with identity and make it what it is; a culture-form[130].

Drawing on the diversity of viewpoints, which makes a self- definition as a discipline of architecture so difficult, Gardner (1974) could not have put it better: 'There is no general agreement upon the objectives of a course of architecture, which leads to an academic award which, in turn leads to a professional qualification'. He then adds: 'If the objectives of a course are hazy, then the content and boundaries of the subject must be uncertain. Perhaps this is right, for an intellectual boundary is a nonsense anyway, most of all in architecture, a

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129 There are still international movements holding the same bias, among them was the recent European Architecture Student Competition, titled 'future Bauhaus'. The brochure of its exhibition of the results, held in Dusseldorf Germany, 1-5 November 1994, accentuates the idea of: '... 'glass goes global...'

130 For more on this issue, see Chapter 5, under *Creativity.*

subject that, by its very nature, touches upon every aspect of knowledge. And knowledge will always grow and will always change our understanding of things'. The latter statement accentuates the pivotal role of the theoretical commitment in the course of structuring any architectural course.

1. 3. 5. CORE ISSUES AND ARGUMENTS

Having given a general perspective of the issues and arguments that have mainly appeared in the architectural literature during the past two decades or so, a number of the issues will be taken as the main lines of thought to contribute to the furtherance of arguement in the proceeding chapters.

Norberg-Schultz concludes his argument on architectural education by the following statement: 'It seems natural to take *architecture* as the point of departure for architectural education. But as far as we know, this has never really been done. Instead, one has taught abstract formal ideals or fragmentary aspects of planning and technics'. (Norberg-Schultz, 1966, p. 224). In his view, 'lack of an integrated theory of architecture which defines and co-ordinates the problems', is the main reason to the above mentioned shortfall.

It is timely here to point out that the emphasis on 'architecture' as the departure point of education might be argued as misleading to study of the past[131] rather than making the future, the latter being the main role of the architect. In other words, architectural education might be suggested as being the *education of architects* rather than *education for architecture*.

The above judgement sounds true, unless 'architecture' is interpreted as a *process* rather than a *product*, although the 'product definition' of architecture also encompasses the notion of 'architect' as the one who *does* it. Architecture, though, in this sense is the 'act' or 'profession' of the architect rather than the produced edifice. Within this sphere of thought, *education for architecture* would mean 'education for doing architecture' rather than 'knowing architecture', contrary

131 The author owes this point to Stuart Sutcliffe, who rightly mentioned the above possible misunderstanding, commenting on the earlier draft of this Chapter.

to the case with architectural history and theory.

Architecture, as the departure point for architectural education, is a human commitment in the course of shaping the built environment. It is, thus, a process of problem-solving and making proper decisions, purposeful, timely and, as Protzen put it (1981), *idoneous.* Although some would rightly argue[132] that the term 'problem', having got an inherent substance of negative meaning, is not a proper word to generalise the common grounds of the architects' task of design but, with compromise, the present author will use it along with the current conventional interpretation of the term in the educational literature.

There is even more to the above issue than that; according to the current conceptions of learning, which underlie the act of education, *learning* is also suggested to be 'an active, goal-oriented, cumulative process' (eg. Shuell 1990, 1988, 1986). The above mentioned process is what is meant by the term 'problem solving'. It is used as a metaphor to characterize the activity of teaching and learning (as noticed in Shuell, 1990) and, thus, it could serve as a common umbrella embracing both architecture and education. To avoid any possible misunderstandings, though, it should be made clear that the word 'problem' will be interpreted hereafter in a neutral rather than negative sense (more compatible with the terms 'question' and 'puzzle', as seen in the terminology of mathematics).

In addition to the above, the term 'problem solving' could be interpreted either as a 'method', which generally indicates a systematic / analytic approach to design, or as a higher level of human cognitive process which indicates his ability to transfer and apply an acquired knowledge of facts and principles to interpret various situations and solve various problems. The latter interpretation of the term is more widely used in the present study.

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132 In one of his tutorial sessions with the author, Charles Cockburn questioned the use of the term problem for architectural projects. The word 'problem', as he defined, conveys a negative meaning as to whether there is something wrong, which is not always the case with architecture and design. Perhaps the distinction made by the Persian terms *moshkel* and *mas'aleh* could contribute to this argument. The term *moshkel* could be taken as the exact synonym of the word problem, whereas the term *mas'aleh*, having been derived from the word *so'al* meaning 'question', is used in the same way as 'problem' is, in the context of design.

In a primal analysis, problem solving involves *acquiring* the relevant knowledge and *applying* it in the course of generating alternative solutions. In Shuell's words (1990), 'it involves both propositional (knowledge about things) and procedural (how to do it) knowledge'. Effective problem solving, as stated by Shuell (1990), requires a number of specific skills including: '(a) problem identification/posing (including problem representing), (b) distinguishing relevant from irrelevant information and understanding the problem well enough to know what information is missing, (c) searching for appropriate information (both existing knowledge and new information), (d) identifying and evaluating alternative outcomes and solution strategies, (e) knowing when and how to try out the selected alternative, and (f) the ability to use both general and domain-specific strategies'. This issue will be further expanded in Chapter 5, under *Problem solving.*

Although problem solving strategies are believed to be rather more domain-specific than previously realized, the above stated skills which, in one way or another, underlie the act of designing as well as teaching and learning, can be taken as prerequisites for knowledge acquisition and application, ie. for learning as well as for the design process.

Using the 'problem solving'[133] metaphor to think about architectural education, the core issues and arguments should address the following key questions:

a) What areas of knowledge contribute to defining and coordinating the architectural problems? As stated earlier, architectural theory, or what Norberg-Schultz would suggest as 'the integrated theory of architecture', could serve as the main resource in treating this question.

b) How the missing relevant knowledge/information is identified in the process of designing as well as that of learning to design? To address this question

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133 Problem solving is defined by Shuell(1990) as follows: '...problem solving is a *goal directed* activity that requires an *active search* for and generation of possible alternative actions and *decision making* as to which course of action to follow next. As part of this process, the problem solver must *mentally evaluate* the viability of various alternatives and then *verify* the effectiveness of the alternative selected by trying it out to see if it will work. Problem solving is clearly an active process!'

one needs an understanding of and a mastery over the problem solving procedures. It is also dependent on a treatment of the design process, dealing with the creative act of designing and its methodological aspects and their educational implications.

c) How is the relevant knowledge/information acquired (in the course of designing) and transmitted (in the course of education)? This question would involve the theories of learning and effective teaching, bearing in mind their general as well as domain-specific aspects.

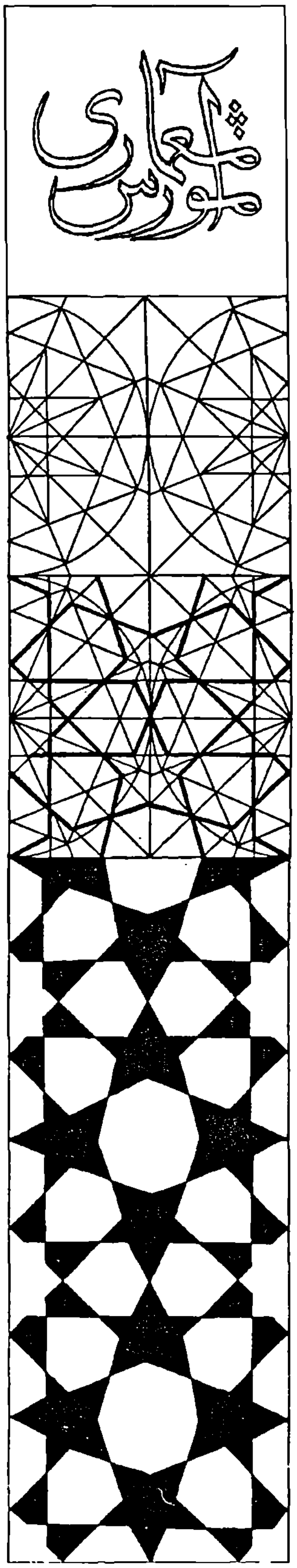
d) How is the relevant knowledge retrieved and applied, in the process of designing, to lead to the proper solution? The design process debate, as well as the teaching strategies, and on top of all the issue of learning transfer would contribute to dealing with this question.

The first question (and to some extent the second) are mainly concerned with the content of architectural education, while the rest mostly tackle the process and methods of learning and teaching architecture. While the first issue (and to some extent the second) draw upon the theory of architecture as their main source, the rest are based on the theories of learning and transfer.

1. 3. 6. CONCLUDING REMARKS

The core issues mentioned in the previous section clearly highlight the common fields of anxiety, evident in the corresponding literature, that is the *content* of education and the *process* and *methods.* Those issues concerning the question of *process* and *methods* constitute the main focus of the present research. Needless to say that the significance to education of the first issue, i.e., the *content* which is mainly determined in the light of architectural theory and the timely outcomes that are expected from education (professional paradigm of the time), is worth separate scrutiny. It should also be attended that the interrelationship between the two domains makes it inevitable to build, although not as the centre of study, on a number of basic tenets regarding the definition of architecture.

As partly mentioned before, some of the issues raised in this Chapter, will be further tackled in the course of argument on the *core concepts.* Chapters 4, 5, and 6 will undertake an investigation of theories of *learning* as well as those of *transfer* to find out the core concepts that contribute to conceptualizing a framework for architectural education, so dependent on transfer and application of learning outcomes as well as learning itself.



PART II

CORE CONCEPTS

CHAPTER 4.

MODES OF LEARNING

Whatever sort of training we think about, or whatever sort of educational experience we consider, the one thing they all need to have in common is 'learning'. (Ellington, et al, 1993, p. 22)

As... [we] learn more and more about the way the mind works, we can often learn better ways to teach. Our instruction becomes compatible with the ways in which knowledge is organised and processed. (Gage & Berliner, 1991, pp. 271-272)

2. 4. 1. INTRODUCTORY POINTS

Commencing the debate on education with *learning* presupposes the fact that any educational set up is a *learning* situation and that to establish an understanding of learning is among the first steps. Even though this might seem a statement of the obvious, yet it seems to be a proper point of departure for opening the argument. Perceived from different angles, learning is the content, the objective and also the yardstick for judgement about education. *Education* is, in fact, the advancement of learning achievements. What the exact meaning of *learning* is and what constitutes the process of learning is a relatively new line of scientific inquiry, having been launched as late as the end of the last century.

The present chapter, though, will address the issue of learning, drawing upon the findings of Educational Psychology, whose main concern is '... the study of learners, learning, and teaching.' (Slavin, 1991, p. 3). It should be made clear at the outset that the main concern will be to explore the ideas, concepts and theories which best contribute to the central objective of this study, i.e. approaching a framework for architectural education, rather than a psychological investigation. Eraut (1989) might be addressing a similar issue when he points out that in the field of applied social sciences '[A]cceptance of a theory or approach is more likely to indicate acknowledgement of its importance rather than its truth...' (p. 3) (and one might add; its potency to explain certain problems or lead to respective solutions).

2. 4. 2. WHAT IS LEARNING?

A quick review of relevant literature indicates a variety of interpretations of the term learning, particularly more illusive on the borderlines with its related notions like thinking, development and behaviour. In order to help link those notions together in a perspective and gain a rather organised understanding of the issue of learning, it seems necessary to establish a framework for the study. A preliminary survey will be made to identify the basic elements of a definition for 'learning'. This will then be followed by an attempt to pattern the different classifications of the theories of the 'size' that Egenter (1992, p. 23), in another context entitles, 'macro theories'[1].

What is learning though? 'This seems like a simple question until you begin to think about it...'(Slavin, 1991, p. 98). Three definitions of learning are cited here to initiate the argument, bearing in mind that these are quoted from three current text books, given that textbooks, in every discipline, are most likely to be unbiased and to contain well established and commonplace definitions in their relative areas of concern:

1. After the earlier mentioned remark, Slavin (in the same source) defines learning as '... a change in an individual caused by experience'. 'Learning involves', he writes (p. 125), 'the acquisition of abilities that are not innate. It depends on experience, part of which is feed back from environment'. He gives two signifiers for learning; the *change*, and its originating factor which is *experience*.

With experience as its cause, learning is apparently distinguished, in his statement, from those changes which naturally take place as 'development' or

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1 "... theories can be compared in regard to their relative 'size'. A theory which is related to a limited base can be part of a larger theoretical structure which stands on a broader base. This relation between a larger and smaller theory is here designated as one between macro- and microtheory." (Egenter, 1992, p. 23)

'maturation'. But the question how to describe the changes that are generated by *thinking* rather than by experience remains untouched. To support the above question one can cite a considerable amount of learning situations where learning occurs through observation of and thinking about others' experiences (the apprenticeship system, as an instance) and/or one's own past experiences. This is what Bandura theorises as vicarious learning (see Slavin, 1991, p. 121)

Further in the same source (p. 98), Slavin concedes that '... some theorists would not call this [i.e., learning through thinking] learning. Instead it might be interpreted as a case of delayed learning originated by deliberate instruction, years of experience and mental effort'.

2. Good & Brophy (1977, p. 133) suggest learning as 'the development of new associations as the result of experience'. 'It is an internal event', they add, 'not directly observable, although its effects can often be documented through recording systematic changes in behaviour'. Albeit experience is again taken here as the basis of learning, which was pointed to as a matter of questioning, this definition exhibits a wider perspective of the issue particularly in terms of considering the 'process' of learning as well as its 'result'. The notion of association, though, can be questioned as narrowing the definition down to the relations between the environmental factors and the learning achievements, taking little account of the learners' 'mediating processes- their strategies and plans' (Wittrock, 1987). Conversely, Gestaltists, for instance, hold that learning occurs through restructuring the perceived elements rather than associations between stimuli and responses; they conform to meaningful, as opposed to rote learning. (see Mayer, 1983, p.42). The latter issue will be tackled further in this chapter, but turning back to definitions, the idea of learning as a process, is more elaborated in the third citation which follows.

3. *Learning* for Gage & Berliner (1991, p. 225) is, '... the process whereby an organism changes its behaviour as a result of experience'. The notion of learning as a process means that it takes time, and according to the above definition, only changes in behaviour that occur in that process, can be associated with learning.

'Behaviour', they explain, *'refers to some action, ..., or combination of actions'.* It can be argued here that the notion of behaviour delimits the wide scope of human learning, which in certain cases might result in a change of attitude or thought without necessarily an observable result. Attending to the latter issue they declare it inevitable to study behaviours since it is the only conceivable way of approaching the act of learning, given that learning itself is an internal event and thus, unobservable. They write; 'The overt behaviours of talking, writing, moving, and the like allow us to study the cognitive behaviours that interest us-thinking, feeling, wanting, remembering, problem solving, creativity, and so on' (p. 225).

Use of the term *organism* instead of say *individual* in the above definition is another matter of questioning. It is reminiscent of a prevailing tendency among psychologists (particularly the behavioural ones) to seek the general laws common to all organisms (see Good & Brophy, 1977, p. 144). It is true that extensive experiments on dogs, cats, pigeons, etc. have shaped the foundations of the discipline of learning psychology and some of them have generated valuable developments in designing instruction strategies, but whether the higher levels of human cognition can share a common definition with learning in other organisms is a serious question to be raised.

Good & Brophy, though, extend the interpretation of learning by calling it 'a dynamic and active process'. 'We are not passive containers into which knowledge is poured', they assert, 'we are active information processors who decode information coming in and recode it in our own terms in the process of learning it[2].' (1977, p. 131). The latter statement focuses on human learning and apparently adopts a *cognitive* perspective which is the prevailing trend of learning psychology today (see bellow for more about cognitive and behavioural views).

Psychologists, in general, differentiate learning from related notions like behaviour and thinking (although the literature on the theories of learning and thinking evidences the use of the terms interchangeably). It can be interpreted, in a

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2 This definition will be expanded later, under Information Processing Model of Learning.

sense, that *thinking* might lead to *learning* and learning might or might not manifest in *behaviour* or performance.

An overview of the current literature about definitions of *learning*- some of which cited above, reveals a number of basic elements which can be taken as basic notions, while the differences indicate the variety of viewpoints. It seems more appropriate to avoid trying to put all aspects of learning in one short definition. Thus the major attributes of learning are catalogued bellow:

- Learning is an internal event that can not be identified unless through perceiving its overt results.
- Learning (*as an achievement*) is a change in behaviour (overt as well as cognitive behaviour).
- It should be distinguished from changes which are innate (development, maturation, etc.).
- It happens through association of 'unknown' with 'previously known' (learning by association).
- Learning is caused by experience, part of which is feed back from environment (trial learning).
- It can also be caused by attending to others' and/or one's own past experiences (vicarious learning).
- Learning (*as a process*) constitutes several cognitive activities like thinking, feeling, problem solving, etc.
- It also occurs through restructuring the subject according to the learner's mental structure (meaningful learning or learning by understanding).

So far, the argument was developed upon the variety of definitions of learning but there are more issues to be explored to provide a procedural understanding of learning, so central to education. Before moving further on to the theories-of-learning debate which is all about how to explain the act of learning and how people learn, it is appropriate to take the argument one step back and ask why it is that people commit learning- Why do people ever learn? Whatever the answer to this question, it would indicate one's interpretation of human nature which apparently biases one's way of describing the process of learning, as well as designing instructional strategies. Such an inquiry may help to achieve a better insight to the various positions taken by the learning and instruction theories and provide a wider perspective of educational systems.

Attending to the very question, Good & Brophy (1977, p. 138-139) identify Learning theories by their underlying interpretation of human nature. They categorize those in four major approaches to be entitled as; a) *Human as evil,* b) *Learning as enjoyment,* c) *Natural goodness and curiosity* and, d) *the blank slate.* Using the above source, a short statement of each approach follows:

a) *Human as evil:* In this approach no internal motives are conceived for human beings. People are not likely to indulge in learning unless they are forced to. Such a philosophy could have provided the theoretical basis for the rigid and highly disciplined educational systems of the past.

b) *Learning as enjoyment:* 'The pursuit of pleasure and the avoidance of pain' as the fundamental motive of human learning is the underlying idea here. The common trend to make learning experiences 'as enjoyable and intrinsically rewarding as possible', stems from this philosophy. People are assumed to volunteer for learning only when and where the above need for enjoyment is met.

c) *Natural goodness and curiosity:* This view represents a rather humanistic position. People, in this sphere of thought, are curious to know, and their curiosity leads them to indulge in learning. This view underlies theories that build upon the learners' readiness and internal motives and, thus, insists on discovery as the major route to learning.

d) *The 'blank slate':* The core idea in this view is that humans have 'few if any natural predispositions'. The main source of learning, then, is the Individual's experiences, which '... are determined by the environment and are thus open to planning and control'. 'In its strongest form', the same authors acknowledge, 'this approach pictures learners as almost entirely passive and reactive, so that their behaviour can be controlled predictably and systematically through environmental manipulations.' (p. 139).

Having cited the above categories, the present author holds that these could all be true but not the whole truth. The Human being, complex and multi-dimensional as he is, hardly conforms to such categorisations. These can be helpful in terms of revealing the very complexity of human dimensions; the various aspects of his nature. More, although some of the above notions might be better accepted, but life experience evidences that a degree of reality exists in all of them. Perhaps this is why educationalists, who deal with the realities of human learning, tend to apply a spectrum of useful theories, regardless of the categories or trends they seem to fall into (See Good and Brophy 1977, p. 165, Slavin 1992, p. 124).

It will be maintained afterwards that the very development of the learning and instruction theories has been towards rather hybrid theories encompassing many or all seemingly diverse aspects of human learning.

Wilhelm Muhlmann could not have put it better in another context, when he wrote 'The eternal oscillation of theories, which all provide us with *particular aspects of the whole truth*, guarantees that we stay continuously in close contact with ultimate reality, although incapable of grasping it to the full extent;...' (in Egenter, 1992, p. 25) (emphasis added). Good and Brophy also concede that those interpretations of human nature 'are stereotyped extremes... [and] most theories involve mixtures of these approaches' (1977, p. 139).

The definition of learning as well as the philosophical ideas behind different theories have been tackled so far, now it is time to move on to the 'Hows' of learning which are central to learning theories and indeed, the most contributing concepts to the present study.

2. 4. 3. HOW DO PEOPLE LEARN?

As was maintained earlier, to have a better understanding of the variety of theories, a framework should be devised to accommodate what were called earlier 'macro theories'. To fulfil the above contention, the current text books and encyclopedic sources in the fields of psychology of learning, thinking and instruction are consulted[3]. Perceiving the different ways of classifying learning

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3 To spot the key sources and conduct this part of study, the author has mostly benefited from interviews with Dr. Chris Kyriacou at the Department of Educational Studies, University of York.

theories provides an outline of the general scheme which is sought here;

Slavin (1992) elaborates the 'learning theories' in the structure of his book, subdividing them in two main approaches; Behavioural and Cognitive (p. 99, and also the table of contents). A similar classification is held by Good & Brophy (1977, 165), although they put learning theory under the classroom management debate highlighting the main function, in their view, of those theories.

Gage & Berliner (1991) tend to draw on practical applications rather than theoretical implications of ideas, but when they come to classify the theorists in terms of their focus, they identify them in two groups; the behaviourists and the cognitive psychologists (p. 225)

Pressley (with McCormick) (1995) take a rather fresh perspective in dealing with theories. They strongly hold that even the seemingly contradictory theories complement one another to provide a complete understanding of the human learning process. Therefore, ignoring the common classifications, they deliberately put the somewhat contrasting theories together to explore their complementary elements. Following the above contention, they assert somewhere; '... we believe that none of them offers a conception that can stand alone, but that all of them offer perspectives that complement one another.' (p. 181). While pointing at the commonplace grouping of theories, they write; 'Instructions that include both behavioural and cognitive components are more powerful in many situations...' (same source, p. 212). They suggest the future direction of the discipline of educational psychology as being towards pulling together of the findings of differing theories by grand theories of the kind that are capable of 'combining the two [behavioural and cognitive] traditions'. What were designated earlier as macro theories.

Taking the instructional aspect of the theories, Wittrock (1987) in his contribution to the International Encyclopedia of Teaching and Teacher Education identifies three psychological perspectives as underlying what he calls models of heuristic teaching; Behaviouristic, Cognitive and Humanistic. The latter perspective, also mentioned by other authors, is mainly elaborated here because of its identical emphasis on the 'individuality and uniqueness of learners' which clearly influences the instruction strategies. This approach to learning is, but, of a cognitive nature and can conveniently fall into cognitive tradition. (see Wittrock, p. 70)

With thinking as its main focus, psychology of thinking perceives the issue from a different angle and, thus, comes up with a different classification of theories. Mayer (1983) identifies three trends in the modern psychology of learning; 'Behaviourism, Gestalt, and Cognitive psychology (p. 16). Behaviourism, from his standpoint, is defined as being hostile to research on 'thinking', while Gestalt psychology of the 1920s, as well as Cognitive psychology of the second half of the century, contribute to developments in the psychology of thinking.

Two major streams in theorising the mechanism of thinking, as a prerequisite for learning are identified by Mayer as follows; *Associationism,* 'based on the principle of learning by reinforcement', and *Gestalt,* based on 'the idea that thinking involves restructuring the elements of the problem in a new way'. (Mayer, 1983, p. 10). The latter will be mentioned later along with the cognitive trend.

'Learning has been studied for over a century, and probably more than any other topic in psychology' (Good and Brophy, 1977, p. 134), but only a portion of the findings have got instructional applications[4]. Apart from the very specificity of some areas of research, which might have made them inapplicable to life situations, much of it has been conducted under circumstances that have little to do with real educational settings. Moreover, it is appropriate to be mentioned that learning, in an architectural education setting, is meant to contribute to the act of designing in its broad sense. Therefore, the overview of learning theories and concepts will mostly focus on those which, to the author's judgement, are found as having useful implications in terms of *applicability* and *transferability* of knowledge and/or having been influential in the development of ideas.

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4 Recent theories and research, though, tend to consider teaching as well as learning (Good and Brophy, 1977, p. 133).

Transferability of learning is, in a sense, the final aim of any educational endeavour. Much of the knowledge transmitted through schooling is not for its own sake but for its usefulness. 'Ultimately, schooling is intended to produce learning that will transfer to life situations in ways that will make us able to cope with them successfully' (Good and Brophy, 1977, p. 182). This proves to be more vital to architectural education which, by nature, is meant to lead students to '... work at generalising and applying what they know; to be active transferrers' (Gage and Berliner, 1991, p. 322). The concept of 'transfer' is considered by the present author as one of the central issues to architectural education. It will, therefore, be discussed separately in the following chapter *Learning for competence.*

As stated earlier, regarding their approach and perspective, learning theories have developed in two major streams; *Behavioural* and *Cognitive*[5].

Behavioural learning theories are mostly concerned with the outcome of learning as *observable behaviour*, 'speaking of stimuli, responses, reinforcement, and types of, rates of, and changes in performance' (Good and Brophy, 1977, p. 144). These theories, the above authors add, 'for the most part... avoided terms such as "goal", "motive", "intention", and even "logical thinking", because these could not be observed or measured'. Cognitive theories, in contrast, emphasise the unobservable *mental processes* that lead to learning achievements. They are interested in studying the internal factors which facilitate learners' active learning, rather than external manipulations.

2. 4. 4. BEHAVIOURAL TREND

At the turn of the century Pavlov in Russia, developed the basics of what became known as *stimulus-response* theory (S-R). In that, behaviour is seen as a response to stimuli in the environment (Slavin 1992, p. 101). Through his well known experiments with dogs, Pavlov showed how *neutral* stimuli gain the power of evoking responses by being paired with unconditioned stimuli, which already

5 'The boundaries between Behavioural and Cognitive theories of learning have become indistinct in recent years as each school of thought has incorporated findings of the other.' (Slavin 1992, p. 99). This view, as mentioned earlier, has been expanded in Pressley (1995).

enjoy that power. Neutral stimuli, though, turn to *conditioned* ones through the process of *conditioning.*

Turning back to the definition of learning as 'change of behaviour', it is revealed that Pavlov's model, at best, covers the reflexive behaviours that are common to all organisms. The intellectual behaviours, though, remain untouched by this model. Moreover, the instructional implication of the S-R approach considers learning as determined by the environmental factors or stimuli and hence, the learners as manipulatable subjects to instruction- recall *the blank slates.*

The above idea was further developed by Thorndike and became the dominant trend in the psychology of the United States for decades[6]. He maintained that responses, as well as stimuli, are likely to be conditioned through experimental manipulations or 'trial and error. This implies that different responses to certain situations can be learned through what came to be called *instrumental conditioning,* as opposed to *classical conditioning* of Pavlov. These conditioned responses, though, would be instrumental in helping the learners reach their goals (Good and Brophy, 1977, p. 142).

Through observations of cats in his famous puzzle box, Thorndike explained how learning occurs through association of stimuli and responses. Learning, according to Thorndike, is achieved through trying various responses until one succeeds to solve the problem, or in his words; 'by trial and error, and accidental success' (see Mayer, 1983, pp. 20-21). In this view, as will be maintained later, learning is achieved by testing and choosing proper responses from the existing reservoir, rather than creating new ones; a reproductive rather than productive process.

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6 Koestler is struck by the dominance of behaviouristic view in the first half of the century when he writes (1964, p. 557): 'How, just at a time when the mechanistic conceptions of the nineteenth century had been abandoned in all branches of science, from physics to embryology; how just at that time, in the 1920s, the concept of man as a rigid mechanism of chained reflexes could become fashionable in cultures as different as the United States and the Soviet Union is a fascinating problem for the historian of science'.

'Law of Exercise' and 'Law of Effect' were the most influential laws of learning developed by Thorndike. The law of exercise can be taken as Thorndike's version of the English expression "practice makes perfect". It states that practice increases the specific stimulus-response link. It was questioned afterwards whether exercise was sufficient to make things perfect. So he himself later on modified this principle, admitting that exercise was necessary but not sufficient. Exercise plus feedback, could lead to improvement of performance (See Good and Brophy, 1977, pp. 142,143). But how the environmental feedback influences the act of learning, is explained by the 'law of effect'.

His 'Law of Effect', is seen (from the same source) to be a '... version of the pleasure-pain principle'[7]. According to this principle, any behaviour would be either strengthened or weakened when followed, respectively, by a favourable and/or unfavourable response. This law explains how a relevant response, after a number of successful trials, turns out to become a reinforced habit. These two principles explain the mechanism which operate in the pragmatic approach of trial-and-error. Perhaps the most important contribution of Thorndike was to maintain that all learning experiences, whether mental or practical, do have transfer value. This was obviously refuting the then traditional view which held courses like mathematics and classical literature as having particular merits in providing 'mental discipline' and foster thinking faculties.

Behaviourism, apart from the fundamental contribution of Pavlov, Thorndike and others, is associated in its apogee with Skinner. Skinner is believed to have been, as Good & Brophy (1977, p. 155) hold, 'the dominant force in behaviourism and in learning psychology generally'. Like Thorndike, his approach to human learning was based on the relation between behaviour and its consequences. His work has focused on controlling the behaviour through using consequences, the process labelled by him as *operant conditioning.* This is why he makes reinforcement so central in his theories. The development of 'programmed' and

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7 This theory is entitled by Koestler (1964, p. 496) 'a stick-and-carrot theory' when he criticizes the behaviourist system of thought.

'self- pace' learning[8] and invention of 'teaching machines' are believed to have been lead by the Skinnerian principles (See Good and Brophy 1977, p. 154).

Having mentioned various versions of the behaviourist tradition, one might question whether it is possible or even necessary to learn from consequences. Is it necessary to burn ones hand before learning not to touch the boiling water or one can easily learn it through being warned and instructed? How can one explain, though, the process whereby an apprentice learns through imitating what his or her master does? What is the significance of learning from history which is clearly dealing with others' experiences?

'Social learning theory' or learning through 'modelling', is seen as 'a major outgrowth of the behavioural learning theory tradition' to respond to the above questions. This theory owes its development to Bandura. Unlike predecessors' emphasis on the effects of the consequences of behaviour and trial and error, this theory signifies the learning value of modelling. Modelling is defined as 'learning by observing other's behaviour' or from 'others' successes or failures'- vicarious experience (See Slavin 1992, p. 119).

Although being among behaviourists, Bandura accounts for 'internal mental processes' and 'the effects of thought on action and action on thought' (Slavin 1992, p. 119). Therefore he can be taken as the foremost among behaviourists who draw near to the cognitive sphere of thought. Social learning theory, though, '... helps bridge the gap' between the two perspectives (Slavin 1992, p. 124).

Before moving on to cognitive perspective, a few points must be added regarding the educational implications of the concepts mentioned so far:

Firstly, the most direct application of the behavioural theories is in the development of teaching methods at the classroom level, mostly through use of reinforcers, punishers, motivators or other techniques generated from those

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8 Skinner is quoted by Pressley (1995, p. 199) as saying: 'We could double the efficiency of education with one change alone- by letting each student move at his or her own pace'.

theories. These are, to some extent, beyond the scope of the present study which is looking for educational frameworks rather than teaching strategies. Moreover, those techniques are more coherent with the primary levels of education which are more institution rather than student-centered and intellectual motives are less in operation. Secondly, even so the development of individualised instruction strategies, such as programmed and computer aided instruction can play a significant part in architectural education where the multi-route and self-paced education calls for students to be able to take subject disciplines due to their preferences. And finally, as will be acknowledged later, many of the ideas developed by behavioural theorists have found fresh interpretations within the cognitive sphere of thought and thus retained their validity and influence in the hybrid theories of the recent years. (eg. see Pressley, 1995, p. 208).

2. 4. 5. COGNITIVE TREND

It seems appropriate at the outset to identify a number of closely related terms which are used by cognitive psychologists, but with separate interpretations. The short but clear statement of Mayer (1983) is cited here to clarify those definitions. He acknowledges the separate cognitive processes as including: 'sensation and *perception* (reception and recognition of input stimuli), *learning* (encoding of input information), *memory* (retrieval of input information), and *thinking* (manipulation of perceived, learned, and remembered information)'. 'These topics', he adds, 'form the core of what has been called *cognitive psychology*' (Mayer, p. 8) (italics added). Another point to be made here is that the above processes are closely interrelated. Thinking, thus, might end in new learning and learning, in turn, influence the process of perception.

Albeit cognitive movement is associated with the second half of the century, it shares many of its basic concepts with the short-lived Gestalt psychology of the 1920s. (Mayer, 1983, pp. 16-17). Therefore, a short account of the Gestalt movement seems opportune here.

Gestalt psychology was the first movement[9] to explain learning in different terms from what was the common knowledge since Aristotelian 'associations'. According to *associationism*, human mental process comprises of two basic components; ideas and associations. (Mayer, 1983, p. 11). Learning can be explained, in Aristotelian view, by three laws or doctrines:

"*Doctrine of association by contiguity* - Events or objects that occur in the same time or space are associated in memory, so that thinking of one will cause thinking of the other.

"*Doctrine of association by similarity* - Events or objects that are similar tend to be associated in memory.

"*Doctrine of association by contrast* - Events or objects that are opposites tend to be associated in memory". (Quoted from Mayer, 1983, p. 12).

Thinking was asserted by Aristotle as being a matter of moving from one idea to another 'via a chain of associations'. He also asserted that such thought was impossible without images: "We cannot think without imagery". (Quoted in the same place).

Thinking, in the associationist view, is the 'trial and error application of the pre-existing response tendencies', Mayer writes. He adds that '... the three elements in an associationist theory of thinking are: the *stimulus* (a particular problem-solving situation), the *responses* (particular problem-solving behaviour), and the *associations* between a particular stimulus and a particular response'. (Mayer, 1983, p. 22) (italics added).

Being based on the past experiences, the associationist view of thinking and learning can be criticised as being counterproductive, searching for already

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9 Selz (1913) is reported by Mayer (1983, pp. 14 -16) as being the first who developed 'the first nonassociationist theory of thinking'. The main concepts he developed were, Mayer writes, '... that the unit of thought is a structural complex of relations among thoughts rather than a string of particular responses and that the process of thinking involves filling in or completing a gap in the structural complex rather than following a chain of associations'. (Mayer, 1983, p. 14)

developed responses in a probabilistic basis, rather than innovative ideas and responses. This very criticism is the bedrock of the Gestalt approach to thinking. In Gestalt argument, thinking can either be '... based on creating a new solution to a problem, [which] is called *productive* thinking because a new organization is produced; ... [or] on applying past solutions to a problem, [which] is called *reproductive* thinking because old habits or behaviours are simply reproduced[10]. (Mayer, 1983, p. 42).

The main tool Gestaltists used for understanding the 'highly complex mental processes, [*productive thinking* in their words]... was the idea that problem solving involves reorganizing or restructuring the problem.' (Mayer, 1983, p. 77).

'*Gestalt* is a German word meaning "form" or "configuration". Gestalt psychologists... suggested that we perceive whole units rather than pieces of sensation, that the whole of a sensation is more that its parts'. (Slavin, 1991, p. 132).

Pointing at the short life[11] of Gestalt psychology and its destruction by Nazism, Mayer acknowledges that '... research on thinking did not re-emerge on a large scale until what Gardner (1985) calls "the cognitive revolution"'. Then he adds: 'The development of electronic computers, cognitive theories of development and language, and a shift from studying laboratory animals to humans all converged to produce modern *cognitive psychology* during the late 1950s and 1960s'. (Mayer, 1983, p. 16)

After a brief overview of the Gestalt movement, as the predecessor of the cognitive trend, three influential figures of cognitive psychology are denoted here

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10 The distinction between productive and reproductive thinking has also been called a distinction between "insight" and "trial and error", between "meaningful apprehension of relations" and "senseless drill and arbitrary associations", between "structural understanding" and "rote memory". (Quoted from different authors, in Mayer, p. 42)

11 'The rise of Nazism during the 1930s put an end to the work of many Gestalt psychologists, although some did continue their work elsewhere...' (Mayer, 1983, p. 16). One recalls the similar destiny of the Bauhaus movement.

to represent[12] the development of what turned out to be today's dominant trend in psychology of learning[13]; those are Piaget, Bruner, and Ausubel.

'Piaget's theories', Good and Brophy write (1977, p. 159), 'emphasize very strongly the concept of learning as *active* information processing (to be expanded later in this chapter), resulting in exploration and *discovery*'. 'For Piaget', they add, 'stimuli are not external events that "control" people by "eliciting" their attention or reinforcing their responses. Instead... people act on stimuli. *Learning is what people do to and with stimuli, not what stimuli do to people.* (italics added).

The point should be made here is that the above concept, also elaborated by Bruner and others proved to give rise to what is called the 'constructivist' approach to human learning (See e.g. Slavin, 1991, pp. 192-194). In this perspective, larning is, indeed, *reconstruction* of the coming information through learner's mental processes. It is, in fact, the *interpretation* of what is received by the learner from the environment. This approach appears to be a macro theory of wide acceptance in today's Educational Psychology circles.

Unlike behaviourists, Piaget perceives new learning as the development of new schemata (See bellow) through accommodation, rather than that of new associations or links between the stimuli and past experiences. The process of accommodation as well as that of assimilation, for Piaget, are active processes in which the learner plays the decisive part. (See Good & Brophy, 1977, p. 159).

Perhaps no one is as much emphasizing *discovery* as Piaget, as the only way toward complete understanding. He even holds nondiscovery approaches as being harmful. (See Pressley, 1995, p.8). He claims that '... each time one prematurely teaches a child something he could have discovered for himself, that child is kept from inventing it and consequently from understanding it completely'.

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12 Taking these three figures as representative of cognitive trend, is after Good & Brophy (1977).

13 Educational psychology has largely become a cognitive psychology of education... (Pressley, 1995, p. 206).

(Piaget, 1970, p. 715, quoted in Pressley, 1995, p. 8)

Having worked with Piaget for some years, Bruner shares many ideas with him. He (1966, 1971) agrees with Piaget that '... learning involves the active processing of information and that it is organized and constructed in a unique way by each individual'. (Good & Brophy, 1977, p. 160). He concedes that, write Good & Brophy (same place); 'Knowledge about the world is not simply "poured into" the individual like liquid into a glass. Instead, individuals attend selectively to the environment, process and organize the information they take in, and store this information into their own unique models of the environment'.

Bruner's (1966) *discovery learning* is believed (Slavin, 1991, p. 192) to have been the most influential cognitive model of instruction.. 'Bruner argued that the teacher's role must be to create situations in which students can learn on their own, rather than to provide prepackaged information...' (Slavin, the same place). Students, in this sense, would construct their own understanding of the matter rather than receiving it.

As the notion of discovery learning is associated with Bruner as well as with Piaget, it seems to be the most appropriate to develop that argument at this very stage. The notion of schema which is also central to Piagetian thoughts, will be addressed later on when drawing on the information processing theory.

Discovery learning, as many educators after Piaget and Bruner believe, is the best way of achieving 'deep understanding of science' and also 'improving student attitudes toward science' (Pressley, 1995, p. 377). Merits of discovery learning is enumerated by Slavin (1991) as follows; 'First, it arouses students' curiosity, motivating them to continue to work until they find answers... Second, this approach can teach independent problem-solving skills, and may force students to analyze and manipulate information rather than to simply absorb it'. (Slavin, 1991, p. 192).

Although the effectiveness of learning through discovery is hardly disputable, its efficiency can be questioned in many cases. 'For many students', as Pressley

(1995, p. 9) acknowledges, 'discovery is inefficient at best, requiring far longer than it would to teach the same strategies... using direct explanation'.

One could also ask whether all students would discover what they are expected to gain to satisfy the demands of schooling. Moreover, there is always the risk of misunderstandings, that is the question whether or not learning is *correct*. Pressley (1995) is pointing at the same question when he writes; 'That there are so many science misconceptions among students who have acquired scientific knowledge on their own makes it obvious that pure discovery learning alone is not always a good idea, however, despite its enduring attraction to some science educators' (p. 337). He concedes, somewhere else (p. 9), that, '... pure discovery sometimes produces less learning, less efficient learning, or less "correct" learning than educators might desire'.

The above criticisms and the like stimulated attempts to modify the theory of discovery learning. These attempts generated a spectrum of teaching strategies with *discovery learning* and *direct instruction* at two extremes. Along that spectrum, learners would have, respectively, the maximum and minimum participation in the process of instruction. These instruction strategies will be stated later on.

Ausubel was the one who drew on the question of discovery versus direct instruction, by proposing an alternative approach to instruction, called *reception learning*. (Slavin, 1991, p. 194). Although he acknowledges the importance of discovery learning, 'Ausubel notes that it is inefficient or even impossible under some circumstances'. (Good & Brophy, 1977, p. 163). More, Ausubel holds that, 'didactic teaching often is the simplest and most efficient method to produce learning'. (The same source).

Instruction, according to reception theory is '... to structure the learning situation, to select materials that are appropriate for students, and then present them in well-organized lessons that progress from general ideas to specific details'. (Slavin, 1991, p. 194).

The discussion of *rote* learning as opposed to *meaningful* learning is another contribution of Ausubel. Rote learning is the memorization of facts and concepts, whereas meaningful learning is one which relates to learner's pre-existing knowledge (or in other words, schemata). (See Slavin, 1991, p. 163). The significance of this concept, although recognized earlier by the Gestaltists, appeared to be one of the requisites of learning transfer which will be expanded in the following chapter.

Ausubel's name is also associated with the notion of *advance organizers*, proposed by him '...as devices to facilitate learning and retention [through making the information meaningful and familiar to learners]'. (Good & Brophy, 1977, p. 164). The process of using advance organizers is explained by Gage & Berliner (1991, p. 282) as follows: 'The instructor provides students with an *advance organizer*- a brief introduction about the way in which information that is going to be presented is structured'. 'The advance organizer', they continue (The same place), 'is like a set of general concepts that helps students organize the more specific material that follows'. This technique stems from the very notion of meaningful learning which constitutes the assimilation of new information in the existing knowledge structure.

The advance structured preview of the content is assumed, as Mayer proposed, '[to] activate prior knowledge (i.e. , schemata) that would increase the likelihood that the learner would be able to understand new information by relating the new content to prior knowledge' (i.e. , to assimilate the new content to prior knowledge). (quoted in Pressley, 1995, p. 311). In this sense, as Brooks & Dansereau (1987) notice, '... the prior content knowledge of a learner, if it is meaningful knowledge, functions similarly to Ausubel's... advance organizer'. (p. 136). Ausubel's concept of *advance organizers*, to the present author's view, enjoys a great potency to be used as a mental device in theorizing a framework for architectural education. (See Ausubel, 1960). The latter point will be further argued in Chapter 7.

Having cited the classical contributions to the cognitive trend, it seems timely to draw upon what can be called, to use Egenter's term (1992, p. 23), the 'macro-theory' of *information processing*; a theory which, in a cognitive sphere of thought, tries to explain the internal process of acquisition of knowledge and information. Slavin writes (1991, p. 130): 'What is the process by which information is absorbed, and how can teachers take advantage of this process to help students retain critical information and skills? These are questions that... have led to *information-processing theory'.* (Slavin, 1991, p. 130).

2. 4. 6. INFORMATION PROCESSING MODEL OF LEARNING

Based on theories of cognitive psychology, learning is conceptualized by the *information processing model* which perceives learners as active processors who decode, encode, store, retain and retrieve, or in one word *'process'*, the information received through senses.

Information processing theory, interprets human learning by looking through both biology and culture (the biological mechanisms of human brain and the socio-cultural environment) as its contributing disciplines. (See Pressley, 1995, p. 225).

The various routes the incoming information passes until it becomes a part of knowledge structure, is demonstrated by authors in conceptual models and flow charts (See for example Slavin, 1991, and Gage & Berliner, 1991). Despite subtle differences between these models, their main components are all common.

The model presented here is mainly based on what Gage & Berliner (1991, p. 273) suggest, while borrowing some complementary terms and points from Slavin (1991).

According to this model, the main components of memory are *Sensory Register* (or Short-term Sensory Storage); *Short-term Memory* (or Working Memory), *Long-term Memory*, and the interactions between these.

As shown in the following figure, the 'input stimuli' or the information from environment is the starting point of the process. 'In order for the stimulus to work its way through the information-processing system', Gage & Berliner write (1991, p. 272), 'it must first elicit... a response that focuses ... *attention* on the stimulus.

This begins the internal mental process'. (italics added).

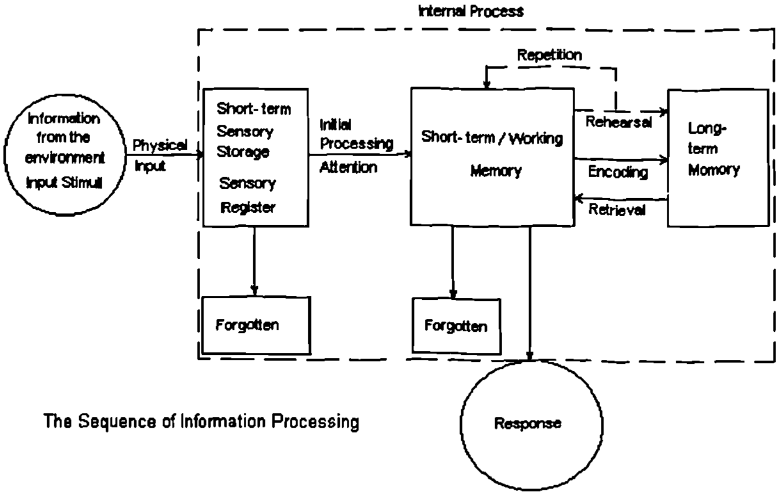

Figure 11. *An Information-Processing Model of Memory, adapted from Gage & Berliner.*

What happens, then, in the process to the information? Does it alter while being processed? Or is it perceived as it is received? The information processing model, like other cognitive theories, believes in learners' active contribution to the mental process. Pointing at this issue, Slavin acknowledges: 'As soon as stimuli are received by the senses, the mind immediately begins working on some of them. Therefore the sensory images that we are conscious of are not exactly the same as what we saw, heard, or felt; they are what our senses perceived. *Perception* of stimuli is not as straightforward as reception of stimuli; rather, it is influenced by our mental state, past experience, knowledge, motivations, and many other factors'. (Slavin, 1991, p. 132).

The Sensory Register stores the information from the environment for a short time, 'no more than a couple of seconds' (Slavin, 1991, p. 130-131). What happens next and which information would work its way through the process, is determined by the learner's *attention.* As Gage & Berliner (1991) suggest: 'This is a particularly important point in the process because *what we currently are processing* in our working memory *is a chief factor in determining the stimuli we attend to.* If we do not pay attention to the new information coming in, it's forgotten; if we do pay attention to it, it moves from Sensory Register to the short-term memory and working memory storage systems'. (p. 272) (italics added).

The latter point enjoys significant implications for education in terms of stimulating the learner's attention. *Attention*, as inferred from the above statement, would determine whether the received information is ever likely to be processed. (One recalls the function of 'advance organizers' as discussed earlier).

'Information that a person perceives and pays attention to is transferred to the second component of the memory system, the *short-term memory* [or working memory]' as quotes Slavin (1991, p. 136).

Information in Short-term Memory, '...if rehearsed or encoded, remains the focus of attention or is passed along to Long-term Memory.... The information stored in long-term memory is almost never forgotten, although we may be unable to retrieve it because of a failure in the way we search for it'. (Gage & Berliner, 1991, p. 272). Pointing at the functions of short-term and long-term memory storage systems, Gage & Berliner add: 'Any response we might make... stems from working memory, either directly or through retrieval from long-term memory. (pp. 272-273).

Before moving on to the long-term memory, a point to be usefully appended here is that, although the theory of short-term memory has been questioned by some researchers but since its main features are evidenced by observations these views are not incorporated in the present argument. Those features are; the limited amount of information one can rehearse in one point in time (Anderson, 1995, p. 175), the rapid forgetting function displayed from short-term memory (or whatever it be called) and the influence of long rehearsal on the amount of infomation transmitted to the long-term memory. The questions posed to that theory are; 'whether there really are fundamental differences in forgetting functions of short- and long-term memories' (same source, p. 173), and whether it is the length of rehearsal which is critical or else its depth and meaningfulness (same source, p. 174), or in brief whether there is such a thing as a short-term, halfway station to long-term memory. (same source, p. 174).

Due to research findings, reported by Gage & Berliner (1991, p. 278-279), the storage capacity of the Long-term Memory 'is virtually unlimited'. Storage of information, then, is not problematic. 'The problem is', they concede (In the same place), 'one of *retrieval*, locating the information in... [Long-term Memory] and bringing it up as the focus of attention in... [Short-term Memory or Working Memory]'. (italics added). 'The first step in retrieval process', according to the same source (p. 324), 'is making the information meaningful. We do this by making associations_ by tying something that is to be learned to something the students already know'. The function of advance organizers, hierarchical and organized structure of the content, conceptual models and learners' schemata are among mediating devices which help learners generate meaning for the information they receive and thus retrieve it more easily.

Since information is received through different senses, a question arises here as to what the shape of memory would be like. Dual code theory of memory, as Slavin (1991, p.141) reports, hold that '... information is retained in long-term memory in two forms: visual and verbal'. The form of information, in this sense, corresponds to the sensory input; what people see is stored in pictorial form, whereas what they hear or read is retained in verbal form.

Apart from the above, another distinction can be made about what is stored. That is, as Gage & Berliner quote (1991, p. 280), the distinction between 'declarative knowledge and procedural knowledge'. They write (In the same place); '*Declarative knowledge and information* is about factual things. It ...[is] composed of two types- episodic and semantic. *Episodic memory* refers to the personal, dated, autobiographical memories that we all have stored... A particular episode marked by place or time is the kind of memory we denote by the term "episodic" memory'. But semantic memory, they explain (In the same place), '... is about concepts, principles, and characteristics of objects, all without personal involvement'. Another feature of Declarative knowledge, as Anderson notes (1955, p. 234), is that it is explicit and one can report and is conscious of it. *Procedural knowledge*, on the other hand, concerns the mental representation of procedures, or in Anderson's words, '[it] is knowledge of how to do things, and it is often implicit[14]'. (same source, p. 235). Procedures, in this context, 'are operations that are adapted to achieve particular goals. (Gick & Holyoak, 1987).

The above mentioned distinction between declarative and procedural knowledge is painted by Pressley (1995) in an exemplar; 'Although we can state the steps involved in starting a car [declaratively]', he writes (p. 82), 'starting the car does not seem like a sequence of steps any more but rather like one action- a compilation of steps that could be described declaratively because when first learned, it was represented declaratively. It is now represented in another form as well, one that cannot be talked about, a procedural representation that is evident only in its performance'.

Given the extremely limited capacity of the short-term memory, one can imagine the significance of the procedural knowledge, compared to declarative one, in terms of the effective use of the short-term memory. Pointing at the very issue, Pressley acknowledges (1995, p. 43): 'Most critically, more of this limited short-term capacity must be expended when executing a declarative sequence than an integrated procedure'.

He defines the above distinction somewhere else as follows; 'What is coded into the action portion of productions is *procedural knowledge*- knowledge of how to do things... They also possess a great deal of factual information, *declarative knowledge*. Procedural knowledge is knowing *how;* declarative knowledge is knowing *that.*' (Pressley, 1995, p. 41). The same author writes somewhere else (p. 43), 'The movement from declarative representation of a sequence of actions to a single procedure is known as *proceduralisation*. Then he adds (In the same place); 'With practice, the sequence can be executed automatically and without the need to interpret the steps in the sequence'. He declares that, '[p]rocedures develop from declarative representations through *repeated practice.* (p. 82). (italics added).

Either declarative or procedural knowledge is organized in *networks of concepts*

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14 'Implicit memory is defined as memory without conscious awareness'.(Anderson, 1995, p. 233).

or relationships (schemata) which enable learners to understand and interpret the incoming information. (See Slavin, 1991, p. 139). 'Many complex *connections between concepts* are stored in long-term memory', Pressley notes (1995, p. 54). 'Two important properties to these connections, he continues, 'are that information is stored in *hierarchies*, and these connections permit concepts to stimulate the activation of other concepts'. (italics added).

The above statement accentuates the significance of order and pattern in facilitating the process of acquisition, store and retention of information. New information is not stored unless it is meaningful through becoming a part of or incorporated in mental structure or 'schemata'. It might be timely here to render a short account of the notion of 'schema', so central in explaining the 'meaningfulness' of learning.

2. 4. 7. SCHEMATA AND MEANINGFUL LEARNING

"The insights of cognitive psychology... inform us that *learning is a process of making meaning*". (Gage & Berliner, 1991, p. 324) (italics added).

'*Schemata* (singular: *schema*) have been proposed as a way of understanding how mind organizes information', the same authors write (p. 284). Then they continue by quoting that, '[schemata] are abstract structures that represent the knowledge stored in memory ... They are the existing mental structures that allow us to learn new information'.

As was pointed out earlier, 'Cognitive-processing theorists... use the... terms "schema" and "schemata" to describe *networks of concepts* individuals have in their memories that enable them to *understand* and incorporate new information. (Slavin, 1991, p. 139) (italics added). The same author[15] notifies (p. 164) the most important principle of schema theory as holding that: '... information that fits into an existing schema is more easily *understood*, learned, and retained than information that does not fit into an existing schema'. (italics added).

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15 quoting from Ausubel, 1968; Anderson and Bower, 1973; Rumelhart and Ortony, 1977.

To have a clearer interpretation of the term *schema,* a reference is made here to Abercrombie (1960) who traces the introduction of the notion *schema* to Bartlett (1932) and cites several definitions of the term. She writes: 'Bartlett (1932) defined a schema as "an active organization of past reactions or of past experiences which must always be supposed to be operating in any well-adapted organic response". Vernon (1955) has described schemata as "persistent deep-rooted and well organized classifications of ways of perceiving, thinking and behaving", and Wolters (1943) stressed that the organizations are "living and flexible"... Schemata can be regarded as tools which help us to see, evaluate and respond'. (Abercrombie, 1960, p. 28)

'One important insight of schema theory', Slavin asserts (1991, p. 165), 'is that *meaningful learning* requires the active involvement of the learner, who has a host of *prior experiences and knowledge* [schemata] to bring to understanding and incorporating new information'. (emphasis added).

The terms *schemata, assumptions, hypotheses,* and *brain models* are quoted from different authors by Abercrombie (1960) as 'various ways of expressing the fact that we never come to an act of perception with an entirely blank mind, but are always in a state of preparedness or expectancy, because of our past experience'. (p. 53)

'Cognitive theories', Good & Brophy denote (1991, p. 158), '... stress that perception is organized and learning is usually systematic and active. Most learning involves active processing of information so that it is *organized meaningfully* and retained as part of a *general Gestalt* [complex of schemata]. Bits of information are not stored in isolation from one another. Instead, they are "sorted", "filed", and "cross-indexed" in systematic and *meaningful* ways'.

As Gage & Berliner (1991) assert: 'Where a relevant schema does not exist, you must provide it for the material you are teaching. When we can relate new material to what students already know, they can generate their own meaning for the new material, and learn and retrieve it more easily.' (p. 324). The function of advance organizers, conceptual models[16] and similar techniques fall in this category.

'Our abstract knowledge structures, our schemata', the same authors put somewhere else, 'should be built to accommodate the widest range of examples and applications'. Then they suggest that, 'you should always try to present a wide array of examples in which the student can see how new principles and techniques can be used'. (Gage & Berliner, 1991, p. 321). They continue with another significant point (In the same place): 'Many of those examples should be placed in *real-world settings*. Ultimately much of what is learned in school must meet some criterion of usefulness or value in the nonschool world'- or architecturally speaking; *in the world of profession and practice.*

These cognitive notions of schemata and meaningful learning underlie a host of teaching strategies in which the learners' pre-existing knowledge is taken as central. As stated earlier, these strategies fall into a spectrum, from direct explanation to pure discovery. The representative strategies can be put in hierarchy in terms of the learners' degree of contribution to learning process; Direct Explanation, Guided Participation, Observational Learning, Guided Discovery, Scaffolding / Apprenticeship, Discovery Learning.

Guided participation, as Pressley (1995) acknowledges, '... involves extensive, explicit teacher direction of student processing. Teacher cue students step-by-step about how they should accomplish a task... [with this assumption that] ... students will eventually internalize the steps they are cued to use if they go through them enough times'. (p. 8). 'Guided discovery teaching', at the other side of the spectrum as Pressley notes, 'is more explicit than pure discovery teaching, typically involving the teacher posing questions to students, questions intended to lead students to understand ways that a problem could be solved. The questions lead the students to "discover" strategies'. (Pressley, 1995, p. 9).

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16 'A conceptual model consists of the words or diagrams used in instruction to help learners build mental models of what they are studying'. (Gage & Berliner, 1991, p. 314)

Contrary to direct explanation which 'flow more from the teacher to the students', 'scaffolded instruction is a result of continuous and mutually responsive interactions between students and teachers'. (Pressley, 1995, p. 10)

Whatever strategy be used in instruction, learning in a cognitive sphere, is interpreted as *construction* of meaning by learners themselves. Cognitive learning takes place '... when learners actively construct or *generate* meaning for themselves out of what is presented to them'[17]. (Gage & Berliner, 1991, p. 287).

Before moving on to the concluding remarks, Koestler (1964) is cited here to provide a useful conceptual model of what was argued so far. There (pp. 561-562), he briefly parallels the major characteristics of the two main trends in psychology of learning:

S-R [Behavioural] Theories	***Cognitive Theories***
Conditioning	Insight
Chained responses, stamped in bit by bit	Patterned, flexible responses, adapted to the total situation
Gradual learning by trial and error	Sudden learning and problem-solving through insight
Acquisition of habits and skills through reinforcement	Acquisition of knowledge ('cognitive structures') through latent learning
Emphasis on peripheral, sensory motor activity	Emphasis on central cognitive processes
Emphasis on discrete stimuli, on parts and perceptual elements	Emphasis on relation-patterns, wholes, perceptual Gestalten
Motivation = reinforcement by need- or drive-reduction, or anticipation thereof	Motivation by exploratory drive, or its combination with other primary drives
Continuous linear gradient leading from rat to man	Hierarchic levels of organization

17 This idea explains Wittrock's '*generative model of learning* as quoted in Gage & Berliner (1991, p. 287).

2. 4. 8. CONCLUDING REMARKS

This chapter started with a tentative assumption that *learning* is the core issue in any educational setting and that a study of the human mind's procedures of getting information will lead to a better understanding of education in general and architectural education as such.

A review was made, thus, in the leading trends in psychology of learning i.e. the behavioural and cognitive ones, contrasting and comparing their views towards the issue. It was argued in several stages that the difference between those views could be seen more of one in scope and area of study rather than contrast of opinions. They focus, was maintained, on different subjects; the external and internal events of human learning respectively.

As could be gathered from the discussions done so far, the extensive research undertaken in the field of experimental psychology during the present century will generate a wide variety of teaching strategies that can be applied and adopted in architectural education, the most significant of which are those dealing with higher and more sophisticated levels of learning experience. Moreover, the concepts introduced by the theories of learning and instruction generate useful implications regarding education frameworks.

Taking the information processing model of learning which gives a relatively thorough picture of the learning procedures, the present chapter concludes with the following remarks:

1. The initial stage of the process, i.e. *attention*, guarantees the input information to be processed or in other words to be *attended*. Apart from important lessons inherent in this notion in terms of instruction techniques (teaching devices such as advance organizers and conceptual models to be mentioned as examples), there is also a valuable point concerning the interdependence of the curricular components and design projects.

As was explained earlier, attention is chiefly determined by the learners' current mental state and what they are currently processing. To apply this point to the context of architectural education, which is mostly about to transmit information to be applied in design process, it can be argued that the activation of mental processing by relative design questions and examples will enhance the learners' attention to the information given. This point accentuates the significance of integrating the theoretical and applied knowledge with design projects. (to be expanded later).

2. Another point to be made about the initial stage of mental processing is the question of reception/perception. As was pointed out before, the sensory input is already processed at the very first stage, and the perception of stimuli is dependent upon the learners' knowledge structure (schemata). Each learner, in this sense, perceives the given stimuli in his or her own way. This implies the shaping of the learners' schemata as an important requisite in the process of instruction. (See bellow for more).

3. The next stage, perhaps the most crucial in the process, incorporates two major activities. Information in the short-term or working memory is either kept as focus of attention or sent (encoded) to the next component, i.e. the long-term memory. Information is kept as long as it is active and in use, so using the information is a way of strengthening memory. Architecturally speaking, the application of the knowledge in projects keeps it active in the working memory for a longer time and makes forgetting less likely. The process of rehearsal occurs, not merely by repetition but through application.

4. The second activity, associated with short-term memory is the act of encoding. The encoding process leads to the most important determinant of education, i.e. the learners' schemata. Given Information, in this process, is restructured and/or interpreted according to learners' mental pattern or schemata, which are abstract representations of objects, situations and events containing all sensational aspects of reality. In this way the information is learned meaningfully which is, as maintained earlier, a requisite for retrieval process.

To put it in the context of architectural education, since architectural knowledge base is mainly concerned with environment in its broad sense, the learners' reservoir of environmental schemata plays a decisive role in the process of encoding the information they are given. An architecture student, for instance, is more likely to assimilate and absorb a piece of information about, say, structural systems if he or she already enjoys a 'prior experience and knowledge' of structures, be it verbal or visual. It will increase the probability of the given information to find relevance to learners' previous knowledge and thus be acquired meaningfully.

The latter issue accentuates the value of study trips, visual note taking habits, monographs, surveying and experiences of the kind that help broaden the range of environmental schemata and visual reservoir of alternative design solutions, all to be brought latter to understanding and incorporating the given knowledge.

5. The last remark to be mentioned here is the *significance* to architectural education of procedural knowledge as distinct from declarative one. Given the action and process-oriented attribute of architectural education and also the limited capacity of the working memory, the most efficient way of using that limited capacity to keep the largest possible amount of active information, proves to be procedural knowledge.

This is more true when dealing with applied knowledge of design which is chiefly meant to be applied in the process of designing; the knowledge of how to do things. It is best taught through decision making and design situations instead of deductive and sequential explanations, although it can be complemented and reinforced by declarative knowledge. Teaching through application and repeated practice is again accentuated by the above principle.

This chapter rendered an account of learning processes, perceiving the mechanisms of acquisition, retention, store and retrieval of information. The question how acquisition and store of knowledge can lead to its transfer from the learning situations (usually abstract and unreal) to variety of future application circumstances remains to be discussed in the next chapter along with higher levels of cognitive competencies associated with the creative design procedure.

CHAPTER 5.

LEARNING FOR COMPETENCE

Transfer takes place whenever our existing knowledge, abilities, and skills affect the learning or performance of new tasks. (Fleisman, 1987, p. xi)

2. 5. 1. INTRODUCTORY POINTS

The previous chapter rendered a general account of the development of learning theories and its educational implications. It was maintained that learning is an active process whereby learner's pre-existing knowledge play a decisive role. It was also argued that knowledge is, in fact, *reconstructed* by every individual learner rather than simply being absorbed or recorded. The 'macro theory' of 'schema' was also usefully demonstrated as a basis for the above accounts. Then the 'information processing' model of memory was delineated to explain the current conceptions on the issue of learning procedures; reception, perception, retention, encoding and retrieval of information. To put it in brief, learning was argued as being active and constructive, knowledge-dependent and schema-driven, and organized in networks of schemata through mental processing.

This chapter will focus on issues more specifically contributing to professional education, pinpointed here as education for competence[18]. Hence, the notion of learning 'transfer' will be developed to see how knowledge, acquired in learning situation, can be applied in diverse life or job situations. What follows, though, is an investigation in the significance as well as the main attributes of 'transfer';

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18 Competence is here used with its lexical meaning *'ability to do what is needed'* (LDCE, p. 204) as distinct from *'A term in linguistics that refers to a person's abstract knowledge of a language, which is not always reflected in performance'.* (Anderson, 1995, p.451). The author's use of the term is associated with what is called by Ellington, et al (1993) *the competence revolution* as a fresh look at educational descriptors. This idea has a longer currency in the USA, particularly in management and industry (see e.g., Brown, 1993; Prahald & Hamel, 1990), where the organisational focus is shifted from the end products to 'core competencies'.

its closely related notions i.e., 'problem-solving' and 'creativity' as well as 'designing'; and finally the question as to how transfer of learning can be enhanced through decontextualization of case knowledge and memory retrieval strategies. It will conclude, then, with a view on the determinants of learning transfer to lead to further development of instruction models and strategies for architectural education which will be tackled in the proceeding chapter.

2. 5. 2. SIGNIFICANCE OF TRANSFER

Transfer of learning is, indeed, a crucial goal of any learning environment, given that learning, as the other activities of man, is meant to transcend his life. Perhaps the most telling expression of this contention is by Whitehead (1962) when he heralds that, 'Education is the acquisition of the art of the utilisation of knowledge'. (p. 6).

'One of the major aims of education, whether stated explicitly or implicitly', as Brooks & Dansereau assert (1987, p. 121), 'is to increase students' ability to competently interact with a varied and changing world. To meet this goal, the student must be able to appropriately transfer knowledge and skills acquired in one setting to another (e.g. from one course to another, from courses to a job situation)'.

Apart from the differences of the learning and life conditions which makes transferability of learning achievements indispensable, there are other issues concerning the present state of the knowledge which make this property even more vital to learning and instruction endeavors. Among those issues are a) the massive volume of knowledge and information which constitutes today's disciplines, and b) the increasing complexity of performance situations.

Resnick is right when he adheres (1989, pp. 7-8): 'It is obviously impossible, in the limited number of years and hours... to teach every specific skill and piece of knowledge that... [learners] will require during their lives'. So he concludes then, that instead of 'trying to impart volumes of specific knowledge... instruction should cultivate general abilities that will facilitate learning throughout life and in variable settings'. (the same place).

The next issue, i.e. the increasingly complex performance situations and their influence on the design of training systems, is tackled by Fleisman, drawing upon the example of military training. He argues that, 'the increasing level of complexity of the activities and tasks required of military[19] personnel makes it less likely that training can be done on-the-job while still maintaining efficiency and safety'. One consequence of this, in his view, is the fact that 'training settings will increasingly be away from the job environment, making it necessary to design training programmes which will have *effective transfer* to the target jobs. (Fleisman, 1987, p. xii) (italics added).

Learning-for-transfer, though, is a crucial issue to be borne in mind while designing any instructional programme that deals with complex knowledge and competence. Architectural education is definitely an instance to the above concern. For example making a proper design decision that can sensibly cope with all the variables of a brief, involves skills that are so complex that nobody would expect any educational setting to be able to transmit all of them in the limited time of an architectural course. Rather, it is more practical to orientate instructions towards teaching the most critical bits of knowledge that enable them to cope with future problems through gathering and utilizing the specific information required in each particular case.

The latter initiative, one must concede of course, will depend on proper working theories and research which at present are rare[20]. In his 'foreword' to *Transfer of Learning,* Fleisman is pointing at this shortcoming when he writes: 'Given the centrality of the topic [transfer] to so many areas of basic research and application, it is indeed surprising that there has been no comprehensive book on the subject'. (Fleisman, 1987, p. xi)

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19 Although mainly promoted by the military forces in the US, research on 'learning transfer' seems to be more legitimately required in professional- such as architectural education. A citation from Cormier (1987, p. xix) is thought provoking: "The Army Research Institute for the Behavioural and Social Sciences [in America], for example, has been actively promoting transfer research in response to Army training needs. In addition, interest in transfer issues has spread to the international community as reflected in the Proceedings of the 1985 NATO Symposium *Transfer of Training to Military Operational System*".

20 'Unfortunately, we still do not have a learning theory that will enable us to design an optimal programme of instruction'. (Gray & Orasanu, 1987, p. 202).

2. 5. 3. THEORIES OF TRANSFER

Resnick identifies two major theories of transfer each, as she notes, 'with long historical traditions'. She thus enumerates them: 'One, known once as the theory of mental discipline, equated the mind to a set of general faculties that could be exercised like muscles. According to this view, if each faculty were optimally exercised, the mind would be optimally capable of acquiring new knowledge'. 'Early in this century', she adds, 'Thorndike and Woodworth (1901) proposed an alternative account of transfer: the theory of common [or identical] elements'. 'According to this theory', she notes, 'capability transfers from one task to another to the extent that the tasks share common elements'. (Resnick, 1989, p. 8).

Through his experiments, Thorndike ascertained that all fields of knowledge enjoy transfer value and it is not exclusive to certain domains like literature and mathematics, as were held until then as exceptional mental faculties. The question as to what those common or 'identical elements' could be, is surely worth attention. Gage & Berliner (1991) hold that from the two forms of Thorndike's interpretation of the term the more vast and useful one has widely been overlooked. They write: 'Thorndike's theory that identical elements account for the phenomenon of transfer was widely advocated, but mainly in its narrowest form_ *identity of substance*_ one-to-one correspondence between the elements of what was studied and what was to be done in real life'. Then they assert: 'Thorndike had also pointed out that there could be *identity of procedure*, whereby the general habits, attitudes, principles, patterns, and procedures we have learned can facilitate performance in a wide variety of situations'. (p. 308)

The transfer value of principles was first elaborated by Judd (1908). Having noted that, Gage & Berliner portray the researches conducted by Judd and those who followed his line: '... they experimented with the teaching of principles of such generality that they facilitated solving many problems and learning many things that seemed very different'. (Gage & Berliner, 1991, p. 308).

Thorndike's theory of identical elements and Judd's 'transfer value of principles' are complementary ideas that brought the concept of transfer to the fore and in various forms and with fresh interpretations are still valid. (see e.g., Fleisman, 1987, p. xii).

The earlier mentioned types of transfer which can be designated as *substantive* and *procedural* transfer generate two basic ways of teaching for transfer respectively. 'We can concentrate on substantive transfer [or otherwise].... on procedural transfer'. Having said that, Gage & Berliner (1991, p. 319) declare that the latter approach involves 'using our knowledge about how principles and rules can apply across a wide variety of situations'. They also assert that (same place), 'these two approaches are not mutually exclusive; both are important in teaching for transfer'.

The first approach, i.e. concentrating on the common substantive elements, although more certain and straight forward, will result in what Pressley (1995, p. 70) calls 'low-road' transfer. 'The problem with low-road transfer is that', as he mentions, 'often more than recognition of superficial similarity is required to solve a problem... [r]ecognition of structural similarity between the current situation and a previously encountered situation is required'. This is the transfer of the kind which he refers to as 'high-road' transfer.

The above point can also contribute to the question as to whether or not the recognition of those identical elements is always done correctly. Life experience indicates that there are many cases that common elements are superficial and deceiving. In such cases, the identical memory *is* activated and retrieval *does* occur but transfer is 'negative'. In other words, as the retrieved information is not relevant to the case at hand, not only does it fail to solve the problem, it might rather cause new problems through misinterpretation of the situation.

Cormier & Hagman (1987, p. 1) demonstrate the case as follows: 'In essence, transfer of learning occurs whenever prior-learned knowledge and skills affect the way in which new knowledge and skills are learned and performed. When later acquisition or performance is facilitated, transfer is positive; when later acquisition or performance is impeded, transfer is negative'. They also add: 'Transfer can be general (i.e., content independent) affecting a wide range of new knowledge and skills, or specific (i.e., content dependent), affecting only particular knowledge and skills within a circumscribed subject matter'. The general transfer, mentioned above, is what is designated by Pressley as 'high-road' transfer.

Both substantive and procedural elements are, in fact, elements of the learning situation, that is to say, the external environment. Accepting the structure of the theory of identical elements, cognitive theorists broadened its dimensions by taking intellectual/mental constructs as functioning like Thorndike's *identical elements*. While pointing at the same issue, Gray & Orasanu (1987) highlight the unifying value of the cognitive contribution to the theory of identical elements. They write (p. 211): 'By including cognitive constructs as among the common elements that can be transferred, the cognitive approach has eliminated the old verbal learning distinction between specific and general transfer. The entire task, including aspects of the stimulus and response as well as more general or cognitive aspects, can be described or analyzed under a unified system'.

The above point clearly stems from the cognitive tendency to put emphasis on the internal events of thinking and learning, as distinct from the behaviourist focus on the environmental and external issues. It can be implied that the identical elements, in this view, are also likely to be supplied by learner as well as by situation; hence, learner's intention to transfer.

The acceptance of and emphasis on the common elements, as Gray & Orasanu (1987) declare, 'puts the cognitive science approach squarely in the tradition of Thorndike's approach to transfer, the difference being that cognitive elements are much more abstract than the usual interpretation of Thorndike's dictum as S-R pairs [which are external observable elements of the learning process]'. (p. 185).

The significance to education of all theoretical issues on transfer -already mentioned or to be mentioned later, is to contribute to the enhancement of transfer. But before drawing upon the question how to enhance transfer, it seems appropriate to usefully paint a picture of two closely related issues to transfer, i.e. 'problem-solving' and 'creativity' and then establish an interpretation of *design* which is identified with both. 'Transfer' is incorporated in the core of these notions and therefore they are probably best comprehended in this context.

2. 5. 4. PROBLEM SOLVING

One indication of transfer of learning is the ability to use information and skills to solve problems. (Slavin,1991, p. 184).

Problem solving is seen as 'one of the most important skills an individual can possess'. (Brooks & Dansereau quote, 1987, p. 131). Inherent in problem solving skill is, the very act of transferring the pre-existing knowledge to bear on the decision making circumstances.

Within this context, the term 'problem' enjoys a broader sense than its ordinary meaning as 'difficulty'. Although in every problem situation there are always hurdles to be overcome but this is not necessarily associated with difficulties. It is, in fact, a move from a given question toward an optimal answer.

As Mayer (1983) records, 'most psychologists agree that a problem has certain characteristics; *Givens, Goals, Obstacles*'. Any definition of the term, in his view, 'should consist of the ideas that (1) the problem is presently in some state, but (2) it is desired that it be in another state, and (3) there is no direct, obvious way to accomplish the change'. (p. 5)

In his *The Act of Creation,* Koestler (1964) defines problem-solving as 'bridging a gap between the initial situation and the target' (p. 649). 'Target', he continues, 'must be understood in the widest sense_ it may be an apple hanging high up on a tree, or a formula for squaring the circle, or inventing a honey-spoon which does not drip, or fitting a fact into a theory, or making the theory fit the facts'.

A significant implication of the above definitions also, is the *goal-oriented* nature of problem solving task which is mostly overshadowed by the negative impression of the term_ resulted from the illusion between the notions of 'problem' and 'difficulty'. (See also the last section in chapter 3).

Today 'problem-solving' view of learning enjoys wide application in quite a large number of diverse learning situations, from primary courses in mathematics to complicated and multi-disciplinary areas such as regional planning. And more, although there are identical elements in those situations, but it is hardly possible to take a one-off position toward them. Therefore, a point must be made here as to what kind of problems are addressed in a learning environment which is primarily concerned with complexity and creativity_ architectural education being an outstanding exemplar of such environments.

Problems are typically divided in two major categories: 'well-structured or closed-system problems, and ill-structured or open-ended problems'. (See Brooks & Dansereau, 1987, p. 131). Closed-system problems are suggested by Bartlett (1958) as being formed so that 'all the elements for solution are available, including the appropriate declarative and procedural knowledge necessary for finding a solution'. (quoted in Brooks & Dansereau, 1987, p. 131). Math problems are among the instances.

Open-system problems, on the contrary, are characterized by Simon (1978) as 'not providing all the necessary information for arriving at a solution. These types of problems generally do not have specific criteria for determining if a solution is appropriate and frequently have no specified permissible steps for moving from one state to another in attempting to solve the problem'. (quoted in the same place). Inventing new devices, designing buildings, creating new thoughts and feelings through the medium of art; these and many other issues that man deals with in his life are open-ended problems. As a matter of fact, 'many *real-world* problems are open ended and ill-structured in nature', quotes Brooks & Dansereau (1987, p. 131).

Despite the above mentioned statement, many attempts has been made to identify several stages involved in the process of thinking to solve problems. Mayer (1983, p. 48) cites[21] a four-fold model for that process:

1. *Preparation*	information is gathered and preliminary attempts at solution are made.
2. *Incubation*	the problem is put aside to work on other activities or sleep.
3. *Illumination*	the key to the solution appears (this is where the "flash of insight"... occur).
4. *Verification*	the solution is checked out to make sure it "works".

21 His citation is from Wallas's *The Art of Thought*, (1926).

The above model is a reminiscent or, to be more precise, an expansion of the 'conjecture-test' model of design process, discussed in chapter 3. It can offer, indeed, a more comprehensive scheme of design process, elaborating the preparation phase, so crucial to informed act of designing.

The key phase of 'illumination' or 'insight' is, but, the point whereby the identical schematic knowledge is transferred to the problem situation to interpret the structure of the problem and thus lead to solution. The richer the reservoir of schemata the more likely the occurrence of transfer; here lies the difference between the 'expert' and 'novice'. 'Experts', as Pressley (1995) holds, 'have many schematic images corresponding to situations common to the domain [abstract representations of the phenomena]'. 'Moreover', he continues, 'their images and other schemata are flexible, with experts modifying them as necessary to deal with new situations'. (p. 109).

A noticeable aspect of open-system problem solving, which puts it squarely beside 'creativity', is 'the use of analogies and inductive reasoning to facilitate transfer of problem-solving skills from one setting to a second, similar setting'.(See Brooks & Dansereau, 1987, p. 133). It is through analogies that one manages to relate the relevant similarities or 'identical elements' between the learning and transfer situations, the 'initial' and 'transfer' knowledge/skills.

The common attributes of problem-solving and creativity justifies taking the two notions as parallels (e.g., the previous source). Hence, a brief account of *creativity* to develop the argument.

2. 5. 5. CREATIVITY

The task of explaining mental creativity has become that of finding for it a place among the basal and ultimate powers of knowing; or, as it is technically designated, of cognition. (Spearman, 1930, p. 15)

The creative act is not an act of creation in the sense of the Old Testament. It does not create something out of nothing; it uncovers, selects, re-shuffles, combines, synthesizes already existing facts, ideas, faculties, skills. The more familiar the parts, the more striking the new whole. (Koestler, 1964, p. 120)

To define the curious concept of creativity, a spectrum of thoughts has been generated by intellectuals of all times; from the 'mystical idea that one is visited by one's daimon and the creative act follows', to the familiar conceptions that 'one is seized by the unconscious, ..., or by inspiration'. (O'Doherty, 1963). Or as the above author himself suggests, 'a very deliberately motivated act which is the leap of insight'. But to stimulate and conduct the argument towards what is more in tune with the present study, the author will mainly draw on Spearman's *Creative Mind* and Koestler's *The Act of Creation*, both of which focus on the meaning and process of creativity.

In his *Creative Mind* (1930), Spearman introduces six 'doctrines' about creativity to move on to his own views (pp. 6-12). Explanation by 'genius', by 'imagery' and by 'combination' are those attributed, in his view, to ancient psychological tradition. The remaining three are those contributed by the then 'three modern schools of thought... claimant to be The New Psychology'[22]; i.e., Gestalt, Behaviourism and Psycho-analysis. The former three are mentioned next to initiate the argument:

The first doctrine tries to explain creativity with reference to *genius*. 'Genius is properly the faculty of invention; by means of which a man is qualified for making new discoveries in science or for producing original works of art', Spearman quotes (p. 6). He rightly argues that referring the meaning of 'creativity' to 'genius' which, in its own turn, seeks a proper definition, is 'rather a refusal to explain'. In this doctrine, according to Spearman, creativity is in fact taken as the last word of explanation; it is to explain itself.

The most ancient of the three doctrines is, in Spearman's words (p. 7), 'that which resolves creation into *constructive imagination*'. The original meaning of the word 'imagination' is, as Spearman notes (p. 8), 'the usage of mental *images*, visual, auditory, or otherwise'.

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22 Needless to say that Spearman is writing in the late 1920s, before the development of 'cognitive school' in psychology of learning.

Later on (p. 10) he draws on the comparisons then made between the persons 'who are endowed with such images and those who are unendowed'. He declares (same place): 'In not one single kind of performance, so far, have the imageful persons shown any superiority over the imageless'.

Having thus rejected the doctrine of creation by means of images, Spearman passes on the third doctrine i.e., explanation by 'combination'. Holding it as the dominant tendency among thinkers from the ancient times, he states the doctrine as follows; 'According to this doctrine, when we regard a mental product— be it picture, poem, invention or otherwise— none of its constituents are new in themselves; *new only is the fact of their now keeping company*'. (pp. 10-11) (italics added). This is again, to his view, too broad an explanation to be able to specify the creative among ordinary acts of the sort that constitute even new combinations but have nothing that can 'merit the title of *creative* at all'. (p. 11).

Before drawing upon Spearman's interpretation of creativity which concerns the present argument, there is another point that should be made here. Despite lack of precision, as pronounced by Spearman, the doctrine of 'creation as combination' still enjoys a wide favour. Koestler develops this idea throughout his frequently referred to *The Act of Creation.*

Koestler quotes (1964, p. 590): 'All our evidence thus points to the conclusion that a new insight consists of a *recombination of pre-existent mediating processes*, not the sudden appearance of a wholly new process'. (his emphasis). Although he concedes that such recombination is frequent in everyday life, he holds that 'in a theoretical framework' they must be considered 'to be original and creative'. (In the same place).

Highlighting the significance of finding novel relationships between already existing things which, to his view, is the core of creativity, Koestler (1964) points at what he calls *shift of attention*. 'Shifts of attention to previously neglected aspects of experience', he asserts (p. 233), 'make familiar phenomena appear in a new, revealing light, seen through spectacles of a different colour'. Then he articulates the point by the following statement: 'At the decisive turning points in the history of science, all the data in the field, unchanged in themselves, may fall into a *new pattern,* and be given a *new interpretation,* a *new theoretical frame*'. (same place) (italics added).

Regarding the significance of *relationship,* Ritter (1979) goes even further and takes it as 'definition of existence'. He asserts: 'The nature of existence is determined by the relationships of or in relationship[23]. This it seems to me, is the ultimate in *reality-thinking*'. (p. 52) (his emphasis). Within the sphere of this 'relationship thinking', any creative act would mean nothing but giving birth to new relationships. 'Any kind of event or existence is relationship of relationships, perhaps to infinity', he writes (p.55).

Taking a different position from the above, Spearman questions the validity of the then current explanations of creativity and then passes on to portray his own views by suggesting sets of 'qualitative' and 'quantitative' principles of knowing. His three qualitative principles are relevantly incorporated here in the present argument. Those are; 'Principle of Experience', 'Principle of Relations', and 'Principle of Correlates'. By these principles, he has tried to explain different levels of creative thinking. A short statement of each is cited next (Spearman,1930).

■ Principle of Experience suggests; 'A person tends to know his own sensations, feelings, and strivings'. 'Any lived experience', he thinks, 'tends to evoke immediately a knowing of its own characters'. (p. 15). This is in his view the lowest degree of creativity. (see p. 18)

■ Principle of Relations is formulated as follows; 'When two or more items (percepts or ideas) are given, a person may perceive them to be in various ways related'. (p. 18). This can be interpreted as the mental generation of relationships between perceived characters; putting things in pattern.

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23 To define the *creative bias* of his *educreational* framework, he writes that 'the total of possible relationships within any environment is an indeterminate number of combinations... [from which] the creative bias tends towards: (i) growth; (ii) structuralization; (iii) transformation'. (Ritter, 1979, p. 57).

■ Principle of Correlates reads; 'When any item and a relation to it are present to mind, then the mind can generate in itself another item so related'. (p. 23). Here the given *relation* bridges between the *perceived* and *conceived* items. This degree of creativeness is, in his view, 'the utmost to which the human mind can under any conditions possibly attain'. (p. 26).

With notion of transfer as the main concern of this chapter, Spearman's principle of correlates, which tackles the very issue, seems to need more remarks. But before that, in order to better interpret those principles, the three figures (A, B, and C) are cited here from Spearman (1930, p. 23); the principles of mental creativity or cognition powers.

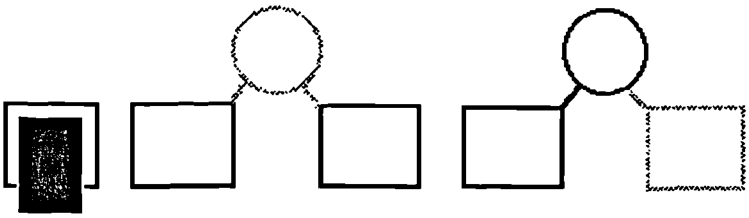

Fig.2A
Principle of experience

Fig.2B
Principle of relations

Fig.2C
Principle of correlates

Figure 12. *The principles of cognition powers. After Spearman*

In Figure 2A the back rectangle represents the initially lived experience, whilst the outlined one is the (more or less incomlete) apprehension of this experience. In Figs. 2B & 2C the circles present relations, and the rectangles are their fundaments, whilst the lines joining the circles and the rectangles together indicate their *coherence*. The lines are continuous for everything that is given initially, but dotted for that which is generated by means of process. (Spearman, 1930, p. 23)

'To obtain an instance of the third principle', he claims (p. 23), 'nothing more is needed than to look at a triangle and try to picture how it would appear upside down'. Within the frame of that principle, the givens here are the 'triangle' and 'upside-downness' and the generated correlate is the upside-down triangle.

To establish the notion more clearly, Spearman renders the sequence of events wherein the final item is generated. Those are as follows: 'On some previous occasion *a* and *b* have been known to possess the relation *r*. Thereafter, by transferring *r* to *a'* which is different from *a*, the mind can evoke *b'* which is not only different from *b*, but appears capable of transcending all existence, known, real, or even possible'.

This is the heart of what Spearman attributes to 'creation'; the generating of correlates. But having taken the above mentioned sequence as a basis, there is another point which seems to need remark. That is the question, whether or not the creative act can also lie in discovering new relations between already existing items. An analysis of the above sequence can lead to an answer.

In his statement of events, the clause '... *a* and *b* have been known to possess the relation *r*.', is clearly representing Spearman's principle of relations. The knowing of *r* as a relation between *a* and *b* is a mental process and that it is, of course, hardly accepted by Spearman as creative; '... it only copies what was already existing', he puts (p. 22). But considering the fact that 'relations', by nature, are *ideal* rather than *real* phenomena, he concedes that they are created by the mind and thus admits; 'However, on this point we may be allowed to compromise by allowing the principle of relations to be creative...' (p. 22).

Now the point to be made here is that; if recognising the relation between *a* and *b* can be taken as creative, the transfer of *r* to the new situation *a'* can, by all means, merit the title of creative, *even if b' is already existent.* In such a case, although *b'* is not 'created' but the very attribution of *r* to *a'* and *b'* has lead to creation of a novel combination (noticeably one among numerous possible ones); a new *whole.* This is further reinforced by the now common sense creed of Gestalt; a whole is different from and more than its constituents, and thus enjoys a life of its own.

There is another point which might be usefully appended to this account of pre-existing / new: Is Spearman's upside-down triangle (see preceding paragraphs) a novel item or novel is a new combination of the two concepts of triangle and upside-downness? All the constituents which make a triangle are already there but now in a relatively new combination. Isn't it right to say that 'upside-downness is now one of the constituents of triangle contributing to the creation of the whole? Spearman himself confirms that 'the relation in this process is rarely if ever a perfectly isolated one. It comes rather as an element, the sole *indispensable* element, in something that is relative'. (p. 26) (his italics).

Based on the latter argument, though, a fourth figure might be contributed here to complement Spearman's preceding figures concerning 'powers of cognition'.

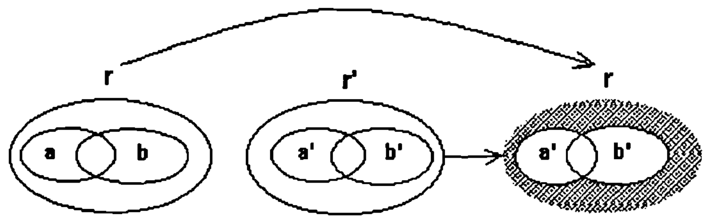

Figure 13. *Creation as combination*

Koestler's statement on the aspects of creative act makes better sense now. It reads; 'The displacement of *attention* to something not previously noted, which was irrelevant in the old and is *relevant* in the new context; the discovery of *hidden analogies* as a result of the former; the bringing into consciousness of tacit axioms and habits of thought which were implied in the code and taken for granted; the *un-covering* of what has always been there'. (Koestler, 1964, pp. 119-120) (italics added).

Schon (1963) is attending to the same idea when he writes: 'New concepts do not spring from nothing or from mysterious external sources'. New concepts, in his words, 'emerge out of the interaction of old concepts and new situations where the old concept is not simply reapplied unchanged to a new instance but is that *in terms* of which the new instance is seen'. (quoted in Abel, 1981) (emphasis of the original).

Drawing upon the argument of 'innovation versus tradition' in Persian culture (and perhaps in all cultural traditions), Tadjvidi observes[24] a point which squarely supports the above argument. He asserts that in the traditional context *innovation*, be it in poetry, painting, architecture, or whatever, would always follow

24 In an interview with the author, April 1993. Dr. Tadjvidi is a distinguished Iranian miniaturist who has done extensive research on history and theory of art in general and the Persian Islamic art in particular.

intensive experience to master all the technical subtleties of the precedent. One who wishes to become a poet, for instance, would memorize at least 10000 verses of great poets, before he allowed himself to *innovate.* So would do a painter with different techniques of painting, say, trees, clouds, or flowers, and a *memar* with experiencing all the techniques involved in the art of building. It is then that he will be able to create new patterns out of the well mastered elements of the precedents.

Going back to the previous argument, the idea of creation through combination, if well attended, is capable of bringing all the seemingly diverse definitions of 'creative act' under one umbrella. Still more, the present author suspects that each of the interpretations of creativity, some of them mentioned above, involves a part of the truth. The point is perhaps that the diversity of definitions mirror the very diversity and complexity of areas of creativity which they primarily address. The doctrine of 'imagination', for instance, is conveniently valid when dealing with image-making arts (e.g., painting, music), while the concept of 'combination as creativity' is more compatible with the act of 'designing' (e.g., architectural design)[25] wherein the aim is to move from a set of given 'means' towards the desired 'ends'.

To end up the argument on problem-solving and creativity with, Koestler's schematization of creative process of solving problems is perhaps the most appropriate. With reference to Archimedes' well known discovery (i.e., a method for measuring the volume of a crown[26]), he tries to visualize how a creative mind flies beyond the 'habitual rules of the game' (koestler, 1964, pp. 105-108).

In his diagram (following Figure), *S* is the point where the process of creative

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25 It might be necessary to note that the above instances are by no means absolute. There is a spectrum of tendencies in each of the areas of creativity which makes it difficult to pigeonhole them in categories; some trends in 'architecture', for instance, tend to bring image making to the fore, while 'painting' in some cases adopts the approach of applied arts.

26 'Everyone is acquainted with the delightful story of ... [Archimedes], how he sprang out of his bath and ran as he was through the streets, crying out *Eureka, Eureka!*' (Spearman, 1930, p. 99). He had found that the volume of the crown could be measured by immersing it in water; the cubic area of the rise of water would be exactly equal to that of the crown.

thinking starts. It lies on a plane M_1 representing the domain where ordinary problems are solved by following the 'rules of the game' or technically speaking, by the established disciplinary strategies. But in some cases (such as Archimedes'), the target T is located outside the *plane.* Therefore, the trains of thought represented by the loops are futile and unable to reach the target. M_2 is actually the *transfer* plane; L the point where the link is made possible; and m_2 is the actual train of thought which leads to the target point.

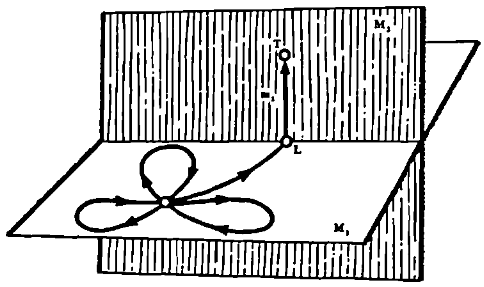

Figure 14 *Creative process, after Koestler*

This diagram also demonstrates the subtle difference between problem-solving and the act of creation and discovery; the former confined within Kuhn's (1962) puzzle-solving paradigm (here, the plane M_1), while the latter moving beyond the paradigm (shifting to the plane M_2).

After the rather lengthy account of problem-solving and creativity, it seems timely to return back to the issue of transfer, as assumed to be central to achievement of competence. As maintained in the preceding considerations, whatever position is taken in defining the nature and process of problem-solving as well as those of creativity, transfer proves to be the key issue. There is always an element of moving from one context to another, or in Koestler's words, '[a] mental cross-fertilization between different disciplines'. (1964, p. 230).

Having given an account of problem-solving and creativity, the more relevant notion to architectural education, namely design, remains to be tackled next. But before moving on, a short remark in parentheses, although not of reasoning, might be judicious here.

2. 5. 6. BETWEEN PARENTHESES

Although Koestler rightly notes that *'The creative act is not an act of creation in the sense of the Old Testament'*, but since 'Man is believed to be the vicegerent of God on the earth'[27], the act of creation may have some hints as to what creative act of Man could be like. A few verses from the Holy Qor'an which address the creation of Man is cited here only by way of blessing. It should be made clear here that neither is the author in the position of claiming to interpret the Qur'anic words nor is this meant to be part of the reasoning in the current argument; hence it is put between parentheses. An investigation of *creativity* in the Holy Books is, by all means, one of great excitement. Such an investigation, needs its own relatively competent scholars.

Chapter 82 of the Holy Qor'an reminds Man of how the physical world is to be destroyed before the final Day of Judgement, and certifies that every single act is recorded and measured and will meet its just consequences. Within this context, it gives a short account of Man's creation to remind him of the Creator.

To make a wider comprehension of the nuisances possible, two translations are paralleled here, although a thorough translation of the texts of this delicacy is hardly ever possible. The verses 6, 7, and 8 of the Chapter *Al-Infitar* (The Cleaving Asunder) of the Holy Qur'an read:

6. O man! what has beguiled you from your Lord, the Gracious one,(Q)[28]
   O man! what has Seduced thee from Thy Lord Most Beneficent?-(M)
7. Who created you, then made you complete, then made you symmetrical?(Q)
   Him who created thee, Fashioned thee in due proportion, And gave thee a just bias;(M)
8. Into whatever form He pleased He constituted you.(Q)
   In whatever Form He wills, Does He put thee together.(M)

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27 SeeThe Holy Qor'an, e.g., chapter 2, verse 30.

28 (Q) refers to a copy translated by M. H. Shakir, published in Qum, Islamic Republic of Iran. (M) stands for a copy translated by Abdullah Yusuf Ali, published in Medina, Saudi Arabia.

The sequence starts with 'creating' and leads to 'putting together'[29]. It can be inferred that creation here refers to bringing from non-existence to existence, which is a considerable difference between the *act of creation,* in the very sense that Koestler puts it, and human creativity. Apart from this essential distinction, the rest of the sequence might be taken as a statement of human creative commitments; to make symmetrical, to proportionate, and to put together. This *'putting together'* (combining), while keeping the due *proportion* and doing *justice* to the constituents, is perhaps the fundamental ingredient of Man's creativity.

2. 5. 7. CREATIVE PROCESS OF DESIGN

When we say there is a design, it indicates that an intellect has organized events into discrete and conceptual inter-patternings. Snowflakes are design, crystals are design, music is design, and the electromagnetic spectrum of which the rainbow colours are but one millionth of its range is design; planets, stars, galaxies, and their contained behaviours such as the periodical regularities of the chemical elements are all design-accomplishments.
(Fuller, 1971, in Papanek, 1973).

The issue of *design* has been subject of hot debates since the advent of the *design method studies* in the late 50s and early 60s. Those studies were about to systematize the design process so designers could cope with the then increasing complexities of the industrial age- when design problems had changed their character from professional to rather multi-disciplinary ones (see Rittel, 1973). The actual merit of those studies, but, could be regarded as reflecting on the nature and process of designing; a metacognition of design, so to speak.

Design studies, at its advent, was based on a common belief that '... the logical nature of the act of designing is largely independent of the character of the thing designed' (Archer, 1969), so the nature of the design process in all fields was

29 A similar account but in different wordings can be found in Chapter 87, *Al-A'la* (The Most High), verses 2 and 3. There is also a sequence of creating, giving proportion, measure and guidance.

widely held to be the same. The idea, at its extreme[30], is pronounced by Gregory when he writes: 'All kinds of engineers and technologists have an involvement in design. All artists, in whatever medium they may work, are designers. This is true of architects, electrical engineers, metallurgists, poets, works managers, as well as a host of other people and professions. Fundamental to this general idea of a designer is the building up of a structure, pattern, or system within a situation'. (Gregory, 1966, p.4). This presumption is evident in the wide range of disciplines from which the contributors to the early conferences on design were coming (Industrial and engineering design, architecture, planning, graphic design and even painting), whose common interest was seen to be 'systematic methodology of designing'. This comprehensive view of design is further more elaborate in what was quoted earlier from Fuller (1971).

The development of design method studies reveals that the common denominator of various approaches to design process is the recognition of its multi-dimensional nature; the analytical, scientific and research-oriented commitment, be it 'content/context identification' or 'conjecture testing', and the synthetical, intuitive and analogy-driven endeavour, not to mention the value-laden responsibility of designer to make decisions.[31]

The above mentioned properties of design process stem from the dual characteristics of the design outcome itself; novelty and utility. It is a creative response but unlike artistic expressions, is also bound to satisfy utilitarian ends. Its aim is to produce something *new* and *useful.* What differentiates between various design methods is the degree to which they put emphasis on either of those commitments or endeavours. So is their view as to what the sequence of the design process is and more, the question whether the process of design is ever sequential.

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30 It was in Portsmouth Symposium, 1967, that the domain specific aspects of design methods were brought to the fore and 'Design Methods *in Architecture*' was taken as the theme of the discussion.

31 'It takes two to invent anything. The one makes up combinations; the other one chooses...' (Paul Valery quoted from Broadbent, 1988, p. 24).

Design process, though, constitutes properties both of 'creative act' and 'problem solving'. It is, therefore, creative in terms of generating new patterns and relationships, i.e., the transfer of recognised relationships to new situations and elements, and it is problem-oriented[32] due to its being primarily bound to fulfil a pre-determined task.

As was briefly pointed in the Chapter 3, design methods are held to have been developed in three generations; 'analysis-synthesis', 'participatory', and 'conjecture-test' methods (see e.g., Broadbent, 1979). To portray this development is clearly beyond the contention of the present argument. The proceedings of the related Workshops, Conferences, or Symposia (a number of which referenced here), provide a useful source for the pursuit of developments in that field. But to substantiate what was suggested earlier as the common aspect of different design methods, some noteworthy issues are discussed next.

In his opening address to the first conference on design methods (in the UK), Christopherson postulates a rough statement of the task of designer. It consists, in his view, essentially of three stages; 'a. conception, b. realization, c. communication'. (Christopherson, in Jones & Thornley, 1963, p. 2). As is self evident, his perception of design process still shares many points with the traditional way of designing and is only an opening to further debate on more systematic approaches, presented in that conference as well as in the succeeding events of the kind.

Collecting a directory of thirty five such *systematic* methods in a comprehensive source book, Jones (1970) categorises those methods from the viewpoints of *creativity*, *rationality* and *control over the design process*[33]. 'Each of these three

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32 'Design is, of course, but a class of problem solving: it begins with the identification of a problem, i.e., of an aspect of reality perceived by the client to be unsatisfactory in some respect- it ends with ... a blueprint for a new artifact which, as soon as it is put into use, changes established relationships among existing components of the world and thus creates new unforeseen problems'. (Rzevski, 1981).

33 Focussing on architectural design, Broadbent's *Design in Architecture* (1988), proves to be the most exhaustive source/text book to date. It covers a spectrum of theoretical as well as practical issues on architectural design, which make it a text book of high educational values.

views of designing', he suggests, 'can be symbolized in a cybernetic picture of the designer.

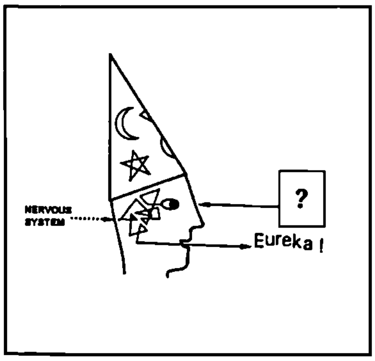

Figure 15 Designers as black boxes

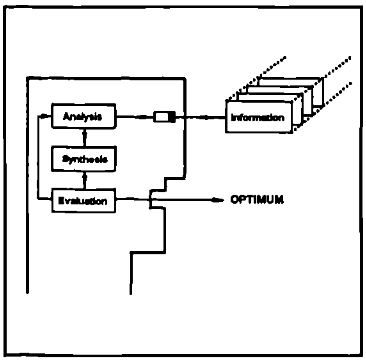

Figure 16 Designers as glass boxes

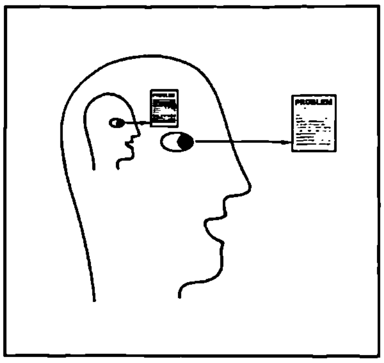

Figure 17 Designers as self-organizers

From the creative viewpoint the designer is a *black box* out of which comes the mysterious creative leap; from the rational viewpoint the designer is a *glass box* inside which can be discerned a completely explicable rational process; from the control viewpoint the designer is a *self-organizing system* capable of finding short cuts across unknown territory. (p. 46) (emphasis of the main source).

Albeit Archer himself expresses, in succeeding years (1979), hesitations about compatibility with design of scientific/systematic methods, his *Systematic Method for Designers* (1963a,b,c,d, 1964a,b,c) is among the most influential contributions to systematisation of design process. But despite being remarkably systematic and sequential, Archer's proposed method for designers[34], accounts also for a *creative* component in the process of design; or in his own words, 'a creative step'. (1963b).

Attending to the dual attribute of designing, he writes (1963b): 'One of the special features of the process of designing is that the analytical phase with which it begins requires objective observation and inductive reasoning, while the creative phase at the heart of it requires involvement, subjective judgement and deductive reasoning'. But the very use of the terms *step* and *phase* for creative component of design evidences the stepwise and sequential characteristics of systematic

34 among *glass-boxers*, in Broadbent's words (1969).

design methods. It is, of course, hardly surprising because by and large, the design-method-movement, at its advent, drew heavily upon the assumption as to design being best systematised when following a rational[35] approach, which is inherently of a sequential nature. The following Figure demonstrates Archer's breakdown of basic design procedures and phases. It can be taken as prototypical instance of systematic approach to design process.

As the diagram reveals, 'Archer's design process is a methodical, step-by-step sequence of activities, with decisions being made at each point before moving onto the next, which conveys a sense of a straight route being purposively forged'. (Cross, 1981a).

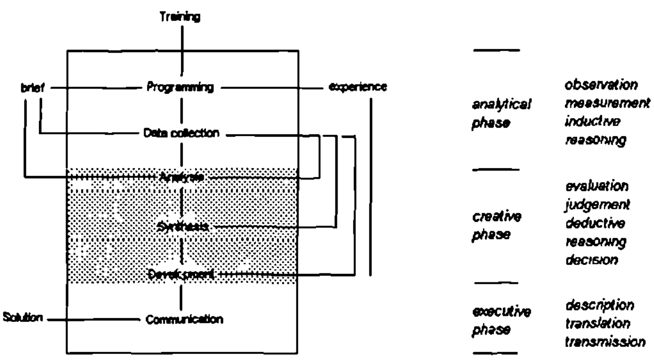

Figure 18 Design sequences, after Archer, 1963b

At the other side of the argument, there are design theorists who take the creative faculty of designers as the core of design activity. Broadbent (1966) writes, '... it seems clear that, within the design operation a central *black box* will always be needed which consists of the human brain, working in symbiosis with the human body' (his own emphasis). Brainstorming and Synectics are seen as the most effective techniques, developed to facilitate creative design solutions through generation of analogies. (see, e.g., Jones, 1970, pp. 274-285 and Broadbent, 1988, pp. 347-353).

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35 'The majority of design methods are concerned with externalised thinking and are therefore based on rational rather than mystical assumptions. The design process is assumed to be entirely explicable...' (Jones, 1970,, p.. 49).

Jones's (1970) third type of designers who are, by definition, capable of reflecting on the process of design, represent a view of design that justifies the necessity of 'design method studies'. In another context, Esherick (1963) is touching the issue from a similar perspective when he voices a plea for *process-* rather than product-orientated theory of design. He declares: 'Virtually all nineteenth-century theory in design... ultimately directs its energies to the *appearance* of the end product... it is focused *outside* man, on his tools and his artifacts - not within man - within the domains of his needs or his purposes or his will'. (Esherick, 1963). Research on design issues and Design-method-studies as such, in a sense, are of metacognitive values of enabling designers to monitor their design strategies and tactics, or as Jones (1970, p. 46) puts it, to find 'short cuts across unknown territory'[36].

The designers' various ways of moving from a given 'design problem/question' to a desired 'apt solution', can be categorised against different criteria. One useful grouping of *design styles* is suggested by Cross (1981a), drawing upon the grouping of learners presented by learning psychology. He likens designers with learners to identify the different strategies they adopt in the process of designing. He writes (1981a): 'in the course of designing, the designer is learning about the problem, its solution, and their relationship'.

Drawing upon the psychology of learning, Cross (1981a) mentions the four theoretical viewpoints addressing the learning style dichotomies. Those are: (i) convergent/divergent, (ii) impulsive/reflective, (iii) field-dependent/independent, and (iv) serialistic/holistic. He then transfers these characteristics to the context of design and designerly thinking. A brief account of each will follow[37] next.

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36 The significance to education of design process argument lies in the very point, i.e., the provision of metacognitive and monitoring awareness, rather than in its prescriptive function.

37 In his letter of 27 February 1995, Professor Broadbent appreciates the view of *learning styles* as a useful 'line of inquiry'. He thus paraphrases (his former colleague, Powell) that there is the learner who needs, 'a) ... to start with an overall panorama and then goes on to fill in the details [holistic]; b) ... to work step by step through some carefully structured, cumulative, sequence of ideas [serialistic]; c) ... to contemplate theory first before plunging into action [reflective?] and d) the learner who prefers to plunge into action and prefers to build up by experience a knowledge of "how to" [impulsive?]'.

Convergent style of thinking is defined as 'taking in information and producing or *converging* on the single right answer (or a limited number of right answers)', records Cross (1981a) (his own emphasis). 'In contrast', he continues, 'divergent thinking is not concerned with the one correct answer. Instead, the emphasis is on a person's ability to generate a wide range of answers'. Convergent and divergent styles are associated with closed-ended and open-ended questions respectively. (see the same source).

Criticising Jones's (1970) position as to the *convergent stage*, traditionally 'nearly the whole of designing', will eventually be taken over by computers, Cross draws attention to a significant point regarding the designerly way of thinking; that of value judgement. 'While it is true that computer-aided design tends to reduce the amount of human effort in many of the traditional, detail-design stages', he concedes, 'it is also evident that *evaluation* of alternatives remains a complex task at which humans are better than machines. Instead, perhaps it is the generation of alternatives (i.e. divergence) that is more likely to be automated?' (1981a) (italics added).

Reflecting on designing styles, he rightly concludes that '*both* cognitive styles [divergence and convergence] are necessary in design'. (Cross, 1981a) (emphasis of the main source). Generation of concepts is bound to be followed by choosing a final appropriate one to be executed. In both procedures what is actually happening is the transfer of apt concepts, however be they learned, to bear on solving a given problem.

Another significant point raised by Cross (same source) is the 'valid role in design' of impulsive thought. That which, in his view, 'runs counter to most teachers' preferences for *reflective* student behaviour'. He observes those preferences away from 'designerly' modes of thought and, in fact, 'counter-productive in design'. It can be added that generation of design concepts is the outcome of impulsive mind, while reflective thinking is a process of testing, refining and reinforcing those concepts.

Cross's argument on field-dependence/independence designing styles, suggests that 'a high degree of field-independence is desirable in design'. He notes that, 'The designer needs to perceive *pattern*, structure and meaning in the fields of data'. (Cross, 1981a).

Finally, the serialistic and holistic styles of thinking are both treated by Cross (same source) as underlying the variety of design methods. Archer's design process, for instance, is identified by him as taking 'a serialistic learning strategy'. Systematisation, in a sense, is a serialistic, step-by-step way of dealing with procedures, while intuitive approaches take a holistic view of things.

A noteworthy implication of the impulsive/reflective and serialistic/holistic arguments is the significance to design of designer's preconceptions or schemata. Designers are learners of the kind who start with laying out a solution first (which is of course a tentative one) whereby they pre-structure the problem and then seek relevant data about it. This view of designing is clearly at odds with the notions set by early systematic (analysis-synthesis) models of designing.

To substantiate this point, Cross (1981a) draws on a study by Lawson (1979) wherein two groups of fifth year students of architecture and of science were given experimental problem-solving tasks. He records that 'fifth-year architectural students tended to adopt a *solution-focussing strategy* (i.e. learning to understand the problem by proposing solutions to it) whereas fifth-year science students tended to adopt a *problem-focussing strategy* (i.e. learning to understand the problem by logical analysing its structure)'. (his own emphasis). A similar experiment with a group of first year students of architecture and one of 'a general sample of their university entry cohorts' indicated 'no significant differences in strategies' between them. This meaningful result 'suggests that architectural students learn to adopt the designerly, solution-focussing strategy in the course of their... education'. (Cross, 1981a).

The latter point leads the present argument to the influential contribution of Hillier, et al (1972), which gave rise to what was later called the third generation design methods, i.e., the conjecture-analysis model of design. Drawing an analogy with the paradigm shift in philosophy of science from a 'rationalist and empiricist' bias to a 'hypothetico-deductive' scheme, after Popper and Kuhn, they put forward their alternative model of design based on Popper's evolutionary model of conjectures and refutations (see bellow); what they call conjecture-analysis model of design as opposed to the then prevalent analysis-synthesis paradigm.

Rzevski (1981) renders a concise account of Popper's theory which can usefully be cited here to elucidate what Hillier, et al suggest as the real process of designing. 'According to Popper', Rzevski records, 'the world... evolves by means of numerous problem solving activities... in accordance with the following pattern: $P_1 \rightarrow TS \rightarrow EE \rightarrow P_2$. Then he notes that, ' P_1 is a current problem... TS is a tentative solution to the problem P_1 [and] EE is the process of error elimination from the proposed solution TS by means of repeated testing and modifications. Error elimination may be carried out, for example, by exposure to the real world where only "correct" solution survives (the survival of the fittest), by experimentation with real or abstract models, or by analysis'. 'P_2', he continues, 'is a solution to the current problem P_1 which inevitably represents a new problem'. 'This new problem', he notifies, 'emerges, rather, as a result of new relationships which are brought into existence with every change. The real world is so complex that it is practically impossible to foresee all changes in relationships and all consequences of these changes'. (Rzevski, 1981)[38].

Applying the same model to the context of designing, which can conveniently be taken as a *creative problem solving* activity, Rzevski (1981) highlights the important features of design as follows:

1. '*Design is an investigative process (research)*',
2. '*Design is a creative process (art)*',
3. '*Design is a rational (logic-based) process*',
4. '*Design is a decision making (value-based) process*'.

Central to the Popperian Philosophy of science and to the current positions in

38 Having quoted the above, the present author perceives a subtle distinction between a scientific *conjecture* and a design *conjecture*, the latter being more of an imagery rather than propositional nature.

due course, is the validity of 'the cognitive schemes by which we interpret the world and pre-structure our observations'. (Hillier, et al, 1972). The idea of pre-structuring the world which is reminiscent of *gestalt* creative thinking, is of significant implications in terms of designing as well as research on design. Upon this basis, Hillier, et al., (same source) argue that 'design is *essentially* a matter of pre-structuring problems either by a knowledge of solution types or by a knowledge of the latencies of the instrumental set in relation to solution types'. (their own emphasis).

What was argued here is clearly the common theoretical aspects of designing. Needless to say that in the practice of design, either the *problem* or the *instrumental set* are definitely domain-specific, and so are the *solution types.* Perhaps the only domain-independent attribute of design is the very point articulated by Fuller (1971); that is the imposition of *inter-patterning* organisation of events/elements. This is the very core characteristics enumerated earlier for 'problem solving' and, more noticeably, for 'the creative act'. What stimulates and sets up the process is the design conjecture which is obviously the transfer of designer's schematic concepts to the design situation, to be further tested against reality. The transfer of the pre-existing conceptions to design situation is more successful the more identical the structure of the designer's conjecture and that of the situation are.

So far the argument has been developed to maintain that the notion of 'transfer' is the core of problem-solving, creativity and design, now the question how to facilitate transfer of knowledge and skills, so central to 'education for competence', is the object of the proceeding pages.

2. 5. 8. WHAT CONSTITUTES ENHANCEMENT OF TRANSFER?

Understanding concepts well enough to apply them to new situations requires extensive, elaborated knowledge of the concepts. Such knowledge requires long-term exposure and practice with concepts... Application, transfer, and creative use of what has been learned do not follow from short-term instruction. The development of powerful thinking and flexible use of knowledge is a long-term affair. (Pressley, 1995, p. 260).

To address the above line of enquiry a clear vision of the processes involved in transfer is required. Only then might the instructional interventions be possible to influence those processes. Taking the information processing model of learning and memory, the processes whereby transfer occurs can be put in brief.

As was maintained earlier, short-term or working memory is where the act of conscious manipulation of information is undertaken. To perform a task, information about the task is kept present at the working memory while seeking for relevant information required to better interpret the task, set the problems and find out proper solutions. The required information, stored in the long-term memory, need to be activated and recalled to the working memory. The activation of relevant information involves issue which were covered earlier under theories of transfer. But in order for the retrieved information to be applicable in transfer situation - clearly different from that of initial learning, it should be decontextualized or abstracted. Therefore, what helps decontextualize the information is also in line with enhancement of transfer. Then comes the retrieval process and memory strategies which aim at facilitating memory retrieval.

Conforming to the same model, Gick & Holyoak (1987) identify four determinants for transfer. They write: 'First, it is important to consider the *structure of the task* to be initially learned and its relationship to the transfer task... [sorting out the identical elements]. Second, it is necessary to assess whether the *conditions at encoding* foster learning of the material and are appropriate for the subsequent transfer task... [degree of generalization]'. Then they continue: 'The third class of factors concerns *conditions at retrieval* (ie., the performance of the transfer task) that influence access to and application of appropriate knowledge. Prior knowledge, often encoded as rules, will need to be activated in memory... Finally he points at background knowledge as being also influential: '[T]he fourth important factor to be considered is the *background knowledge* of the subject. For example, expertise in an area may result in successful application of knowledge, despite apparent dissimilarities between the contexts of initial encoding and eventual retrieval'. (pp. 20-21) (italics added).

The way the prior knowledge is encoded to facilitate generalization or 'decontextualization', and the memory strategies that help better retrieval of information, appear to be two relevant issues to be tackled next.

2. 5. 8. 1. DECONTEXTUALIZATION

Procedural transfer, however, often calls for effort, for mindfulness.... You have to decontextualize, or separate the idea from its original associations, so that you know and understand its essential elements and can apply them to a new context. (Gage & Berliner, 1991, p. 321)

To make a better sense of the significance of decontextualization of learning to transfer, a subtle difference between two usually mixed notions of *application*[39] and *transfer* should be mentioned here. When the situation wherein an information is to be used is the same as the learning situation, that information is simply applied or *application* takes place. But if that information is going to be used in a different situation, then *transfer* is inevitable[40].

With the same point in mind, Gick & Holyoak notice (1987): 'Manipulations that foster the acquisition of *generalized* rules, sufficiently *abstract* as to characterize both the training task and the subsequent transfer task, will increase positive transfer'. Then they continue to acknowledge the significance of learning through diverse examples in due course: 'The rules acquired must be well learned and based on an overall set of examples diverse enough to allow generalization mechanisms to abstract the *common structural components* from surface differences'. (p. 30)(italics added).

Having considered the above remark, it can be admitted that decontextualization of knowledge is a prerequisite of transfer and that it merits more scrutiny. But to move on that argument, an essential question must be addressed. If learning is context-dependent and 'situated' - which it being the case enjoys support from the cognitive scientists (See e.g., Resnick, 1989. p. 3)[41], then how can it lead to representation of the 'general'. How can certain circumstances embody general

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39 Gagne & White (1978, p. 190) use *retention* instead of *application.*

40 The author owes this remark to Dr. Kyriacou, University of York.

41 The issue of situated learning will be tackled in the proceeding Chapter.

rules?.

Here it might be declared, as was earlier, that generalization is attained through diverse examples and inductive reasoning[42]; which is of course true. 'Once two or more examples are available, it is possible to induce more general rules by abstracting the components that are shared by the examples'. (Gick & Holyoak, 1987, p. 25). But the question is how many examples and to what limit. Any educational programme is due to achieve its goals in a limited time duration. Therefore the general tendency in educational settings would be 'the fewer examples possible the better'.

To approach the above issue, a possible line of enquiry is to see what the contributing factors are in the process of generalization and that 'whether a generalizable approach to problem solving can be developed from experiencing a single example'. 'Probably yes', is Pressley's answer to the latter question, but making achievements in that, as he asserts, is dependent upon learners' understanding of the procedure and of where and when the procedure can be applied; what he calls, 'metacognition[43] about the procedure'. (Pressley, 1995, p. 68). This issue will be expanded shortly, but what are the contributing factors to generalization?

Two factors are essential here, learner's cognitive capability and the exhaustive case. To interpret the structure of a case and derive its underlying rules and principles (or to produce schemata, technically speaking), is clearly a strategic expertise, partly stemmed from the background knowledge and experience, but more a trait of the creative mind. But in terms of educational interventions, this factor is less conducive than the scheme of the case itself. This latter factor is the core of what appears to be among effective instruction strategies, particularly

42 Inductive reasoning can be defined as; 'reasoning from known facts to produce general principles' (*LDCE, 1992)*.

43 Knowledge about one's own cognitive system is called *metacognition.* (Gage & Berliner, 1991, p. 310).

developed for professional disciplines[44]; the case-based methods.

The case method of instruction, as Pressley reports (1995, p. 67), 'is based on the premise that humans often come to powerful *general understandings* in light of *one case.* Given this assumption, it is not surprising that great care is used in selecting examples for inclusion in sources like law school case books'. (p. 67) (italics added).

This notion of individual cases representing general rules is also supported by others. Symes[45], who contributed to development of case method in architectural education, writes[46]: '... a variety of particular circumstances must be related to a core set of values. One way of doing this is to show how certain circumstances actually embody an expression of those values. In such situations, the particular can become representative of the core. This is one of the main purposes of teaching through cases; to choose and organise case material which will represent general truth'.

Some go further and put emphasis on cases even after the abstract knowledge or schema is constructed. 'Before there can be a schema', Pressley suggests, 'there must be individual cases that include information about concepts, procedures, and how the components of the case are related... Even after a schema is formed, representation of individual cases will remain'. Then he adds, 'Case knowledge is important, for *decisions often are based on a single case encountered in the past*'. (Pressley, 1995, p. 67) (italics added).

So far the argument was conducted to identify the routs to decontextualization. It was maintained that people are able to abstract general concepts, or construct

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44 The case method approach has also been introduced to architectural education since the early 1980s. (See, e.g., Marmot and Symes, 1983, 1985; Joroff and Moore, 1984).

45 He and his colleagues developed architectural case method in the early 80s at the Bartlett School of Architecture, University College London. The first international exposure of the method, he writes, was through his contribution to the EAAE meeting at Kassel in 1982. (source: a photocopy print of his report to the above-mentioned event).

46 In one of his letters to the author (7 March 1995).

schematic knowledge, through exposure to individual cases, which of course relies on their cognitive and metacognitive competencies. It was also acknowledged that using multiple cases and perceiving the to-be-learned concept in a range of situations will increase the chance that decontextualization occurs and consequently, transfer of learning is facilitated. Both factors should be taken into account when educational intervention is to be contemplated. Another critical determinant of transfer, i.e., the memory retrieval, remains to be discussed next.

2. 5. 8. 2. MEMORY RETRIEVAL

Because transfer depends on the application of previously acquired knowledge, it is inherently dependent on memory. (Gick & Holyoak, 1987, p.20).

In general, the content and structure of the student's memory is the major mediator between original learning and subsequent performance on a transfer task. (Brooks & Dansereau, 1987, p. 123)

As was established earlier and highlighted by the above citations, retrieval processes play a decisive role in transfer competencies. It is thus appropriate to have a closer look at what constitutes the content and structure of memory; or in other words, at the variety of mental representations of knowledge.

Before passing on the types of memory and transfer, it seems appropriate to draw on a conceptual model to grasp a conception of transfer process and its interactive components. To develop this model, the present author has mainly borrowed from Brooks & Dansereau (1987, pp. 121-123) with a view to the classification of memory structures suggested by Gagne & White (1978) (see further). This diagram, needless to say, is not claimed to have demonstrated all the complexities of transfer procedures. Rather, it is only intended to serve as an *organizer* for the present argument. The author is aware of the subtle points that the specialist of the field would have to make about such complex issues as transfer and memory structures.

In the proceeding model, learning outcomes, or in a sense educational objectives, are pinpointed under two subheadings; *knowledge* and *skills*. knowledge is held here as being represented by *semantic, episodic* and *imagery* memory structures, and skills by *procedural memory*.

What this model clearly implies is that the main actors of the transfer process are the learner, the learning situation, and the transfer situation. What learner brings to the situation is the knowledge and skills they already have, be it specifically related to the task at hand or relatively content-independent learning and problem-solving strategies which is, in other words, their memory structures. (see Brooks & Dansereau, 1987, p. 122).

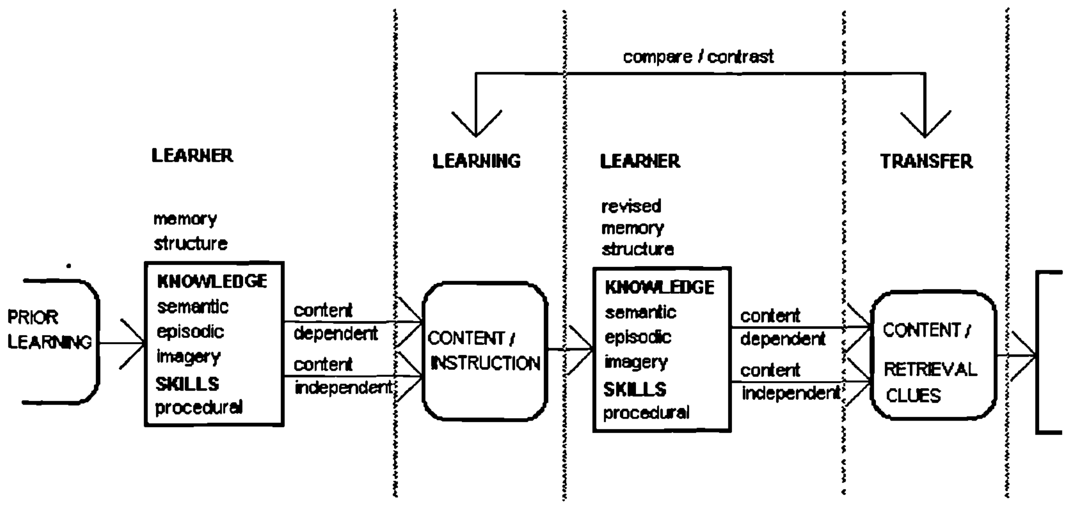

Figure 19 *CONCEPTUAL MODEL FOR LEARNING TRANSFER*

Another issue indicated here is the chain of learning and transfer events which characterize the process. Every learning task benefits from the prior knowledge structure through 'transfer', and leads to a revised knowledge structure which will act, in its turn, as prior knowledge for the proceeding task; an ongoing interaction between the learner and the learning and transfer tasks.

The significance of retrieval clues in the transfer situation, is also among the indications of the model. Whether there is anything common between these *clues* and the elements of the learner's' background knowledge, is the result of comparing and contrasting of two situations which determines the occurrence of the transfer. It can also be inferred that the probability for the transfer of knowledge is the greater the wider the scope of the learner's prior knowledge and skills is and/or, the more explicit the retrieval clues in transfer situation are.

Having the significance of memory structures in mind, Brooks & Dansereau (1987) found their framework for categories of transfer upon a similar fundaments to what was stated above. They concede that 'the job of understanding transfer and teaching principles that facilitate it [is] largely one of determining what types of memory structures are necessary and sufficient for effective performance on a particular class of transfer tasks'.(p. 123).

The types of memory were discussed in the previous chapter. Three were identified; semantic, episodic and procedural, with the first two designated as declarative knowledge structures; to do with facts, principles and objects (know-what), and the third as knowledge of operations and procedures (know-how). (See Chapter 4, under *Information processing model of learning*).

Gagne and White (1978) add a fourth to the categories earlier mentioned. They identify 'four types of organized memory structures[47] relevant to retention and transfer'. Those are: '(a) networks of propositions[48] [declarative representations], (b) intellectual skills [knowing how to do things] , (c) images, and (d) episodes'. (quoted in Brooks & Dansereau, 1987, p. 123). In the conceptual model of transfer, earlier presented, categories (a), (c) and (d) were designated as *knowledge* and category (b) as *skills.*

Regarding the possible combinations of those structures, Gagne & White (1978) draw a remarkable conclusion which merits particular attention. Through an intensive review of the relevant literature, Gagne and White conclude that learning and teaching are most likely to lead to 'effective retention and subsequent transfer' if they facilitate the formation of *'highly integrated, multiple-memory structures* (sets of related prepositions, intellectual skills, images, and

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47 They define the term *memory structure* as follows: 'the contents of memory that result from learning, and the organizations that these contents are postulated to have'.

48 In Gagne & White (same source, p. 191), *prepositions* are defined as, 'subject-predicate constructions put together according to syntactic rules (such as those relating actors and actions, objects and attributes, actions and recipients).

episodes)'. (see Brooks & Dansereau, 1987, p. 125) (italics added).

The educational implications of this idea will be unfolded in the proceeding Chapter when reflecting on the concept of integration. But for the present argument it seems sufficient to note that the above conclusion reinforces the value of learners' active participation in manipulating information, performing tasks, solving problems, and role-playing while being given the necessary verbal and strategic instructions. This will help them construct a multi-memory of the to-be-learned knowledge and skills.

Drawing on the 'conceptual model of learning transfer' presented earlier, the categories of transfer are generated from a network of give-and-take between the essential constituents of the learner's memory, i.e., knowledge and skills. Upon a similar basis, Brooks & Dansereau set their categorization of transfer types. As a matter of fact, the above mentioned 'conceptual model' heavily owes its main features to what was developed by Brooks & Dansereau (1987, p. 122). They identify four general categories for transfer: content to content skills to skills, content to skills, and skills to content[49]. (see Brooks & Dansereau, 1987, p. 125). What follows is a demonstration of those categories, each with a relevant example[50]:

■ CONTENT TO CONTENT
(GENERAL PSYCH TO ABNORMAL PSYCH)

■ SKILLS TO SKILLS
(RIDING BICYCLE TO DRIVING CAR)

■ CONTENT TO SKILLS
(LEARNING ABOUT COMPUTERS TO LEARNING TO PROGRAM)

49 Brooks & Dansereau (1987) also use the terms 'content knowledge' and 'skills knowledge' for 'knowledge' and 'skills' respectively. But to prevent confusion, the short form of *content* and *skills* will be used here. Content stands for *know-that* and skills for *know-how.*

50 A point can usefully be made here that if the four-fold classification of memory structures (propositions, episodes, images and intellectual skills) be taken as the basis for identifying transfer categories, more categories will be generated. Propositions, episodes and images are categorised here as forms of *knowing.*

■ SKILLS TO CONTENT
(CONSTRUCTION OF ELECTRONIC CIRCUITS TO ELECTRONIC THEORY)

General categories of transfer, quoted from Brooks & Dansereau (1987, p. 126)

'Within each of these categories the difficulty of transfer', Brooks & Dansereau denote, 'will be strongly influenced by the compatibility of the individual's knowledge structure with the characteristics of the transfer task'. (1987, p. 125). This is what activates the relevant ingredients of the long-term memory to be retrieved in the transfer situation. Therefore, instruction should develop toward strengthening those compatibilities by means of all sorts of techniques.

In educational settings, *content-to-content* knowledge transfer would mean the ability to apply knowledge acquired in one course to another course. In this category, transfer is best explained by the schema theory which essentially concerns the interaction of the prior with the to-be-learned knowledge. The question as to how this interaction takes place, is addressed by Brooks & Dansereau (1987) , on the basis of schema theory.

'There are at least three ways in which prior knowledge gained in one course may facilitate learning in a second course', they write (p. 126), '(a) The "old" declarative knowledge may provide a general framework for embedding the more detailed "new" knowledge; (b) the "old" knowledge may help in the elaboration of a newly acquired knowledge framework; and (c) the "old" knowledge may provide a convenient analogy which can guide the acquisition of the "new" information'.

The common factor in the above three aspects is the organisation of the old and new knowledge in frameworks, either existing or developing. The wide array of techniques devised to facilitate the formation of these patterns and frameworks fall in this category; 'web-structured instruction material', 'concrete models', 'adjunct application questions', and 'advance organizers' are among those enumerated by Brooks & Dansereau (same source).

Skills-to-skills[51] transfer concerns mainly the ability of applying problem-solving creativity and metacognitive strategies gained in one situation to other situations. Some of the major aspects of this issue were covered earlier in this chapter, and the instructional interventions which provide problem-solving and creativity training would enhance this type of transfer; case-problem projects and instructions on inductive reasoning to mention but few. (see the same source).

Regarding the *content-to-skills* transfer, Brooks & Dansereau (1987) review the major research findings which generally accept the positive influence of declarative knowledge in better learning how to perform new skills. They paraphrase (p. 134): '[N]ew skills are originally represented as declarative knowledge, and it is the process of proceduralization that translates declarative, propositional descriptions into a procedural representation'. 'It appears', they continue, 'that in many cases skill knowledge alone is not sufficient for effective skill performance and that in these cases both content and skill knowledge are required to perform a task at the level of an expert'.

Another point to be appended here is that the prior knowledge is best transferred to performance situations when it is relevant to performing the to-be-learned skills. In this way, the prior knowledge provides a meaningful context for the acquisition of those skills. This will lead to more effective learning and use of the skills. (see, the same source, p. 135)

The last category, i.e., *skills-to-content* transfer is demonstrated by Brooks & Dansereau (1987) as involving 'the learning of skills that subsequently facilitate the acquisition, retention, retrieval, and transfer of knowledge'. (p. 136). These are, in fact, metacognitive abilities and learning strategies that operate in a similar sphere to the content-to-content transfer; aiming at organizing the bits of information in networks of knowledge schemata. 'Peer tutoring' or 'cooperative learning' is reported by the same authors as being 'a relatively low-cost option for

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51 As the argument is to be reflected on higher levels of education, the term *skills* here is mostly meant to refer to intellectual rather than motor skills; such as creative problem-solving.

enhancing skill-to-content transfer'[52]. (p. 144).

The above categories of transfer can be summarized in the following table. As mentioned earlier, this is a simplified picture of transfer categories. Larger matrices would have been required if all the various memory structures (images, episodes) were taken into account. And more, with Gagne & White's integrated memory structures in operation, still a larger variety of categories will be generated concerning the transfer of those integrated structures.

categories of transfer	relevant issues	educational implications	in brief
content - to - content	schema formation schema activation	web teaching / concrete models / advance organizers	advance organizers
skills - to - skills	problem-solving / creativity inductive reasoning / analogies	creativity training case-problem projects	case-problems
content - to - skills	proceduralization meaningful context for learning	prior knowledge, relevant to performance of skills	procedural knowledge
skills - to - content	metacognition networking of information	learning strategies peer tutoring	learning strategies

2. 5. 9. CONCLUDING REMARKS

To conclude this argument, it is appropriate to have a quick review of what has already been achieved in the previous as well as this chapter.

The debate was conducted on learning theories, in the previous chapter, with this in mind that learning is central to any educational environment. The major attributes of human learning, though, were explored with more emphasis on the current cognitive views and more importantly the information processing model of learning and memory which is, of course based on those theories.

Having the findings of the previous chapter as a point of departure, this chapter undertook an investigation of learning transfer as a major attribute of creative thinking and 'learning for competence'. Transfer was argued to be the core of

52 This is one of the merits of studio teaching, most evidently in the Beaux-Arts tradition, whereby skills were in fact the core of education.

problem solving and creativity as well as designing[53]. 'Decontextualization' and 'memory activation and retrieval' were then identified as the major determinants of transfer.

Based on the types of knowledge structures as the poles of transfer, four categories were identified concerning the various possible shapes of transfer of 'content knowledge' and 'skills knowledge'; each having its corresponding educational implications.

To put those findings in perspective and lead to the proceeding chapter, the most important issues are elaborated in the following table. Needless to say that there are other implications which are of significance in their own right but the author suffices to mention those which stand out and are more central to the present argument. The items presented in the table will therefore be selective, but effort has been made to include those items which ultimately lead to a conceptual framework for professional education and consequently education of architects.

ISSUES	ATTRIBUTES	RELATED ISSUES	EDUCATIONAL IMPLICATIONS
LEARNING	ACTIVE	SCHEMA	EMPHASIS ON GUIDED DISCOVERY
	CONSTRUCTIVE	INTERPRETATION	MAKING TO LEARN vs. TEACHING
	ORGANIZED	vs. ABSORPTION	MEANINGFUL vs. ROTE LEARNING
	STRUCTURED	LEARNER'S MENTAL	NETWORKING OF THE GIVEN KNOWLEDGE
	SUBJECTIVE	STRUCTURE	SCHEMA FORMATION AND DEVELOPMENT
TRANSFER	CREATIVE	INDUCTIVE REASONING	STRUCTURAL UNDERSTANDING
	ANALOGICAL	SITUATED KNOWLEDGE	ABSTRACT - SITUATED KNOWLEDGE
	INFERENTIAL	ABSTRACTION	MULTIPLE EXAMPLES/APPLICATIONS
	MEMORY-BASED	GENERALIZATION	CASE PROBLEM PROJECTS
	STRUCTURAL	MEMORY ACTIVATION	INTEGRATED, MULTI-DIMENSIONAL
		RETRIEVAL	INSTRUCTION STRATEGIES
		IDENTICAL ELEMENTS	LEARNING ENVIRONMENT IDENTICAL WITH
		MULTIPLE-MEMORY	LIFE TRANSFER SITUATIONS

To put it in a brief statement; any educational environment, with competence

53 The present author suspects that transfer, in a constructivist sphere of thought is the core of learning as a whole. Learning, as was established, requires bringing relevant schemata to bear on interpreting the learning situation; to assimilate the new coming information. This process is what was attributed to 'transfer of learning'.

as its goal, should:

1. be aware of and build on the learners' pre-existing background knowledge/skills.
2. aim at providing the ground for learners to acquire knowledge/skills in a setting identical with future transfer situations (life/job),
3. enrich learners knowledge structures and reservoir of relevant schemata for their life-long learning, by multiple application of knowledge/skills in diverse situations. And the last but not the least,
4. organize the given knowledge/skills in patterns in order for learners to be able to gain an integrated multi-memory of what is learned.

The proceeding Chapter will first recall the 'problem statement', adding more details to it, analysing it in the light of the above findings and then reflect on how hypothetical solutions can be constructed upon the foundations provided by the preceding discussions. It will ultimately reflect on a mode of learning, cognitive apprenticeship, capable of meeting the requirements.

CHAPTER 6.

INTEGRATION

Integrating thought with action effectively has plagued philosophers, frustrated social scientists, and eluded professional practitioners for years. It is one of the most prevalent and least understood problems of our age.
(Argyris & Schon, 1974, p. 3)

2. 6. 1. INTRODUCTORY POINTS

The previous two chapters undertook to study the core concepts of learning and transfer. After a quick overview of learning theories, it was established that learning is a constructive process whereby learner's knowledge structures (schemata) as well as the learning situations play a decisive role. To put it in brief, learning was argued to be 'constructive', 'knowledge-dependent' and 'situated' or context-dependent. In the light of this view of learning process, transfer of learning was asserted as being central to problem solving, creativity and design. It was maintained that transfer could be enhanced through decontextualization of case knowledge which is resulted from multiple examples. It can also become more likely to occur through formation of integrated memory structures, i.e., learning simultaneously through verbal instructions, images, episodes or personal experiences, and knowledge of procedures and strategies. Points were also made regarding the educational implications of the above mentioned accounts.

The present chapter will commence with reconstruction of the research focus, namely *curricular integration,* in the light of the preceding arguments specifically the transfer of learning. Alternative proposals, in due course, will be categorised and evaluated against their corresponding transfer value; and the question how they should be treated in practice will be also argued.

Then the dichotomy of integration/flexibility will be tackled to maintain that both criteria are vital to architectural education. To reconcile the seemingly contradictory issues of integration an flexibility, 'education for competence' is suggested as a possible view to education. Consistent with this view of education, then, *Academic apprenticeship*[54] is put forward as a mode of learning which concentrates on learning for competence; hence an integral part of education for competence. Finally, the chapter concludes with a number of guidelines which conceptualise a framework for the discussed issues.

2. 6. 2. RECONSTRUCTING THE PROBLEM

The problem to be tackled in this research was put in Chapter 1 as being the *inadequate influence of taught courses on design projects.* It was maintained that since the various subject disciplines are mostly taught by the corresponding specialists coming from other faculties[55], little effort is done - or could be done, to tailor those taught courses according to architecture students special needs. More, as was indicated by *the survey* (See Chapter 1), the coordinating relationships between the lecturers and tutors are comparatively insufficient to meet the above concern; this being more significant in the Iranian context.

A working hypothesis was generated to explain that state of affairs and show a tentative solution. It was argued (in Chapter 3) that curricular split between 'theories' and 'design activities' was the major cause and that the re-integration of curricular components in and around design studio could lead to better contribution of taught courses to design procedures. In this way, as was argued, facts and principles are taught where and when students feel they need them. To put it in brief, the conjecture which initiated this study found the curricular integration as being a central issue to any strategic improvement of architectural schooling.

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54 This is a modification of the author's concept of *academic practice*, proposed in his contribution to the EAAE Forum 1995 in Weimar. (to be mentioned later in this chapter).

55 This is rather more true in the case of science and technology than that of humanities, because many subjects like history, theory, and criticism are taught by architects who are more likely to be familiar with students needs.

Having set the above conjectural solution, it was thought necessary to establish a theoretical understanding of the problem, against which the conjecture could be tested. To approach this task, an investigation of the 'hows' of human learning was conducted in the previous two chapters. What follows next is an analysis of the initial research problem and its related conjectural solution, on the basis of the preceding considerations regarding the nature and process of human learning.

In a primal analysis, it seems logical to take 'curricular integration' as a remedy to 'little applicability' of the given knowledge in the design process. The commonsense interpretation of the term *integration*, within the context of educational discourse, is the interrelatedness of the contributing components of education so they make a meaningful and goal-directed *whole*. This perception of the problem will gain more clarity and precision if interpreted in the light of 'learning transfer'. But it can be questioned as to what actually constitutes the curricular integration, and whether it is the only or best way of treating that problem.

With the wisdom of hindsight, particularly referring to the state of affairs before the academic institutionalization of architectural schooling, integration could be interpreted as follows: Facts and principles, or in other words, the knowledge of designing and building should be delivered through application and practice; i.e., 'on the spot'. It also implies that a full integration of learning, application, designing and building would be the ideal state wherein learning is intended to be applicable either in 'design' decisions or in the process of implementation. And what is more, learning of facts and principles would best happen through observing their application in real situations, rather than through abstract theoretical instructions. Next to that extreme, integration could find other interpretations each conforming to a certain level of combining theory and practice, knowledge and application, and/or designing and building.

The initial problem, i.e., 'little influence of taught courses on design activities', can be conveniently taken as one of 'learning transfer', discussed in preceding Chapter. The tentative solution, put forward earlier, that is the curricular integration, is also addressing the same issue. Integration is, in fact, meant to enhance the transfer of the knowledge delivered in taught courses to design situations, be it a studio project or a real life job situation.

Before the analysis of the problem from a transfer-of-learning perspective, a point should necessarily be made here concerning different categories of knowledge and their corresponding influence on design decisions. Unless it is elucidated how knowledge contributes to design, the concept of integration can not find its clear interpretation. Integration, in fact, is not more than a means, with ends being to inform design. But how knowledge influences the design process?

The *vocational* aspects of architectural education underlie the commonsense view that taught courses should be delivered as an auxiliary part of design studio so that they are applicable in the process of design. The *educational* aspects of architectural education, comparatively speaking, account also for subjects such as theory and history that hardly conform to the above expectation. The influence of these subject disciplines on design, as will be pointed later[56], are rather implicit and thus more difficult to evaluate and measure.

Thus there seem to be a number of questions to be answered at this stage: What is really expected to be the outcome of integration? How does it contribute to increasing the influence of given knowledge on the process of decision making? And finally, what are the constituents of the desired integration? Scrutinizing these questions reveals that the ultimate goal of integration is nothing but enhancement of *learning transfer*. To put it in brief, integration is an educational strategy whereby learning outcome of taught courses is made *transferable* to performance situations, be it design studio projects or real life decision-making.

As was argued in the preceding chapter, in order for a piece of knowledge or information, gained in a learning situation, to be transferable to a new situation; firstly it must be generalised, or technically speaking it should be organised in

56 Even the applied knowledge will be argued later as having tacit influence on design.

abstract mental structures (schemata), secondly it must find identical elements, be it environmental or mental, with the transfer task and situation (retrieval clues), and lastly it should at least be activated through analogy-driven thinking of the creative mind.

Fragmented curriculum, with which modern architectural schooling is usually identified, appears to be a serious obstacle for learning to be organised and meaningful, so crucial to learning transfer. The subject disciplines, though, are not mapped together and therefore have little influence on furtherance of one another's learning outcome.

Now the problem, as well as the conjectural solution, can be reconstructed due to the schematic concept of learning transfer and its educational implications. On that basis, the statement of the initial problem begins to look rather like this: "The learning outcome of the taught courses is hardly transferred to design situations. Therefore the great amount of time spent in lecture theatres have little contribution to the acquisition of the central skill of designing".

Within the context of transfer-of-learning debate, integration is associated with the notion of 'situated learning'. It implies that if learned in application, facts and principles are more likely to be retrieved when required. This is reinforced either by the theory of identical elements (elements of the learning and transfer environments), or by the theory of integrated memory structures, and most importantly by the theory of 'advance organizers'. (See Chapters 4 & 5).

If, for instance, a technical principle concerning structures is taught next to a relevant design question, that design question will function as an advance organizer, putting the given information in perspective or in a pattern with related information, and thus facilitates the process of assimilating it. More, learning through design commitment will structure a multiple memory of the information; a combination of verbal, procedural, episodic and imaginary memory structures. Needless to say that the common elements of the learning and application situations will help to activate the memory retrieval and thus enhance the transfer of information. There are several developments addressing the above issue, a number of which are overviewed in the proceeding pages.

2. 6. 3. LEVELS OF TRANSFER / INTEGRATION

Before moving on the various propositions addressing the above issue, it seems appropriate to draw a map of 'levels of transfer' in the education and practice of architecture, hoping that it will serve as an 'advance organizer', so to speak, to the current argument.

Architecture students acquire knowledge through books, articles, catalogues, mostly lectures, media of all sorts, possibly electronic learning packages, and also experimental assignments. The first level of transfer is to do with making the acquired knowledge applicable in the process of designing studio projects. Studio projects, although being simplified simulations of the real design situations, offer a different environment from that of lecture theatre and/or other learning situations. Hence, the plea for curricular integration is meant to bridge this gap between the acquisition and application of knowledge which, as was maintained earlier, is not a straightforward application but rather it calls for 'transfer', given that the learning situation is not the same as the application one.

The transfer value of knowledge, here, can be promoted by multiple examples and experimentations aiming to bring elements of the transfer environment in learning situation and helping the learner to induce a generalized learning outcome, capable of being adapted to variety of transfer situations. This level of transfer can be associated with the concept of curricular integration.

The second level of transfer of learning outcome is from design studio projects to practice office environment where real commissions are dealt with and real design decisions are to be made.

Case problem projects and gaming-simulation techniques are among the instructional developments aiming to facilitate transfer of learning to real decision-making situations of the professional practice. This level of transfer will lead towards integration of 'academia' and 'practice'.

Albeit the mainstream graduates of architecture courses (as a design education discipline) are expected to act as architectural designers and thus develop their careers in design offices and consultancies, but the transfer of knowledge goes far beyond the confines of the design office. *Design*, as 'a set of prescriptions for construction', is most of the time the end product of the design process, but since any 'design' is meant to be implemented in reality, design decisions must be compatible with corresponding construction situations.

Site visits, supervision and continuing professional education are among routs of knowledge transfer between practice office and construction industry. Building guilds of previous times and turn-key development projects represent this level of transfer through integration of design and construction processes.

The above mentioned levels of transfer and their corresponding integration levels, are summarized in the following Figure.

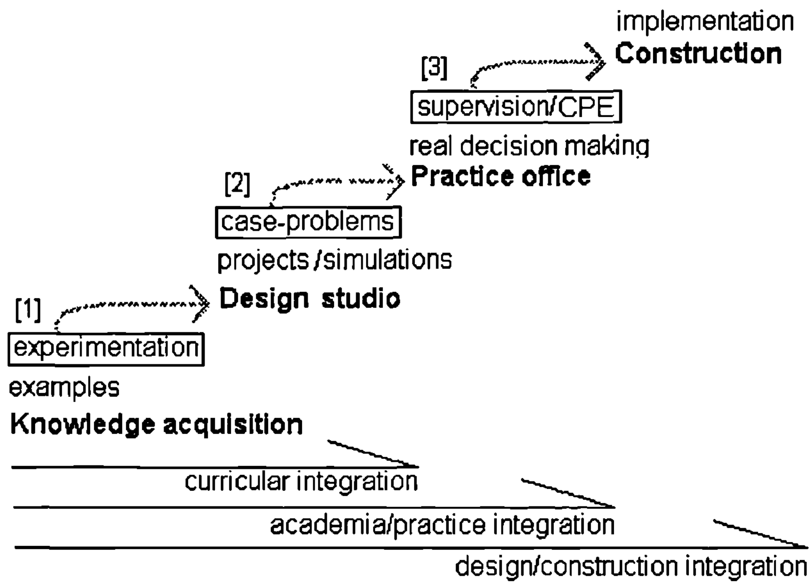

Figure 20 *Levels of transfer / integration in architectural education / practice*

An immediate implication of this map is that architectural education is one of a lifelong duration which calls for a continuous interaction of *learning* and *transfer*, application of learning and learning through application. Architectural schooling, in this perspective, is at best about to provide graduates with competence in 'how to acquire knowledge' and 'how to apply it'. This is best pronounced by Whitehead (1962, p. 6) when he points at education as a whole: "Education is the acquisition of the art of the utilisation of knowledge".

Various propositions have been made to address the issue of integration in order for the given knowledge to be made more applicable in design process. These proposals can be categorised according to the level of integration and transfer they intend to achieve (see the above Figure). A critical overview of a number of such proposals is briefly made next to lead to the closing of the present argument. These alternative proposals are seen at the level of their 'conceptual framework' rather than at that of working details.

2. 6. 4. ALTERNATIVE PROPOSALS

The ultimate level of integration is achieved in the traditional master-disciple system whereby learning, teaching, designing and construction are all integral parts of one activity. Given that the problem of disintegration can be mostly associated with the academic mode of education in modern sense of the word, some argue that the very evolution of architectural education to a university discipline has been an unfortunate one. They hold that there are inherent contradictions between the attributes of the two modes of education. Therefore they would suggest a revival of the apprenticeship, and its more organised version, the pupillage system, where, they would argue, the final product which both education and practice are concerned with, ie. the design and construction of the building, is the focus of the whole process of teaching and learning.

'Not many would question the validity of learning through direct contact with a master at work - somewhat analogous to learning a language through direct exposure to native speakers. As in language training, in an apprenticeship system, competence is achieved through frequent imitating of a procedure; starting from simple tasks up to the most sophisticated ones towards the final totality, be it *building* or *design decisions*'. (N)[57]. Since in this case the learning

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57 Some extracts of the author's contribution to the 1995 EAAE Forum in Weimar (to be published in the proceedings), are incorporated in this part of the argument. (A short report of that event is recorded in the appendix 4). These extracts are marked here by (N).

and transfer situations are identical, learning outcome is both *situated* and easily *transferred.*

'Taking the above position, the question is, if the old system of training architects did work so wonderfully, what then was the point of shifting education to the universities? Some argue that apprenticeship works well when architecture is in a *good condition*, which is not always the case today. This sounds likely but the term *good condition* needs to be defined more closely.

'In traditional and pre-industrial societies, where the boom in urbanisation was not critical, the limited volume of construction activity allowed the rather randomly organised process of training architects to meet the needs of *building guilds*, as well as those of the society at large. More importantly, architecture enjoyed well established and accepted principles and paradigms, which left little other than learning how to do it. This was the case with the Gothic period or as Broadbent (1983) holds, with Islamic architecture where the art of building had acquired a high degree of perfection.

'But is it possible to subscribe to the same model in the present situation? There is no one answer to this question. But two points are self evident: first, the complexity of building techniques, the introduction of new materials and industrialised systems and more importantly complicated socio-cultural variables are factors which make research inevitable to professional practice. Second, there is the lack of a dominant culture to accommodate architecture as a cultural commitment. This is manifested in the expression of hesitations, uncertainty and a common sense of *value crisis* among those academics and practitioners, who are keen to make value-laden decisions rather than ad hoc ones'. (N).

2. 6. 4. 1. PROPOSALS ADDRESSING CURRICULAR INTEGRATION

At the other end of the spectrum, by those who accept academia as the proper setting for architectural education, some attempts are being made and proposals put forward to enhance the level of integration within the structure and curriculum of courses. They aim to facilitate transfer of learning from subject disciplines to design studios. Developments of the kind can be categorised in three groups;

1)those which try to submerge taught courses in design activities, putting the skill of designing at the forefront of architectural schooling, 2)solutions seeking partial integration of curricular elements in groups of interrelated components, these can be likened to componentisation methods in the process of construction, 3)those trying to strengthen the links between the existing curriculum elements by proposing a redefinition of the aims, content and teaching methods of the curricular elements in relation to one another.

The assumption underlying the above proposals, is the self sufficiency of schools to mediate the act of educating architects, unlike the to-be-mentioned alternatives where professional practice is also called for to suffice the acquisition of professional competence. These categories of alternative proposals, as was pointed, aim to integrate the two worlds of education and practice.

To give but a few representative examples of the above, the following contributions can be usefully mentioned: Falling in the first category, Cunningham's *interest groups* model, demonstrated in his (1980), is structured for students to be able to decide what and when to learn, clearly according to what they require in the course of their designing[58]. He, therefore, suggests the acquisition of taught material to be tuned with students' individual self-pace. He asserts (in the same source): 'In the interest of true *integration* several adjustments have been made. Formal examinations have been abolished. Whenever it is feasible competence is assessed through application in design project work, otherwise work items are completed in the student's own time'. Cunningham's *interest groups* structure, reminiscent of the Beaux-Arts ateliers, is devised to facilitate students choice and peer education in a design-based atmosphere. Students, from the second year, associate themselves with one of the *interest groups* each consisting students of all years who share the same interest. 'Design project work', Cunningham notes, 'is the dominant vehicle of the courses to which all else is subservient'.

58 In his doctorate thesis, Ateshin (1987) takes a similar stand and merges the taught courses and design projects in what he calls *Wahdah* (meaning 'unity').

From the transfer-of-learning point of view, Cunningham's proposed model enjoys a number of virtues. Design project work, generating 'the need for lectures and seminars', as he asserts, can be an effective motivation for the taught courses. The taught material in this way is timely and relevant to application points, and learning outcome is structured and thus more meaningful. The notable emphasis on students' preferences creates a highly motivated atmosphere which in its turn facilitates the acquisition of knowledge.

There are, but, points which must still be clarified before the above model proves to be one of workable value. Those points are: First the extent to which and how the acquired knowledge and skills are made transferable to prospective real life situations, given that they are rather seen as intellectual accomplishments[59]; second the order, scope and timing of delivering taught material as expected to fit the students' preferences and needs. This is apparently an administrative question. The experts who deliver the lectures are usually from corresponding departments and therefore they are less flexible to adapt their time with individual students. Perhaps the utilisation of computer aided instructions is the only possible way of individualising those instructions and thus paving the way for students' self-pace progress; and last but not the least the ways of assessing the acquisition of theoretical knowledge such as theory and history, as distinct from that of applied subject disciplines whose influence on design can be measured more directly through project work.

Posed to the above question, by the author, Cunningham further clarifies what he actually meant by 'examination' in his (1980). He writes[60]: 'The elimination of examinations referred to that method of examination which employed wheeling candidates into a room, providing them with *secret* questions around a particular *subject* which required answers, the whole procedure being timed against a

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59 This is hardly surprising because Cunningham holds a humanistic view of education (after Russel, Newman and Leslie Martin) as distinct from one of vocational bias. So, although design project is central to his model, links with professional practice is not articulated. (paraphrased from his interview with the author on 3 November 1993).

60 In his letter of 17 August 1995 responding the author's query. Cunningham is in the department of architecture, University of Westminster, where his scheme has been put to practice.

clock'. Then he proclaims that this method of assessment could only test *short term memory...*, examination *technique...* and the health of one's writing hand... none of which qualities appeared to me as relevant to competent practice as an architect'. 'It is a system', he continues, 'devised more for the convenience of the lecturer than with a pedagogic interest in mind'. Then he explains his own view of assessment method: 'Where possible, my thesis ran, acquired knowledge should be tested through its application in project work, either analytic or synthetic. Otherwise exercises could be (and were) devised which could be done in one's own time (with a deadline to be sure) having no restriction on access to people or information. These are sometimes written, sometimes drawn, are experiments and tests, visits, seminars, visual tests questionnaires etc etc'. Finally pointing that his school has been employing this non formal examination for years, he acknowledges the approval of CNAA[61] visiting group: '... when they visited, our 100% ongoing assessment system was approved with acclamation supported by External Examiners (including at that time James Stirling)'.

The latter issue should be ascertained, albeit he acknowledges that; 'Very little reliance is placed upon the unsupported lecture as an efficient conveyor of knowledge'. There are not enough clues, though, in Cunningham (1980) to the above issues but by and large the model enjoys many promising considerations.

In the same part of the spectrum, Teymur's *experimental integrated education* is worth mentioning. In his *Learning by Learning* (1979), he draws attention to the deficiencies of architectural education today wherein design, as a portion of the whole process of construction, has become 'the main subject in any curriculum in architectural education'. 'This subject', he adds, 'was supplemented (and seldom supported) by a large variety of specialist subjects either for academic or purely pragmatic reasons'. Although these additional subjects have always been seen necessary, 'there has never been a real attempt to integrate them with the design teaching'. This point clearly explains the earlier discussed problem of poor transfer of learning .

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61 Council for National Academic Awards, in the UK.

Upon the basis of the above argument he holds it possible 'to try to reform architectural education by integrating the specialist... subjects and research into the design process, *and* integrating design activity into the knowledge production and knowledge transmission'. (p. 14) (emphasis of the main source). This is what underlies his proposed mode of *integrated* as opposed to *interdisciplinary* education of architects. This model has been put to test in a Winter Term of 1979, he reports (p.17), in the then Polytechnic of the South Bank. He briefly describes (p. 22) it as involving:

a) the full-time participation of *all* the design tutors and specialist teachers in the design process,
b) replacement of fixed design studios, lecture hours and timetables by a combined, integrated, non-hierarchical and intensive re-organization of learning,
c) extending the working hours of everybody to the maximum possible, e.g., at least four full days, or all afternoons, etc...,
d) occasional, spontaneous, instant, intensified, invited, open-ended lectures, criticisms, seminars, visits, ... if and when necessary by whoever is found to be appropriate,
e) all staff and students pooling their knowledge, experience, energy, doubts,, problems *and* ignorance into *one* ongoing activity,
f) breaking all disciplinary, professional and institutional barriers dividing the different areas of learning in favour of a free-flowing exchange of information, experience, criticism, and infinite possibilities of intervention and experimentation,
g) all staff and students sharing responsibilities, deciding collectively, learning and producing together, cooperating on the same project(s),
h) experimenting with group or individual work, but always in public, and experimenting with various mediums (drawings, words, graphics, films,...),
i) rethinking the assessment system for that term, and deciding collectively what to do about it in the course of the term,
j) deciding collectively on, and experimenting with, the modes of recording, presenting, publicizing, implementing, following-up, recommending, ... the process of the experimental term.

There is no published material assessing the implementation of the above mode of education, but in a short interview with the author Teymur evaluated the experience as one of successful pedagogical ends. Regarding the question why it was not continued, he pointed at administrative constraints as the major cause as well as the inert habit of individually running separate courses which is obviously a less demanding way of teaching. Co-operation and co-ordination is always time consuming and also requires careful programming and management.

This, in turn, calls for sympathetic attitude of those who are to take the initiative.

From a transfer-of-learning perspective, the present author holds, Teymur's contribution is among the most promising. Highly motivated learning environment; availability of the contributing specialists to facilitate 'on-the-spot' instruction which satisfies the plea for 'situated learning', so helping information to be more *easily activated* in case of application; and more importantly, the interaction of different disciplines in the process of designing which results in *organisation* of diverse subjects in a pattern based on the 'inseparability of the design and thought'; these are the major attributes of this model which make it an effective response to the question of curricular integration[62].

Apart from all the stated merits, Teymur's proposal leaves some points untouched. One of those points is the transferability of the acquired knowledge to life situations, given that the whole learning situation is designed as an academic commitment. Although he asserts his disagreement with attempts taken to 'turn schools into architectural offices', yet it seems inevitable for architectural education to tackle the realities of the practice. The acquired knowledge of graduates is ultimately due to operate in practice and therefore they need to be supported by other modes of learning which primarily focus on transfer of academic knowledge to practice situations and thus go beyond the curricular integration. (to be discussed shortly).

Representing the second category, alternative proposals try to cluster the curricular elements in components, aiming to make meaningful wholes out of them. Quantrill's *platform-based* structure (1984) is among such proposals. Building upon Norberg-schulz concept of 'architectural totality', he holds that students should be posed, from the very beginning, to 'complete' architectural problems comprising 'all the aspects which characterize a typical architectural totality'. This, he claims, would call for abandoning of the 'conventional subject bases, which have evidenced little or no interaction between subject knowledge

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62 A similar initiative is briefly reported to have been experienced in Iran. (See Chapter 7. under *Peer review*).

and design enquiry', to the favour of 'a vertical structure which would provide for all the factoring to be considered at each level *but* with an increasing complexity of elements and the depth of enquiry'. (same source) (his own emphasis).

This is reminiscent of Bruner's 'spiral curriculum' whereby, as Good & Brophy (1977, pp. 162-163) record, he recommends 'teaching the same material at several different levels by returning to it periodically'. 'Presumably', they continue, 'each time the *spiral* comes around to a particular set of concepts, learners will have broadened and deepened their knowledge about these concepts and related concepts, and therefore they will be both motivated and prepared to undertake newer and deeper exploration into the topic area'.

Four 'knowledge platforms', to substitute the different subject areas, is suggested by Quantrill as follows; *Theory & Diagnostics, Technology & Assembly, Innovation & Invention,* and *Communication & Representation.* These platforms, he claims, would introduce 'a radical change in: (1) the way in which the curriculum is viewed and the interaction of knowledge is focused in the studio design enquiry; and (2) the organizational and administrative nature of the academic programme'. Unlike the preceding proposals, Quantrill's alternative is not reported as put to practice but the idea appears to be a practical step forward. The most predictable problem with implementing this proposal would be one of administering the assessment of learning outcome. Given that each knowledge platform goes beyond the definition of constituent subject disciplines, hence the assessment of students' progress calls for new means and methods involving the co-operation and team work among the contributing tutors.

In a virtually similar sphere, the curriculum for the Iranian schools of architecture, was re-designed in 1982[63] and further put into practice. The curriculum incorporated four *realms* of knowledge (somewhat identical to Quantrill's knowledge platforms but with a horizontal structure). Those were designated as realms of: 1. Architectural design (comprising theory and practice of design and

63 The curriculum and synopses for the 'Master of Art' degree course in Architecture, issued by the Iranian Planing Committee for Arts and Architecture, Supreme Council for Higher Education Planning (1982). (For more on architectural education in Iran, see chapter 2).

communication), 2. Construction technology (covering scientific and engineering aspects of architecture), 3. History and Conservation, and 4) Human settlements (dealing with planning and design in macro scale of settlements); each realm to be coordinated by a senior member of the teaching staff.

Attempts have also been made to apply the same concept in further possible groupings of elements in each *realm*, to form rather composite components. To mention but an instance; a new component entitled *Tarkeeb* (synthesis) was introduced to encompass all the curriculum elements aiming to provide students with an understanding of the means and methods of dealing with design questions and different approaches toward solutions. Subjects such as geometry, geometric patterns, perspective, sketch drawing, measured drawing, surveying, design process, graphic presentation techniques are incorporated in one composite unit to form a meaningful whole and lead to the first design project in the second year. The components of this sort are usually lead by a group of tutors to give a better coverage to all incorporated topics. Theoretically speaking, the significant point in this model as well as in Quantrill's is the provision of opportunities for conventionally separate curriculum elements to be unified and coordinated in planning, implementing and assessment phases, and thus organize the learning outcome, so crucial to transfer of learning.

Regarding the practical aspect of the above programme, Navaee's account[64] regarding the pedagogic objectives and practical shortfalls of the latter alternative component -*Tarkeeb*, indicates that the most difficult hurdle to be overcome is the management and co-ordination of various subjects each of which having, inevitably, its own competent instructor[65]. This seems to be common to the initiatives of the sort whereby *integration* is to be brought to the fore (see e.g.,

64 In an interview with the author, 7 May 1994. He is a member of the 'planning Committee for arts' (*PCA*), and meanwhile a lecturer in Shahid Beheshty school of architecture in Iran. Therefore, he has been involved with both designing as well as implementing and monitoring the above mentioned programme.

65 A similar state of affairs was voiced by Haj Ghasemi, in an interview with the author (7 May 1994). Admitting the merits of integrating the History course with design projects, he mentioned the practical difficulties of orchestration of diverse attitudes, in due course. Haj Ghasemi is a member of the Planning Committee for Arts (*PCA*), and a lecturer at Shahid Beheshty School of Architecture in Tehran.

Teymur, 1979).

As acknowledged by Navaee, the primary objective of *Tarkeeb* was to *synthesise*, in one comprehensive course, all the curricular elements contributing to *synthesis* as the architect's pivotal role in design. Offered to the beginning students, it was meant to bridge between architecture and visual arts moving from 'concrete' to 'abstract' (unlike the Bauhaus foundation course which takes a rather abstract approach). For the above task to be administrable, Navaee holds that two prerequisites must be acquired first. Those are; 1) a harmonious team of tutors for running the course[66], and more importantly 2) a powerful coordinator to orchestrate variety of competencies and attitudes of the team members. These requirements usually run beyond the available resources and hence, integration remains an aspiration which is still far from reality.

The third possible sort of proposals recognize the autonomy of curricular elements but try to devise ways of tuning them due to the specific aims, content and methods they should adopt within the context of architectural education. Focusing on teaching structures as his specialist field, Gulzar Haider (1975) draws on the little influence of structure courses on the way architecture students approach design questions. As he argues, this recurrent dysfunction stems from the fact that structure course is not tailored to the requirements of architecture students and rather it is a replication of the parent discipline, i.e., structural engineering.

Attending to the problem in architectural education as a whole, he asserts that 'the architectural curriculum is not a conglomerate of simplified bits and pieces of... basic parent disciplines'. To overcome this problem, though, he produces a framework for systematically defining the taught elements of architectural curricula, as distinct from the definitions they ordinarily have in the parent disciplines. The cornerstone of his argument which underlies his proposed framework, is the very distinctive nature of taught material when incorporated in

66 One of the obstacles in the way of implementing this course, as Navaee notifies, has been the bias toward abstract experiments of some of the contributing tutors, which runs counter to the intended concrete-to-abstract approach of the course.

architectural curriculum. Therefore, the *interface* of each couple of curricular elements is what he considers necessary to be contemplated.

By and large, Haider's proposed approach to solving the problem appears to be a practical step forward, although it calls for a close and ongoing dialogue among all the teaching staff and thus an organisational power to motivate and lead the dialogues and further administer the results. The least outcome of this approach could be a move towards perceiving each taught course as an integral part of a goal-oriented whole, which is clearly in line with the enhancement of curricular integration and learning transfer.

2. 6. 4. 2. EDUCATION - PRACTICE INTEGRATION

The ineffectiveness of professional schools in this regard must be attributed to the differences between academic education and the realities of professional practice. (Argyris & Schon, 1974, p. 153).

What was argued so far, was an overview of proposals addressing the question of integration/transfer at the curricular level. The second level of integration which constitutes the transfer of knowledge from educational environment to practice setting, is concerned with links between modes of education and practice. A promising development in due course, is the adoption in architectural education of the *case problem approach.* Having initiated in business management in 1910's[67], the case method in architectural education, as mentioned in the previous Chapter, was developed as late as 1980's (see Marmot & Symes, 1983, 1985; Joroff & Moore, 1984), aiming to fill the gap between education and practice; between theory and design. The following statement is a brief definition of the *Case Method Approach* in architectural education:

'Case Method Approach is a teaching vehicle devised to bring a sense of real problems in the process of design projects. By definition, it is not a formative academic exercise dealing with abstract problems and applying abstract

67 'Education for business management has, since innovative work at Harvard University in the 1910's developed a strong tradition of case teaching on the assumption that education for business should be founded in how business actually occurs in practice'. (Marmot & Symes, 1983, p. 1.4).

methodologies. On the contrary, it intends to simulate the real-world situations by providing students with detailed information about particular circumstance, defining the design problem which is to be addressed. By so doing, the method puts architecture students in the position of *real life decision makers.* Case Method exercise is mostly organized for as short a time as one day to one week. Due to the time constraints, the method calls for a concentrated and purposeful design activity. The teaching process will then be followed up with a group discussion on the alternative design solutions presented by students. One of the celebrated gains of the case method approach is hoped to be the students' experimenting 'Contextual Studies', in the very process of designing and, thus, *integrating theory and practice.* The variety of the given cases will help the students to *induce* a method for getting at the required information and applying it in the process of design'.[68]

The significance of the case method approach is more explicit from a transfer-of-learning perspective. Case learning, is *situated* and thus easily transferred to job situations of identical structure with the learning environment, given that the case is usually '... based on an *actual experience* in architectural practice'. (Marmot & Symes, 1983, p. 2.1). The case problem approach, highly flexible and efficient as it is, can be adapted to diverse situations and thus employed as a complementary method along with other alternatives. The problems addressed in this approach are of open-ended nature and therefore call for *creativity* and *value judgment.* And what is more, this method is capable of bringing on the agenda, the 'non-design' skills of designers that are ordinarily overlooked by design studio projects. This latter point also adds to the transfer value of the knowledge gained through cases.

Either the alternatives dealing with curricular integration, or the above mentioned developments, aiming to bridge the gap between education and practice, '... try to find solutions within the confines of academia. Along with these, there are other alternative solutions which build on the assumption that both academic and

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68 This short statement of the case method approach is extracted from the author's letter of 25 August 1994 to Professor Symes, aiming to check his interpretation after an interview with him regarding the same issue. The term *induce* was Symes's suggested correction.

apprenticeship modes of education should contribute to educating architects. But since these alternatives view the two modes of education as controversial, they suggest an amalgamation of the two, occurring in separate time sequences. Le Corbusier's *reform* proposal and the UK system of architectural education are two instances of the above approach'. (N). These are also classified here in the second level of transfer/integration (see the previous figure).

'Le Corbusier's *reform* proposes to 'teach technical subjects in schools but let students learn design by working in an architectural firm of their choice. This system, in his view, is "none other than the traditional workshop of former times. It connects us with that era prior to the institution of architectural schooling, which produced real architecture." (Guiton, ed., 1981). The same idea is elaborated by Crinson & Lubbock (1994, p. 48) when they write, "Indeed... a well-organised office [acts] as a kind of nursery of talent"'. (N). Technically speaking, this model is somewhat trying to *situate* the skill of design by abolishing the distinction between the learning and application environments. But, what is not tackled by this proposal is the question how those 'technical subjects' that are taught in schools are to contribute to students' design skills. What can be inferred here is that Le Corbusier is probably taking the on-the-job training and office experience capable of integrating the given academic knowledge with the design competencies.

'The present system in the UK schools of architecture is an alternative instance of the above amalgamation. After an introductory first-year course and two years of design projects and lectures, students spend a year out in an architectural practice followed by a further two years of study leading to a Diploma in architecture (RIBA Part II)'. (N). What is common in the British system and Corbusier's proposed reform is the assumption as to the cultures of practice and academia are incompatible, so in either case, 'it is the student who is expected to live both cultures separately within time intervals of different length, and ultimately integrate what he gains from those cultures'. While the latter totally leaves *design* to be taught in office practice, the former perceives the office experience as the catalyst between abstract education and the real world of *profession, management* and *business.*

In spite of all the shortfalls[69], this 'year out' experience, is perceived by most architects as 'an essential part of their training' (Crinson & Lubbock, 1994, p. 162). This is hardly surprising, since the office is where they could touch the realities of the profession they were training for. More, it is where they could observe and experience the given facts and principles *in application.* Paragraph 4.57 of the report prepared by the RIBA's Steering Group on Architectural Education reads: 'Practical Training involves a crucial collaboration between the profession, the students and the schools; the opportunities offered should be strengthened and extended'. The group, then, recommends that, 'The existing Practical Training Scheme should be maintained'. (RIBA, 1992, p. 24).

The merits of the latter model are well observed from the point of view of learning transfer but, in practice, the notable problem facing the model is, again, one of co-ordination and control. Taking into account the degree to which the link between education and professional training is loose and easily distorted, especially in difficult economic conditions, all the weak points with which the traditional apprenticeship is pinpointed, in terms of having arbitrary and uncontrollable consequences, will prove to be inherent to this system too. The loose co-ordination of school and practice during the year out reminds one of the statement Teymur (1992, p. 64) used, with a sense of humour, to signify the 'year out' practical training in the UK; as the 'year out (of sight, out of mind)'.

Attending to the very problem of co-ordination and control, which is most likely to stem from the very nature of amalgamation of discrete institutions, the concept of an alternative setting with both educational and professional commitments was put forward. In his contribution to the EAAE Forum[70], the present author suggested that if well supported by state commissions, a hypothetical institution, designated there as *academic practice,* is likely to offer a paradigm for an integrated education, bringing together the merits of academic and apprenticeship systems.

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69 See for example Teymur (1979)

70 See Appendix 5.

Underlying that proposal, was '... the suggestive question as to whether the dichotomous controversy of the two cultures, *academia* and *practice,* should ever be taken as given'. *Academic practice*, though, was suggested to act '... analogously as the *master* in the apprenticeship system, but at the scale of an institution rather than an individual'. (N).

The embryonic state of the *academic practice* was suggested to be the practice arm of schools or *school practice*, but with basic differences; '... *school practice* is an appendix to education, providing a chosen few students with working opportunities. *Academic practice,* on the other hand, is suggested as an integral part of education and rather as an *educational institution* having at the same time professional commitment. [moreover]..., school practice is bound to compete in the market for obtaining commissions, while *academic practice,* like other educational institutions, is subject to state support and investment'. (N).

Albeit the *academic practice* aspires to reconcile the contradictory modes of 'education' and 'practice' by putting them under one organisational umbrella, the very establishing of such an organisation, demands a stepwise preparation of ground in economic, administrative, and most importantly moral/attitudinal dimensions; It calls for a change in *attitude* both of practitioners and educators who are to contribute to the realization of such an idea or ideal.

What Argyris & Schon (1974) report in their context, as 'the advocacy movement' is an evidence of the fact that students, at least, are well grounded in recognition of the lacking of real practice. They write: 'The advocacy movement, which emerged in the mid-1960s as a response to dilemmas like these, urged... the professional to devote himself to the disadvantaged client'. They continue: 'The advocacy movement has spread to professions as diverse as medicine, architecture, social work, planning, and psychiatry, but it has thrived primarily in law- its native field, from which the term and the concept were largely derived'. (Argyris & Schon, 1974, p. 141). Their account of the case reminds the present author of the high enthusiast of architecture students in Iran to join voluntarily the development activities undertaken in remote settlements of the country to offer their professional service to the disadvantaged.

What can be summed up from the above overview is that one common denominator of the alternative solution models is that in practice they all face, in one way or another, administrative obstacles; given that they are primarily dependent upon an orchestrated co-operation of staff initiatives, which is obviously beyond the current conventional attitudes, identical of a fragmented division of labour, not to mention the required extra resources. This is perhaps why the current situation has been so resistant to change, even though the plea for integration has always been voiced in the relevant literature. An overview of architectural course documents[71], indicates that the integration of taught courses and design activities is attended and valued by academic circles, so the gulf to be bridged proves to be the one between 'intentions' and 'realities'. A number of the documents elaborate the issue of *integration* when dealing with lecture courses, to show that their structure and teaching methods are supposedly well worked out. Four explicit instances are cited bellow to show the typical wordings used in such documents;

- '... the uniquely imaginative aspects of architectural design are *integrated* with the technical concerns of modern practice'. (University of Wales, 1989)
- 'The Design Studies modules are run in parallel to form *integrated* programmes of project work and are taught within a choice of studios'. (University of North London, 1993)
- 'In the realm of Architectural Design [of the curriculum], students are lead to maintain how to incorporate the given knowledge of arts and sciences in their Design, and thus realise an *integrated* and unified whole'. (Architecture Course Curriculum, Iran, 1994)
- 'The course... encourages an *integrated* approach to architectural design based on creativity, social awareness, and technical competence'. (De Montfort University, 1995)[72]

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71 The overviewed documents were selected from prospectuses, handbooks or curricula of 9 European, 4 Asian (including one from Russia) and 17 UK schools of architecture, plus the curriculum which is presently being implemented in Iran.

72 In a similar study, Cardona-Aparacio, et al. (1981) mention the following phrases as frequently seen in many course documents; 'specialism x is *integrated* into/within design through special exercises', 'a limited goal project allows technology to be fully *integrated* into design', 'during the course a number of *integrated* projects are designed to enable students to take a closer look at specialist design problems'. (italics added).

So far, the initial research problem was reinterpreted in the frame of learning transfer debate; the alternative proposals addressing that problem were overviewed; and the merits as well as shortfalls of those proposals were also mentioned. The remainder of the chapter will further the argument towards conceptualizing a framework for change. But before moving on, it seems necessary to set the criteria for making proper decisions.

2. 6. 5. SETTING THE CRITERIA

Two important considerations should be ascertained first:

1) Education, analogous to design, is an evolutionary process of conjectures and refutations. There are various actors which determine how an educational environment functions as it does. Programming, though, is only a portion of what education as a *whole*, tends to be. Any educational idea is potentially challenged by the reality of educational practice. Although some would take programming as 'the heartland' of education, and hold that one '... who controls the programming heartland controls the educational system' (quoted in Eraut, 1989, p. 14), but life experience as well as more recent contributions to educational technology, have substantiated that, '... utilisation of programmes might be an even greater problem than design'. Conceding the above judgment, Eraut (1989, p. 14) draws on the appeal for a holistic view to education which resulted in the popularity of systems approach to account for implementation and evaluation and thus close the loop of programming, implementation and feedback. He writes (in the same place): 'The concept of *systems* became increasingly dominant during the mid-1960s and assumed a central role in the emergent field of educational technology'. Therefore, it should be kept in mind that theoretical contributions like the present research are, at best, *the tip of the iceberg*, the rest of which remains to be contemplated through full indulgence in the practice of education, with all the social, economic, attitudinal and cultural implications around it.

2) Each of the proposed models, stated above, bears a portion of the whole truth and can well be useful in certain circumstances. Given that, success or failure of any proposal is dependent on many unpredictable factors, it seems to be more wise to take a pluralistic stand, in practice, and benefit from as many as possible of those alternative ideas. Still more, Eraut (ed., 1989, p. 3) got it right

when he wrote: 'In the area of applied social sciences, where education surely belongs, acceptance of a theory or approach is more likely to indicate acknowledgement of its importance rather than its truth'. Although the generation of any proposal is context-dependent, the creative task of educational practitioners, as any creative act, is to decontextualize and *transfer* useful ideas to diverse situations on an adaptable basis. As was argued earlier in the previous chapter, the prerequisite of the above task is an understanding of the structure and essence of the to-be-transferred idea. This will make the creative *leap* likely to happen.

Having ascertained the above points, it seems timely to draw a closer attention to further connotations of curricular integration. As was revealed by the overview of proposals, there exists a spectrum of approaches to *integration*. At one end of the spectrum, there are those who try to merge the to-be-integrated elements of architectural education, in what is traditionally taken as the core, i.e., design studio. At the other end, though, integration is rather sought for through providing practical links between the contributing elements. The identical element, there, is what underlies the concept of *integration*: First; various courses are to be devised to follow a common direction rather than focusing on their own specialisations. Or in other words, architectural curriculum is identified by its definite goal and outcome and every component is orientated toward that outcome; and second, which is another aspect of the first, there is a plea for relative interaction of disciplines which participate in patterning the built environment, such as technical sciences and humanities. This will lead to the concept of multi-disciplinary or presumably in a rather distant future, a 'metadisciplinary' approach to architecture. (see McKellar & Stein, 1975).

Under further scrutiny, a contradictory point is seen in the above considerations that should be noted here. It is reminiscent of the very dichotomy of vocational training / humanistic education.

The present author holds that both notions are necessary[73]. This view is supported by the very attributes of architectural education: Its action-oriented nature calls for skill acquisition as a core objective, and hence emphasis is to be put on incorporation of taught courses in design activities. Its multilateral attribute, though, leads to a rather flexible process whereby all possible tendencies and specialties can find a way to be developed. To give a crude classification; while the former tends to be 'product-oriented', the latter is rather 'process-oriented'. Product, in the latter, would be determined through timely social/professional needs that influence education as well as students' preferences and potentials. The former is more institution-based while the latter tends to be student-centred.

To close the circle of this argument, another issue seems to need attention; that is the question whether architectural education is (should be) a general or a specialized mode of education. There seems to be no straight forward answer to this question, bearing in mind that inherent in the field of architecture is the demand for 'assimilation and synthesis of knowledge from various sources and disciplines'. To put it another way, '... the generalist nature of architecture could be recognized as a specialty in itself'. (Dittmar, 1984). Even so, the expansion of contributing fields of information to architecture such as science and technology, as well as the increasing complexity of problems facing the human settlements, make it inescapable to conceive of a form of specialism in the discipline. Specialism allows the acquisition of more competence in a specific area within the time period of education. It also cares for individual tendencies and potentialities. Whether this fact should be reflected on architecture courses, and if yes in what level, is still a matter of speculation. The relevance of the latter issue to the main line of argument is in what it implies. Specialization calls for more flexibility in educational process while education of generalist architects is attainable through pre-designed, goal-oriented, and sequenced courses.

The polarity of specialist/generalist architectural education can be resolved if the

73 This view was also discussed and substantiated in the York Workshop on Architectural Education, 15 February 1995.

seemingly dichotomous modes of integration and flexibility are reconciled. It is, of course, conceivable to have 'integrated' 'specialist' courses, but given the multiplicity of possible specialist areas, which clearly implies variety of parallel architectural courses, the practicability of such a scheme is next to impossible. Specialist courses are seen to be only possible through diverse combinations of a number of common elements; analogous to building components and their contribution to variety of designs.

To make the above co-existence attainable, *integration* needs to be perceived as a 'thread of coherence' rather than 'fusion' of curricular elements in a composite whole. Perhaps the most telling analogy, here, is that of molecular structure whereby totally different substances are formed out of a set of common elements; the magic behind it being the very *pattern* due to which the elements are ordered. Of course, the very potency of the elements to intermingle in various combinations, is another complementary factor. This is not, in that, a novel idea. The current modularised systems of education represent a similar concept. To refer to the origins, this concept underlies all the 'personalized systems of instructions (or PSIs)... known as the *Keller Plan*[74]... [and] developed in the late 1960s'. (Ellington, et al., 1993, p. 43). The significance of the concept to the present argument, though, is its implications regarding the concept of integration. The big issue here is again the transferability of learning. The potency of an autonomous curriculum component to join diverse combinations is the greatest, the higher the transfer value of the conveyed knowledge is.

Having said the above, a question arises as to how *integration* is achievable while the autonomy of the components is perpetuated. One possible answer could be drawn from what was tentatively mentioned earlier; 'integration might be taken as a thread of coherence rather than fusion of taught and design elements'. It sounds a reasonable answer, but it should be clarified what that *thread of coherence* actually is.

To develop the argument, perhaps an analogy with geometric patterns would be

74 For more information about the Keller Plan see Michael J. Dunkin (ed.)(1987).

helpful here. The incredible variety of geometric patterns, found in the Islamic visual arts, is generated from a small number of elementary shapes, having *identical sides* to encounter and, of course, flexible angles geared to fill the 360 degrees round each vertex. These common sides exhibit the *thread of coherence*, or thread of integration in a sense, which puts the whole pattern together, while each individual shape has its own nucleus property (three-sidedness, four-sidedness and so on).

To transfer the essence of this analogy to the argument at hand, i.e., integration of autonomous curricular elements in disciplinary wholes, what should be sought for is the *identical sides*, so to speak, that would make taught subjects compatible with design activities, and thus join them in various curricular patterns.

Given that every curricular element has its nucleus characteristic[75], the 'identical side' finds its equivalent in 1) the way each element is orientated and 2) the way it is delivered. Orientation, here, implies the objectives of each element. Method of delivery, though, is clearly the instruction strategies adopted to meet those objectives. When taught within the parent discipline, the objectives and delivery methods of each subject element is different from when incorporated in, say, an architecture course. This fact was also attended by Gulzar Haider (1975) when he wrote about the 'interface' of curricular elements. Modifications, though, will be needed in order for taught material to be adapted to the educational requirements of architects.

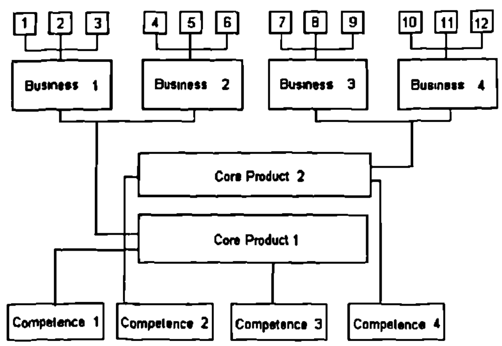
That having said, the question how to define the educational requirements of architects is a matter of further contemplation. If the multi-disciplinary nature of architecture is to be taken into account and variety of routes and specialities made feasible through architectural schooling, then the orientation of elements should be towards those objectives that are central to all the possible routs and specialities. These can best be designated as the *core competencies* of

75 ... or 'a life of its own', as Roger France of Oxford Brooks once wrote to the author (October 1994). Criticizing attempts to obliterate the autonomy of the curriculum elements, he wrote: '... the students would not come to understand that each of the component elements has a life of its own which it is to his advantage to understand'.

architects, whatever their specialities.

The concept of *core competency*, is widely regarded by authors who try to theorize the remarkable success of 'production management' in a number of industrial corporations (most notable the Japanese); corporations that have succeeded to compete through keeping creative and flexible in the rapidly changing market conditions. The essence of this theory is the recognition, and putting emphasis on enhancement, of the core competencies of corporations, unlike its classical counterpart that rather focused on end products. What the theory of 'core competence' proposes is to look after the roots and let the branches and leaves (here the end products) go with the changing needs. (See e.g., Prahalad & Hamel 1990, Brown 1993, Iles 1993).

Prahalad & Hamel (1990) put the whole idea in a diagram which can be usefully cited here (See the following Figure), given the inherent similarities of the case, to what architects are expected to do in terms of creating various designs in different contexts, through a limited number of competencies.



'The corporation, like a tree, grows from its roots. Core products are nourished by competencies and engender business units, whose fruit are end products'.
(Prahalad & Hamel, 1990)

Figure 21 *Core competencies, after Prahalad & Hamel*

Any corporation[76], according to this model, develops along its core competencies and thus should try to maintain those competencies by a continuing process of

76 This model appeals also to educational institutions, explaining the variety of possible trends they might have, due to their core competencies in terms of staff qualifications and equipments. End products, i.e., the job qualifications of the graduates, can be flexibly determined by the social circumstances.

staff education (see, e.g., Iles, 1993, talking about 'human resource development', *HRD* within the context of competence-based corporations). The end products, though, will not be the main goals but the timely fruits of the system that are subject to constant change, due to the changing pattern of needs.

What justifies the above analogy is the evident similarities between many aspects of 'production management' and the role of architects. Two statements by Brown (1993) will substantiate the above contention. It seems as if these statements are cited from the writings on architecture, some dealt with in chapter 2. He writes (1993): 'One of the factors on which the competence debate appears to be based is the hoary old question: *Is management a science or an art?*'. (emphasis of the main source). In the same article, Brown adds: 'Another hidden factor is the ongoing, and as yet unresolved, conflict between whether the delivery of management knowledge is a matter of *education* or one of *training.*

The core competencies[77] of architects, so to speak, can be inferred from the very definition that was earlier attributed, by the author, to architecture. Architecture, as a whole, was suggested to be 'the creative process of making decisions with the intention of shaping or patterning the built environment due to the real needs of people, while retaining its socio-cultural values, and in harmony with the natural determinants'. It is therefore an interaction of spacial needs (be it societal or individual) and available (or to-be-made-available) resources. Architects' major responsibility is the management of this interaction through the medium of *design decisions.* The deliberate use of the term *design decisions* is to imply a wider interpretation than *design*, as normally associated with drawing board.

In a prime analysis, the elements of this definition can be listed as follows:

built environment	as	subject matter,
shaping/patterning	as	aim,
meeting spacial needs	as	objective,
resources (human,material)	as	means,

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77 There is a subtle difference between *competence* and *performance* which is usually disregarded. Iles (1993) quotes Chomsky (1957) as contrasting the two terms in language, 'being more interested in the *deep structure* of competence than the *surface appearance* of performance'. (emphases of the main source).

creative design decisions	as	medium,
attending to socio-cultural values	as	ethics,
creative management	as	process of action.

To put it another way, the *core competencies of architects*, as the responsible agents of the above mentioned act, is *the creative management of the utilisation of resources to meet the spacial needs of people, through the medium of creative design decisions that are intended* [78] *to shape the built environment.*

The above definition of architecture was validated against the results of an enquiry conducted by the author, with the intention of providing a cross section of ideas about the attributes (as well as problems) of architectural education. (See Chapter 1). It can be summed up that among 44 characteristics attributed to architectural education, by the respondents (of eight countries), the most recurrent was the attribute *copetence oriented* (decision, action, design), rating 7 out of 44. The second rate (Each 5 out of 44), was for attribute *multi-disciplinary/collaborative.* And in the third place (Each with 4 out of 44), were attributes *comprehensive* (art ~ science), *creative,* and *environment sensitive* (cultural, natural, built). This enquiry, although not intended to be a statistical study, substantiates, heuristically, the main lines of thought presented in the earlier mentioned definition.

Each of the above issues generate one or more of the architectural curriculum components, attended in various ways in today's schools of architecture. Whatever the ingredient of architectural curriculum, the components fall in one or more of the poles of what Eder (1966) suggests as 'a full and broad education', which underlies 'much human activity'. His poles are the familiar domains of *Science, Craft, Technology,* and *art.* Eder's classification (or polarisation) is similarly found in Orbasly & Worthington (1995), where they try to categorise the current trends in the European schools of architecture.

The above concerns are demonstrated in the two proceeding figures respectively.

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78 This intention differentiates design decisions from decisions made by, say, politicians which can obviously have spatial consequences, though unintentionally, as by products (or side effects).

What can be implied from those diagrams, is that a balanced educational environment in general, and architectural education in particular, takes its point of departure from somewhere around the middle of either diagram, covering all possible dimensions of human learning.

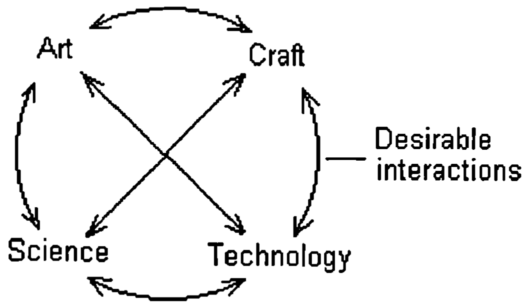

Figure 22 *Ideal of education, after Eder 1966*

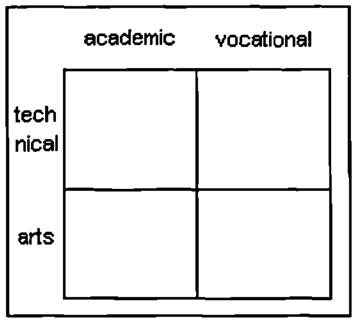

Figure 23 *Trends. After Orbasly & Worthington, 1995.*

What concerns the present argument is not to catalogue and evaluate the curriculum components. The substantial concern in this research is to argue how such components should be perceived and delivered to maintain the highest possible degree of integration.

Shaping the built form to meet the real needs, appears to be the target towards which architects are supposed to orientate their activities, whatever their specialities. Core competencies, though, should be determined by that target. The ability to identify spatial needs as well as resources; the ability to make value laden design decisions; and the ability to administer the available resources (natural, human, organisational)[79] to lead to the target, are the major core competencies of architects.

Each curricular element should be oriented towards at least one of those competencies. Curricular elements, in other words, are defined as being competence- rather than subject-based. This way each subject element of the curriculum will have its *built-in* application strategies which makes it better

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79 In this perspective, clients are also seen as among human resources, implying that even to help identify the real *needs* is partly the architect's responsibility. There are cases, particularly in macro scales, that *problem setting* is even more critical and expertise-dependent than *problem solving.*

contribute to the core competencies, so depending on application of knowledge. A point which needs immediate attention here is that the above statement must not be misinterpreted as highlighting the vocational dimension of architectural education. Competence, here, is intended to mean the widest possible range of *knowing how* in various fields of human cognitive as well as affective domains. It simply implies the ability to *manipulate* knowledge, rather than merely attaining it[80]. This reflects the action-oriented attribute of architectural education. Competence can also appeal to purely intellectual skills such as reasoning, criticising, writing, and even creative thinking. To explain the subtle difference between *competencies* and *objectives* which has been the opening statement of educational systems so far, Ellington, et al. (1993) write: 'A phrase which was involved throughout the *objectives* era [before 1990s in the UK at least], was "is able to ...". It may seem a small step to replace this phrase by "can do ...". Perhaps, it would be better to say "does do ...!"'. (p. 59).

Being the common denominator of curricular elements, competence brings about its apt delivery method which would be largely based on an active process of expert/novice interaction; a sort of apprenticeship[81]. This issue will be expanded later on, but for the time being it should be mentioned that instruction, in this perspective, is organised through guided participation of learners supplemented by 'observation', 'coaching' and 'peer education'. It will also appeal to theoretical subject disciplines such as history and theory of architecture, they being perceived from a competence point of view.

Applied to all the curricular elements, competence-based education with its corresponding instruction strategy (cognitive apprenticeship), provides an identical model of learning that functions as a thread of coherence to bridge the gap between courses and design. It is analogous to the earlier mentioned 'identical sides' in geometric patterns. Being competence-oriented, learning is bound to be

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80 See in footnote 77, Iles' (1993) quotation from Chomsky [1957] regarding the difference he holds between *competence* and *performance* in language, which also appeals to the present argument.

81 Collins, et al. (1989) designate such a method as 'cognitive apprenticeship' which will be discussed later.

achieved through practice of knowledge manipulation, whose prerequisite is making sense of the knowledge. Competence-based education brings the designerly mode of learning, i.e., learning through discovery while solving problems, to bear on taught courses, and incorporates the taught subjects within the process of design, through comprehensive projects. The latter issue is a consequence of dealing with the built environment which is, by nature, multi-layered and complex.

The above model sounds valid theoretically; teaching subject disciplines through practice to acquire the relative competencies, and teaching design in its comprehensive whole covering the contributing subject disciplines. That said, it might, but, be argued that neither design projects nor subject courses have practically enough capacity (timewise and humanwise) to cover all necessary aspects of the other area[82]. All is possible in each course would be to develop other subject areas through a limited number of references and examples. This is a valid point that needs further scrutiny. It was also revealed by *the survey* results that the relationship between courses are the lowest when it comes to coordination sessions and joint projects. (See Chapter 1, under *The survey*).

The argument at this point can develop in two ways. Some might claim that there is no need to convey all areas of complementary knowledge as is committed by the conventional architectural schooling. Whatever is possible to be conveyed through projects, they argue, would be sufficient, given that they serve as *samples* of what should be learned by students. Another line of argument holds that all the knowledge of science, technology and humanities (and even more) which constitutes the content of lecture courses, are necessary for an *informed* design, and should not be restricted to the limited capacity of design projects.

Both the above positions hold a portion of truth. While the former cares about

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82 Given the limited number of design projects in an architecture course (around fifteen or so) which is, by no means, capable of conveying all the required knowledge and skills of designing, let alone the wide range of theoretical and applied knowledge currently delivered through lecture courses.

the effectiveness of instruction, mainly through coaching in practice, the latter puts emphasis on the wide array of content knowledge which, enormous in amount as it is, inevitably leads to the rather economical methods of delivery, at the foremost of which *lectures.*

Two contributions to the human learning debate can fruitfully be drawn here to throw light on the above dilemma; Polanyi's *Tacit Knowing* (in his 1967), and Bruner's (1974) *Going Beyond the Information Given.* These theories are treated next to further the argument at hand.

2. 6. 6. WE KNOW MORE THAN WE ARE TOLD

What was argued in the previous two Chapters was mostly addressing the conscious side of learning and instruction; the ways a given information is processed, retained and retrieved. The transfer-of-learning debate was also virtually in a similar sphere, except the argument on creativity which tackled some analogy-driven aspects of human thinking.

In his 'Going Beyond the Information Given', Bruner (1974) starts with his interpretation of what Spearman put forward to characterise the basic cognitive processes. Those were mentioned in chapter 5 as principles of *practice, relations,* and, *correlates.* (See Chapter 5 under *Creativity*). Drawing on Spearman's principle of *relations*[83] and that of *correlates*[84], Bruner writes: 'I think that Spearman was trying to say that the most characteristic thing about mental life, over and beyond the fact that one apprehends the events of the world around one, is that one constantly goes beyond the information given. With this observation I find myself in full agreement'. (Bruner, 1974). Then he denotes various forms of going beyond the givens by some examples;

Going beyond '*the sense data* to the *class identity* of the object perceived', he continues with an example, '[a] speck on the horizon surmounted by a plume of smoke is identified as a ship',

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83 '... There is an immediate evocation of a sense of relation given the mental presentation of two or more things. "White" and "black" evoke "opposite" or "different"'. (Bruner's statement).

84 '... in the presence of a thing and a relation, one immediately educes another thing. "White" and "opposite of" evokes "black"'. (Bruner's statement).

Going beyond a given context to the missing or masked elements, as when presented the word *P*YC*OL*GY*, in his example, one recognises that the word is *PSYCHOLOGY*, and

Going beyond the two given statements of any syllogism to the third.

This is made possible through what he calls *coding system*. 'To do so, requires a theory', he writes. 'A theory is something we invent. If it is a good theory - *a good formal or probabilistic coding system* - it should permit us to go beyond the present data both retrospectively and prospectively'. (Same source). His notion of coding system, as he concedes, is close to Bartlett's memory schemata. It orders information in *patterns* with other related information and thus enables the mind to interpret the existing data and *infer* the missing.

He sums up the matter as follows: 'We propose that when one goes beyond the information given, one does so by virtue of being able to place the present given in a more generic coding system and that one essentially reads off from the coding system additional information either on the basis of learned contingent probabilities or learned principles of relating material'. (Same source, p. 224). He also suggests that, '[m]uch of what has been called transfer of training can be fruitfully considered a case of applying learned coding systems to new events'.

An educational implication of his argument would be the merits of teaching 'axioms' and 'theories' or in his words 'formal coding systems'. This sounds quite valid in the case of a subject matter like, say, geometry, but he goes further and holds that the same criterion should prevail in all areas of knowledge, as diverse as, for instance, 'the history of a people'.

To support this position, Bruner quotes White as saying, '... a history contains true statements about the whole course of... [an] object's existence... We must observe that some of these statements have causal implications whereas others do not'. (quoted in Bruner, 1974). Two kinds of historians are identified by White: 'The first group is near-sighted, it tries to amass everything in sight on the theory that this is a sure method of getting close to the whole truth. But it fails to realize that those who select facts which seem to have *causal significance* are more apt to come to know things about the future and past of the object'. (quoted in Bruner, 1974) (italics added).

White parallels 'the criterion of *causal fertility* in history with the criterion of *deductive fertility* in logic', as Bruner reports; both being motivated by 'a desire for intellectual economy'. The latter issue is reminiscent of Polanyi's argument on understanding of *particulars* and *wholes*, although put in another context. What follows is a short account of Polanyi's concept of tacit knowledge which builds on the common sense experience that 'we know more than we can tell'.

2. 6. 7. WE KNOW MORE THAN WE CAN TELL

If Bruner holds that to grasp an understanding of the whole truth, one is more likely to succeed if selected facts which seem to have causal implications, Polanyi (1967, p. 18) affirms: 'Scrutinise closely the particulars of a comprehensive entity and their meaning is effaced, our conception of the entity is destroyed'.

Albeit voiced in different contexts, these two proclamations have a common implication which well applies to the current argument, i.e., the possible links between 'design' and 'content knowledge' in architectural education. What is common in the two statements is the fact that grasping a knowledge of the whole is, by no means, next to close study of constituents.

According to Bruner, only the study of causally fertile particulars are useful (and also sufficient) to approximate the whole. Polanyi goes further and holds that attending too closely to the particulars consequently is to the price of damaging the whole. Conversely he argues that the nature of human learning is to attend *to* the whole *from* the particulars.

In his short but inspiring lecture, appeared in *The Tacit Dimension*, Polanyi (1967) uncovers the mechanism of an essential process of thinking by starting from the fact that '*we can know more than we can tell*'. (p. 4). 'We know a person's face', he writes, 'and can recognise it among a thousand, indeed among a million. Yet we usually cannot tell how we recognize a face we know'. (Same place). This is what he calls *tacit knowing*. It is on this very basis, he implies, that the police provides a variety of pictures of noses, mouths, and other facial features, in order for the witness to identify the suspect's appearance from memory; this being done through simply combining the features until the familiar face is recognised. To speak with his vocabulary, the witness attends *from* the facial features *to* the face, or in other words (which better fits the initial argument), the witness *integrates* the particulars to grasp a coherent and familiar entity, i.e., the face. These are what he calls the two *terms* of tacit knowing[85].

Another noteworthy example he gives is 'the way a blind man feels his way by tapping with a stick'. (p. 12). The impact of the stick in his hand 'is transformed into a sense of its point touching the objects'. The man's focus of attention, though, is the sense of the objects on the way (the second term), and knowing of the first term, i.e., the feeling on his fingers and palm remains tacit. The blind man *relies* on his awareness of the feeling he has in his hand to attend *to* the objects on the road. Hence, calling the first and second terms of tacit knowing *approximal* and *distal*, respectively.

There are two significant points in this. First, in the latter example, it seems as if the stick is an extension of the blind man's arm. 'Our own body', Polanyi asserts, 'is the only thing in the world which we normally never experience as an object, but experience always in terms of the world to which we are attending from our body'. (p. 16). The stick, in the above example, functions in a similar manner; it functions as the proximal term of tacit knowing to attend to the distal term which is the objects on the road. 'In this sense we can say that, when we make a thing function as the proximal term of tacit knowing', Polanyi continues (p. 16), 'we incorporate it in our body - or extend our body to include it - so that we come to dwell in it'. That is to say, the particulars are *internalised* to 'function as proximal terms of tacit knowing'. (p. 18).

This is exactly the case with the knowledge of particulars at the moment when

85 Cross (1981b) associates the notion of tacit knowing with 'know-how', which seems to be limiting the scope of the term. The knowing of a face, for instance, is a *know-that* rather than *know-how.*

a painter paints, a pianist performs,and a designer designs. They are aware of those particulars, awareness of the sort one has of his own body, to attend to the painting, the music, and the design at hand.

The second noteworthy point is what draws a sort of parallel between Polanyi's idea and that of Bruner. To put it in brief, attending to the particulars in detail will prevent the grasp of the whole. 'By concentrating attention on his fingers', Polanyi declares (p. 18), 'a pianist can temporarily paralyse his movement', He continues: 'We can make ourselves lose sight of a pattern... by examining its several parts under sufficient magnification'. This should not be taken as downgrading the knowledge of particulars, but the case is made that they must be looked at from a distance to let the totality of the whole to emerge.

Once disintegrated by focusing attention on them, particulars can be reintegrated by interiorizing them once more. The 'pianist's fingers used again with his mind on his music', will 'come to life and recover their meaning and their comprehensive relationship'. (pp. 18-19).

'The destructive analysis of a comprehensive entity', Polanyi concedes (p. 19), 'can [also] be counteracted in many cases by *explicitly* stating the relation between its particulars', [which] goes far beyond the range of tacit integration'. (italics added). Engineers' perception of how a machine works is clearly much deeper than that of a skilful driver, but 'the skill of a driver', Polanyi asserts (p. 20), 'cannot be replaced by a thorough schooling in the theory of the motor car'.

Polanyi's argument implies that there exists always a plea to interiorizing or indwelling the particulars to get a grasp of the whole entity. This is the ultimate degree of *integration* of elements in favour of the *recognition* of the whole.

Architecture and its education is similarly placed[86]. Even though scrutinizing the

86 To the author's knowledge, Chris Abel is the first architectural critique to bring Polanyi's theory to bear on 'whys' and 'hows' of architectural education. (in several articles, e.g., his 1994, 1984 and most notably in his 1981). The present author owes his introduction to Polanyi's thoughts to Abel's lecture at the Portsmouth Symposium 1993, followed by his related articles sent by him later, responding the author's enthusiasm.

aspects of the built environment will inform architects, but to utilize the knowledge of those aspects in the process of making apt decisions, they will have to interiorize that knowledge; to rely on an awareness of it, and/or to attend from that knowledge to the main focus of attention which is dealing with the built environment.

Returning back to the initial query, i.e., the dilemma of integrating the wide range of content knowledge and design, without loosing the flexibility of the course; it might be put in a clearer perspective in the light of the above-treated theories. What follows is an attempt to interpret the implications of those theories in due course.

2. 6. 8. DETERMINANTS OF FLEXIBLE INTEGRATION

Drawing upon the theories stated in the previous sections, it can be questioned whether all the conventional content knowledge should necessarily be delivered separately and explicitly, and also whether or not the worries educators usually have about the limited time allocated, in order for them to be able to cover all the necessary body of information, is valid.

Bruner submitted that it was only by imparting 'generic codes' that education could enable the learners 'to go beyond givens to a prediction of unknowns'. He would propose to teach 'axioms and theories', or in his expression the 'formal coding system'. But is it not the case with present state of affairs in architectural education? Course documents, indicate that the lecture courses are about (at least are so intended) to meet a similar objective to the above. What is wrong, then, that the outcome is not satisfactorily influential on the course of designing? Polanyi's concept of 'indwelling' does have a promising contribution to this argument. Theory, in Polanyi's view, at best serves as the proximal term of tacit knowing from which one attends to the phenomena addressed by that theory (the distal term). 'To rely on a theory for understanding nature is to interiorize it', Polanyi continues (p. 17): 'For we are attending from the theory to things seen in its light, and are aware of the theory, while thus using it, in terms of the spectacle that it serves to explain'. On this very basis he suggests that *a theory is best learned by practising its application.*

Bringing the latter line of thought to bear on the initial argument, a framework will emerge that accommodates an integration of the sort which is not contradictory to the autonomy of curricular elements. Perhaps a visual demonstration is more telling. The following Figure conceptualizes a process of give-and-take between design and taught courses, over the bridge of tacit power of human learning. This bridge is obviously nothing but the learner's mind. It is the learner who should interiorize the delivered content knowledge, and relying on a tacit *awareness* of that knowledge, learn how to design. Hence the most promising determinant of integration.

This is perhaps where the learner-centredness of architectural education is best evident. Attending to a similar concern, Abel (1981) points at the 'ability of students to deal with uncertainty and ambiguity in the course of learning'. He honestly concedes that '... the larger part must go to some possibly innate creative ability of students to make sense of the chaos with which they are usually presented'.

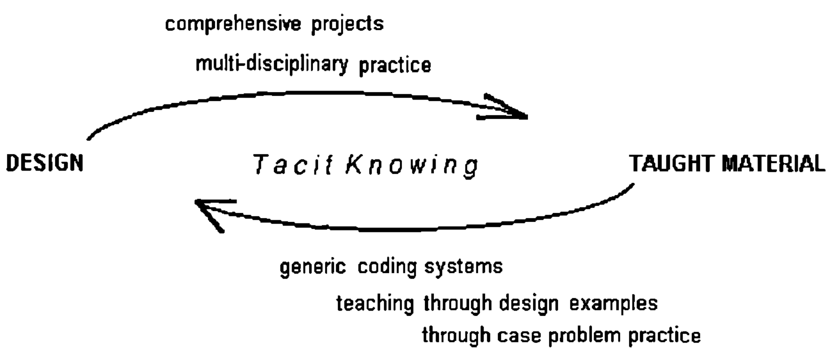

Figure 24 *Tacit dimension of integration*

Regarding the very point, Abel comes to put the prior emphasis on design studio and suggests a reduction in the amount of time allocated to 'classroom teaching and lectures'. What seems to be overshadowed in Abel's contribution is a treatment of classroom teaching itself. This is, of course, hardly surprising, given that he holds design studio as '... the main catalyst by which students are able to integrate *whatever* it is they learn in the classroom or lecture hall, and seminar'. (Abel, 1981) (italics added).

The present author, but, holds that in order for the subject disciplines to be more compatible with design activities and better participate in shaping the desired pattern of knowledge/skills, they should be oriented and also delivered in a similar manner to design studio. As pointed earlier, the taught material should be oriented towards a defined 'competence' and delivered through practice along the line of that 'competence'

Taking students as the main mediators or *integrators* of separate curriculum elements is not, of course, a novel idea. This presumption underlies the fragmented curricular structures (and is sometimes used to justify them). But to rely exclusively on the students ability to 'integrate' or 'synthesise' bits and pieces of discrete knowledge, proves not to be sufficient. Hence the widely voiced problem of disintegration. Students should be helped to make a meaningful whole out of what they are taught.

The remainder of the chapter undertakes to portray a picture of 'academic apprenticeship' as a mode of learning for competence, proposed as a possible way of meeting the above mentioned appeal. What follows next is an account of the theory-practice debate which, in any case, underlies the issue of apprenticeship.

2. 6. 9. THEORY OF PRACTICE

The cornerstone of apprenticeship is practice; to practice while attending to exemplars, observing others and reflecting on ones own action. It is an interaction of theory and practice, or in better words, theory *in* practice.

In their *Theory in Practice*, Argyris & Schon (1974) define theories as '... vehicles for explanation, prediction, or control'; they explain events, help predict future events, and describe '... the conditions under which events of a certain kind may be made to occur'. (p. 5).

Having thus defined theories, they draw a distinction between basic theory and what they call theory of practice. The former, it can be inferred, is rather explanatory and predictive, while the latter is concerned with action; applied theory, so to call[87]. Regarding the familiar plea to 'integrate theory and practice', they identify three schools of thought which influence the way professional schools treat theories. 'One school of thought regards *theory of practice* as deriving from *basic theory*', they write (p. 183). To give an example of this school of thought, '... a more adequate technical theory of urban planning... would depend on development of better basic theory about the growth and transformation of cities, about institutional behaviour, or about policies for the redistribution of human resources...'. (p. 183). The professional school, in this perspective, '... should [then] develop better basic theory..., leaving the derivation of more effective theories of practice to the practitioners'. (same place).

The second school of thought hold that '... effective practice involves intuitive knowledge that is not amenable to explicate formulation, even in principle'. (p. 183). Adherents of this school, come to a similar conclusion to those of the first; professional knowledge/skill '... must be acquired in practice'. (p. 184).

'The third school of thought', Argyris & Schon acknowledge (1974, p. 184), 'says that the professional school should teach the student to think like a professional'.

Taking each of the above schools of thought as being flawed, the same authors draw attention to the lacking point of those positions which they hold is *theory of practice.* 'Without a firm grasp of technical theory of practice', they assert, 'one must take on faith the relevance of particular basic theory to professional competence'. (p. 185).

Given that the third position (stated above) seems more promising in terms of professional schooling, they add, '... learning to think like a professional... requires learning to build *one's own theory of practice*, which in turn, requires engaging in situations of practice'. (p. 186) (italics added).

This latter view of 'one's own theory of practice', might be interpreted as drawing

87 They mention 'physics' and 'engineering theory' as examples of the *basic theory* and *theory of practice.* (p. 185).

near to what Polanyi meant by interiorization of theories, a sense of ownership and indwelling. To meet this end, Argyris & Schon firmly suggest that '... practice must be made central' (p. 186).

Academic apprenticeship is suggested here as taking a similar position to the above, in terms of acknowledging the merits of practice for the learners to make their own 'theory of practice'. An account of this mode of learning will lead to concluding remarks.

2. 6. 10. ACADEMIC APPRENTICESHIP

Apprenticeship is the way we learn most natural. It characterized learning before there were schools, from learning one's language to leaning how to run an empire. (Collins, et al., 1989, p. 491)

That apprenticeship is a powerful perspective on education is apparent from the many references to it in recent years. (Pressley, 1995, p. 238).

In their contribution to *Knowing, Learning, and Instruction,* Collins, et al (1989) put forward their instruction model, what they call *cognitive apprenticeship.* Interestingly enough, the title of their article holds the statement 'Teaching the *Crafts* of Reading, Writing, and Mathematics' (italics added). The present author draws heavily on this contribution to identify what he delineated as *academic apprenticeship* in architectural education.

Familiar in architectural education as they are, the terms *apprenticeship* and *crafts* are deliberately transferred to the context of instructing school children, to articulate the notion of competence or expertise, held by the authors as the objective of education. It also implies that apprenticeship, unlike the conventional interpretation of the word, is not restricted to a narrow stream of vocational training. Conversely, as was pointed earlier, it can be utilized to convey expertise of cognitive/intellectual nature. Hence, its transfer to (or revival in) the academic architectural education as the *academic apprenticeship.*

The idea stems from the earlier treated aspects that the current cognitive psychology attributed to human learning. Resnick (1989) summarizes those aspects as follows: First, 'learning is a process of knowledge *construction*'.

Second, 'learning is *knowledge-dependent*; people use current knowledge to construct new knowledge'. And finally, 'learning is highly tuned to the *situation* in which it takes place' (p. 1); 'what has come to be called situated knowledge'. (p. 11). The latter aspect, only recently being attended by cognitive scientists[88] (see Resnick, 1989, p. 11), is the most contributing to the development of what Collins, et al. (1989) call *cognitive apprenticeship.*

Compatible with the constructive attribute of human learning, one of the pillars of cognitive apprenticeship is its emphasis on students' initiative to observe, to discover, and to approximate the state of expertise. Collins, et al. pronounce (p. 481): '... we believe that teaching methods should be designed to give students the opportunity to observe, engage in, and invent or discover expert strategies in context. Such an approach will enable students to see how these strategies fit together with their factual and conceptual knowledge and how they cue off and make use of a variety of resources in the social and physical environment'. They, somewhere else, assert: 'Conceptual and factual knowledge thus are learned in terms of their uses in a variety of contexts, encouraging both a deeper understanding of the meaning of the concepts and facts themselves and a rich web of memorable associations between them and problem solving contexts. It is this dual focus on expert processes and situated learning that we expect to help solve the educational problems of brittle skills and inert knowledge'. (p. 457).

Rogoff is among the authors who have brought the apprenticeship mode of learning to the fore with the intention of enhancing the social dimensions of education. She (1990) is paraphrased by Pressley as contending that '... there is great similarity across various types of apprenticeship': 'During an apprenticeship, the master provides bridges from what is known by the apprentice to the unknown... [in a process referred to by Rogoff], '... as a situation in which there is *guided participation* of the apprentice, with the guidance provided by the master'. (Pressley, 1995, p. 236).
'Scaffolding is the key term here', continues Pressley, 'with the master providing

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88 Pressley denotes (1995, p. 82): 'Increasingly, cognitive psychologists are realizing that thinking is not just an "in-the-head" thing and that the development of knowledge depends heavily on social interactions'. (p. 82).

as much support as the apprentice needs to function but not more than enough, until support is entirely withdrawn'.

Guided participation[89] is the main pillar of apprenticeship. Pressley (pp. 237-238) catalogues the components of apprenticeship as follows:

1. Modelling: Experts show their apprentices how to do tasks that are important and explain the subtleties of such tasks to their charges...
2. Coaching: The master watches the student attempt a task and offers hints, feedback, and guidance...
3. Scaffolding: The master offers support, guidance, and reminders. The master does not offer too much support, however, pulling away as the apprentice is able to function independently. Scaffolding requires great diagnostic skills on the part of the master, both determining when the apprentice is in need of help and offering appropriate redirection...
4. Articulation: Articulation is a form of testing. Masters require their apprentices to explain what they are doing. Thus, an expert maths teacher may require the tad to explain how he or she went about solving a problem and why the particular solution method was used over alternative methods.
5. Reflection: Apprentices are encouraged to compare their work with that of others, including the master and other apprentices. This aspect of the apprenticeship relationship has received an enormous amount of attention in recent years, largely because of Schon's (1983, 1987) influential writing about the role of reflection in the development of professional competence...
6. Exploration: Apprentices cannot be mere copies of their mentors. Thus, those who mentored our scholarship did not intend that we would simply spend our careers replicating their work but would instead strike out on our own. The apprenticeship relationship permits safe exploration. (also see Collins, et al., p. 476).

Schon's influential 'reflection-in-action' debate, elaborates the fifth component of apprenticeship, i.e., *reflection*, and his *The Design Studio* (1985) portrays a picture of how that reflection works in the context of design studio. Perceiving the above components in their *cognitive apprenticeship,* Collins, et al. (1989) argue that '[t]he interplay between observation, scaffolding, and increasingly independent practice aids apprentices both in developing self-monitoring and -correction skills and in integrating the skills and conceptual knowledge needed to advance toward expertise. (p. 456). This attention to the meta-cognitive and monitoring abilities, as will be tackled later, is one of the differentiations between

89 Or in a sense, *guided discovery,* which is more appropriate for higher education, being more dependent on learners rather than on instructors.

their 'cognitive apprenticeship' and what traditionally is called one. Thus, they hold that, 'cognitive apprenticeship involves the development and externalization of a producer-critic dialogue that students can gradually *internalize*. This development and externalization are accomplished through discussion, alternation of teacher and learner roles, and group problem solving. (Same source, p. 458) (italics added).

Further (p. 481), Collins, et al., give a rough grouping of the above six method; '... the first three (modeling, coaching, and scaffolding) are the core of cognitive apprenticeship, designed to help students acquire an integrated set of cognitive and metacognitive skills through processes of observation and of guided and supported practice. The next two (articulation and reflection) are methods designed to help students both focus their observations of expert problem solving and gain conscious access to (and control of) their own problem-solving strategies'. They continue; 'The final method (exploration) is aimed at encouraging learner autonomy, not only in carrying out expert problem-solving processes, but also in defining or formulating the problems to be solved'.

These are all familiar issues in architectural education and practice. Many of the traits mentioned above are, in fact, inspired (or adopted) from the way expertise were conveyed in crafts, most notably architecture. But distinction should be made between apprenticeship in traditional sense of the word and what is presented by Collins, et al., as cognitive apprenticeship. This is the very point which makes attractive the transfer of this idea to an academic environment for architects; what is to be put forward here as *academic apprenticeship*.

Merits as well as shortfalls of the traditional apprenticeship was tackled in Chapter 3, but three aspects of traditional apprenticeship are observed by Collins, et al., as deficiencies which also appeal to the argument at hand. First of all, the prime aspect of traditional apprenticeship was to do with practical training of *novices* by *masters* within the context of working place and along the line of a *vocation*, producing things or providing services.

What is proposed by Collins, et al., and taken by the present author, is to adopt the model to the intellectual and cognitive activities inherent in *education*, more notably in one of higher levels.

This involves, as noted earlier, a perception of (higher) education which recognises the merits of cognitive and meta-cognitive capabilities of the learners; the merits of manipulating, rather than only retaining the conceptual and factual knowledge.

It might be argued here that any craftsmanship also involves a degree of cognitive ability, which is quite true. But the point is that the end product, in traditional apprenticeship, is usually mastery to perform a definite act, be it making an object, playing an instrument or building a building. Academic world is concerned with rather intellectual competencies which might hardly manifest in concrete forms, even though similar in some aspects; offering a critique, writing an article or sharing a decision-making discussion, to mention but a few instances. It is hardly possible to give a thorough signification of such competencies by the narrow criterion of 'skill' and 'performance' notwithstanding the structural similarities. They are much more dependent on the factual and conceptual knowledge, of course with a pivotal accompaniment of heuristic strategies to manipulate those *facts* and *concepts*.

The second deficiency of traditional apprenticeship which is acknowledged by Collins, et al., to highlight the merits of their proposition, is the randomness of experiences available in traditional apprenticeship, being restricted to 'the demands of the workplace'.

They notice that, '[in traditional apprenticeship]... the problems and tasks that are given to learners arise not from pedagogical concerns but from the demands of the workplace. (pp. 458-459). They continue: 'Cognitive apprenticeship, as we envision it, differs from traditional apprenticeship in that the tasks and problems are *chosen* to illustrate the power of certain techniques or methods, to give students practice in applying these methods in diverse settings, and to increase the complexity of tasks slowly, so that component skills and models can be integrated'. (p. 459) (italics added).

The latter issue identifies a criticism put to the author's proposed concept of *academic practice* (mentioned earlier), which involved a total merging of *academia* and *practice* in a single institution of both professional and academic commitments. This is, of course, a valid point except in situations where a wide variety of commissions are available to enable the *academic practice* to satisfy the necessary scope of educational requirements. *Academic apprenticeship,* inspired by Collins, et al., is suggested to bring the essence of *practice* which is *practising* or learning through experience, within and under control of the academic environment.

The third deficiency of traditional apprenticeship which is to be rectified in the new version, is its being bound to the job circumstances. As was argued earlier, learning on the job or in technical terms, learning within the application situation, has its own merits. It results in a high degree of expertise and in what was delineated before as *situated learning*, which is proved to be highly effective. But from the point of view of *transfer* there remains a lot to be desired. In order for learning outcome to be applicable in future settings, it needs to gain an schematic level of abstraction. 'We propose that cognitive apprenticeship should extend situated learning to diverse settings so that students learn how to apply their skills in varied contexts', Pronounce Collins, et al., (1989, p. 459). They continue: 'Moreover, the abstract principles underlying the application of knowledge and skills in different settings should be articulated as fully as possible by the teacher, whenever they arise in different contexts'. The author's *academic apprenticeship* builds on the properties of *cognitive apprenticeship*, its differentiation being its bias towards the higher levels of education. Therefore, its emphasis would be on *guided discovery* rather than *guided participation*, as is the case with cognitive apprenticeship of Collins, et al.

What have been argued thus far, must now be put in perspective to form the concluding remarks. But before closing the argument there is a delicate point which needs to be further commented; the issue of attitude.

2. 6. 11. ATTITUDE FORMATION

Components of apprenticeship, quoted earlier from Pressley (1995), is similarly mentioned in Collins, et al. (1989). Those are, *modeling, coaching, scaffolding, articulation, reflection,* and *exploration.* They cover a spectrum of events which constitute the process of approximation from a novice position up to the expertise.

These components reveal an underlying focus of attention on Knowledge/skills as the ultimate things to be transmitted, cultivated and enhanced. But evident in the tradition of apprenticeship (at least in the Iranian context) there is another component which is, by no means, less important (if not more) than those mentioned above. That component has to do with ethics, with moralities, and with *attitude.*

If knowledge and skills are about *know-whats* and *know-hows*, attitude is to do with *know-whys*; it is to do with feelings, with orientation towards self, profession and society[90]. To substantiate this charge, the author will suffice it to mention but two evidence. A live evidence is the manner of the *masters*; in the case at hand *master builders* or *Memars.* During his first field trip to Iran, the author succeeded to arrange a meeting with *Memar Mohammad Sha'arbaf* (*Ostad Mohammad*) and his sun *Memar Asghar Sha'arbaf*[91], the *master* and the *disciple.* Ostad Mohammad[92] has built numerous buildings throughout the country (and also in Iraq and Syria).

'He was strictly concerned about the behaviours of his apprentices; even about the subtle points in their personal affairs', said Ostad Asghar about his father/*master.* 'The way they dressed', he continued, 'their treatment with others, their tidiness, their respect for the neighbours' privacy, and even their practice of

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90 In an interview with the author (14 September 1994), Dr. Kyriacou mentioned a hierarchy of learning objectives/outcomes as identical of educational settings. Those were, *knowledge, understanding, skills,* and *attitude.* The latter, but, enjoys a rather moral/religious content in traditional cultures than it does in today's educational environments.

91 Who is also a prominent memar, still active in his sixties.

92 Having a broken hip, Ostad Mohammad was in bed, at the time of the interview. He had also some difficulty with hearing due to age conditions. In the spring 1995, while this chapter was being drafted, Ostad Mohammad passed away at the age of near a hundred. He was famous for his generosity in giving instruction to everybody whoever would like to learn.

religious rituals would closely be observed by *Ostad* and corrected when necessary'.

A similar state of affairs was evident in the manner of *Ostad Reza Memaran*[93]. This was the author's direct observation while his partnership was involved with design and supervision of a project[94], part of whose construction relied on the expertise of a traditional *memar.* Ostad Reza's accounts in terms of how important the moral attributes are in admitting an apprentice by a master, was supported by his own manner at work. Discipline, order, and commitment to perfect work was dominant in his team. While occupied with the sensitive inspection of disciples working on the dome, he would not overlook wasting material by a simple worker and he would shout, in a kind manner, to advise a simple worker not to throw away some broken bricks (what might seem trivial, compared to the responsibilities of a memar of his rank). If there is an accepted principle as to nothing should be wasted, then it must seriously be respected even by a simple worker, let alone the disciples and apprentices.

This very simple reaction reveals a holistic view of training that recognizes the merit of a responsible attitude towards *environment* with its full meaning. This *attitude* is deep rooted in culture and tradition, which are in turn of a religious origin. To perceive some of the cultural roots of the above account the second evidence would be the old 'Letters of the Trades/Professions'. These *Letters*, in the Persian culture, are among booklets called *Rasail-e Javanmardan* or *Fotovvat-Nameh*, meaning 'Letters of Generosity'. These letters are traced back to the Iranian liberation movements against the tyrant of the Umayyed and Abbasid dynasties (See Khan-Mohammadi, 1992). Their wide and rather popular currency is, but, after the Mogul invasion to Iran which left behind nothing but ruined cities, with devastated social and economic structures. Movements such

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93 Still active in his seventies, Ostad Reza is among few highly distinguished memars with a long CV of diverse construction works, from public bathes to bridges, from Mosques to river dams.

94 The project was an educational complex which included a fairly large Mosque for which Ostad Reza was invited to put up a dome on the main praying area. (Technical University of Sharif, Tehran, 1989-1990).

as *'Javanmardan'* (the generous young) were formed and flourished to support the poor mass of people who had most suffered from the invasion. (See the same source). A number of such 'texts' are collected and edited by Sarraf (1991), wherein a Fotovvat-Nameh for 'fabric printers' (*chitsazan*) is also included.

Against this background is the social role of trades and professions perceived. Each trade would have its own Fotovvat-Nameh which sets the basic traits and its committed attitude towards the vulnerable groups of the society[95].

A thorough study of these 'Letters' is obviously beyond the scope of the present argument, but to substantiate the point raised as to the significance of *attitude* in the tradition of professional apprenticeship, a few citations will be made next.

Although with missing words and sentences, parts of a 'Fotovvat-Nameh for the Builders' (Generosity Letter of the Builders) was for the first time published in *Soffeh*[96], edited by Khan-Mohammadi (1992).

A common characteristics of such texts is that they attribute the origins of each trade to one of the prophets or holy religious leaders, and more, the means and tools of the trade are also associated with divine relations. The art of fabric printing, for instance, is attributed to the prophet Lot (Sarraf, 1991, p. 233), and the art of building is associated with the prophet Abraham who first constructed the Ka'aba[97] as a place of worship (Khan-Mohammadi, 1992).

A part of the 'Generosity Letter of Builders' reads: 'If you were asked who the first builder was tell the first builder was Abraham[(A)] the friend of God who put up the house of Ka'aba'. It continues: 'The first builder is also said to have been the

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95 Professor Broadbent mentioned a virtually similar account about the tradition of trades in this part of the world. Every trade or profession, he acknowledged, had its own 'text books' containing the 'secrets of the trade'. As could be gathered, those textbooks would have probably been concerned with technicalities of the trade.

96 Journal of the School of Architecture & Urban Planning, Shahid Beheshty University, Tehran.

97 Cube-shaped stone structure in Mecca which is a place of worship for Muslims. The place is believed to have been the first point on the globe to come out of water.

prophet Noah[A] , who, after the flood was over, reconstructed cities and villages and people were settled again and developments restarted'. (Khan-Mohammadi, 1992). (The [A], over Abraham and Noah stands for; *peace be upon him.*)

Regarding the means and tools; the dying vat was found in the time of Noah (Sarraf, 1991, p. 238), and the mould for making mud-bricks is from the Paradise. 'If they ask where has the mould come from, tell its wood is from the Paradise, and it is box-wood. (Khan-Mohammadi, 1992). Even the colours are not simply 'warm' or 'cold'; they are value-laden, some from the Paradise, some from the Hell. The *meaning* and *orientation* is always there.

The texts enjoy abundant signposts showing the highly value-oriented nature of commitment to a trade, at the heart of which being *generosity;* the degree to which one is prepared to sacrifice ones self for the welfare of others[98].

These teachings, when developed in the scale and depth of a cultural tradition, will then clearly influence the profession as a whole and in Polanyi's sphere will act as the proximal term of tacit knowing for both practitioners and apprentices. It orientates their acts by they attending from those traits to the real job of making things or providing services for the community. Professionals, though, do not feel like single isolated individuals, but rather feel themselves as continued rings of a long historical chain of mankind in their part of the world.

Incorporating the above account in the previously mentioned components of apprenticeship, it can now be suggested to look like this: *Modeling, Coaching, Scaffolding, Articulation, Reflection, Exploration,* and the last but not the least *Attitude formation.* The latter component exacerbates the decisive role of the coach, tutor, teacher, or at best *master* in the educational environment, not in that he teaches, but rather in his presenting the exemplar of the values. 'If they ask what the *prior* thing is in this trade, tell first the *master's attention* and then water'. (Sarraf, 1991, p. 239).

98 Counter to the essence of professionalism, these days, which is primarily concerned with fighting for the benefit of the members; members of the *club*, as once put Charles Cockburn.

The above account is quite admittable for a place like Iran with a long history associated with religious faith and gnosticism, but since religion is the historical spring from where the streams of cultures[99] have started, it is hardly surprising to witness a similar state of affairs even in the West. Palmer's statement as quoted by Argyris & Schon (1974) is telling. They write (1974, p. 146): 'Clearly, what we now call the professions have their origins in religion'. Then they quote Palmer as pointing out: '*Religious professional* is a redundancy. A professional, as I understand it, is supposed to profess, to testify, to bear witness to some sort of faith or confidence or point of view. Traditionally, at least, it was only because he did so that he merited being called *professional.* I would argue that in the traditional view, a professional was religious by definition- at least in the weaker sense of the word *religious* (Palmer, 1973, p. 2. quoted from Argyris & Schon, 1974, p. 146). Then Palmer contrasts the present day professionals with their predecessors: 'They see themselves not as bearers of a faith or proclaimers of a confidence, but as practitioners of technique... pure, empirical, pragmatic, marketable technique... [that] admits of no need of faith (same source, p. 148)[100].

After the rather lengthily treatment of the different avenues of thought, it seems timely to draw on possible implications regarding a framework for change.

2. 6. 12. CONCLUDING REMARKS

The argument thus far has attempted to theorise possible ways of satisfying the criterion of *integration* while retaining flexibility and multi-rout nature of architectural education. It was maintained that merging together of design and taught courses would cause difficulties in administering the co-ordination of specialists who are currently conducting those courses. The assessment of what students actually acquire in various fields was also raised as a subsequent problem. And more, it was argued that pre-designing of various courses in sequenced integrated wholes restricted the flexibility of education.

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99 With the exception of the Post-Renaissance Western culture.

100 The above statements were quite exciting for the author whose bias is to look also for common values of various cultures rather than to try to magnify the differences.

Integration was, then, suggested to be best achieved through students' creative minds. But to enable them to *integrate*, it was acknowledged, discrete courses should be made compatible by orientating towards the core competencies of architects. With courses being competence-based, academic apprenticeship was suggested an apt mode of learning/teaching to serve as a common denominator of various courses. To overlook the details and subtle implications involved in the argument, the main lines of thought can be summarized in a conceptual model which follows.

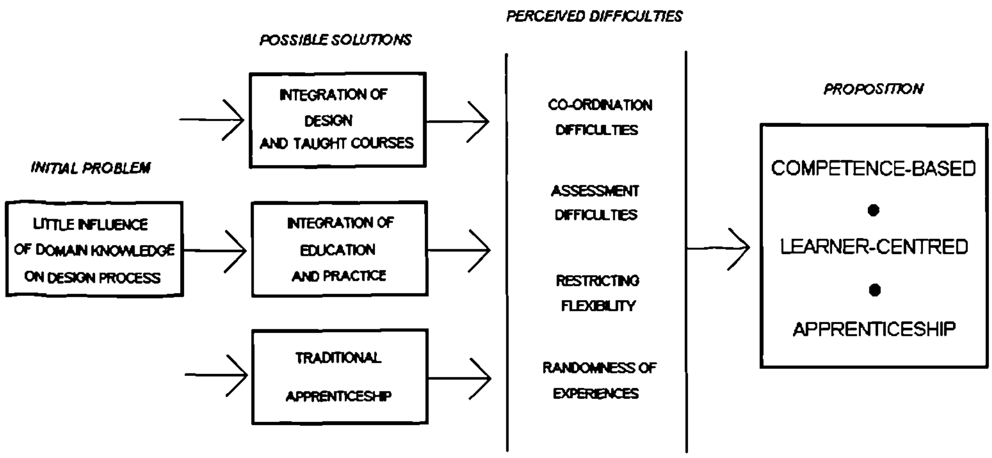


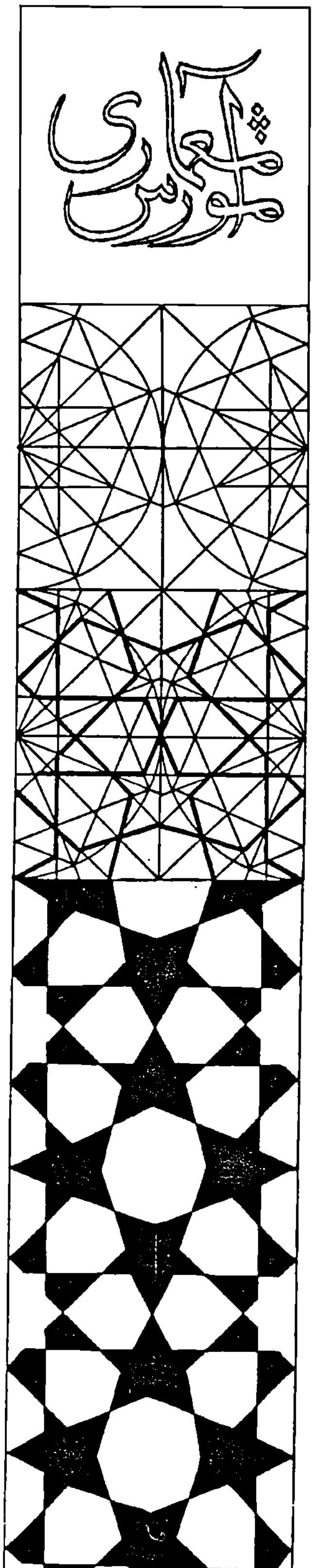
Figure 25 *An abridgement of the argument*

There are a few points which should usefully be highlighted here to set the suggested interpretation of the above-used terms. Firstly, *competence*, as also pointed earlier, is taken as the in-built (not innate) capability to manipulate knowledge and information to meet purposeful ends. It should be distinguished from *performance* and *skills*, although it underlies both notions. *competence-based* education, though, is used here to elaborate the use of knowledge as the ultimate goal of education. The underlying assumption here is that; 'knowledge is power', when and where the faculty of using it exists.

Secondly, *learner-centredness* of architectural education should be supplemented by the decisive role of the *master*, when it comes to attitude formation and change; the missing ingredient of today's knowledge/skills-oriented education. 'Learner' is *central* in that the ultimate *integration* is due to their creative mind; but in the meantime, 'instructor' is also *central* in that it offers a realised archetype of 'hows' and 'whys' of education. A competent instructor is not the one who knows everything, but rather is the one who knows (and is able to exemplify) *how* to learn and *what* to learn. Regarding the same point, Argyris & Schon quote in their (1974, p. 157): 'Whatever *competence* means today, we can be sure its meaning will have changed by tomorrow. The foundation for future professional competence seems to be *the capacity to learn how to learn*'. (italics added).

Lastly, *apprenticeship* is one of academic dimensions. That is to say, it is not restricted to train career graduates, as is the case with vocational courses. Else, it is adopted to maintain the guided discovery, not only in design studio but in all fields of architectural curriculum.

What is evident here is that the above mentioned *three* are closely interlaced and interdependent. These will be put in a wider perspective later on, along with the findings of the previous chapters. This is done by a *peer validation review* which undertakes to test the main lines of thought, emerged out of the present study, against a cross-cultural peer group of distinguished decision makers and thinkers in architectural education, both in the UK and in Iran. It will lead, then, to a set of recommendations regarding a framework for the discipline of architecture.



PART III

TOWARDS A FRAMEWORK

CHAPTER 7.
REFLECTIONS

3. 7. 1. INTRODUCTORY POINTS

The argument thus far contributed to finding a scientific explanation of the widely pronounced dilemma in architectural education (or perhaps in professional education in general), i.e., the *integration* of *knowledge* and *practice*. The discipline of educational psychology and the relevant theories of *learning*, *instruction*, and *transfer* were explored to approach the above objective. A crude summary of the argument on integration was presented by a three-fold statement; competence-based, learner centred, apprenticeship. What underlies that trio, in a closer view, is the active attitude of the learner in the process of learning; learning *for* activity, learning *as* activity, and learning *by* activity. The learner is, thus, the final integrator. This very result can be taken as the point of departure for the proceeding discussion.

As was argued earlier, taking the learner's mind, as the *integrator*, by no means cancels out the responsibility of education in providing the necessary conditions for *learning transfer* towards realization of integrated knowledge.

The theories and concepts, discussed in the previous chapters, were about to indicate how education could help learners to *integrate* the bits of given knowledge towards taking design decisions. Drawn from those 'contributing theories and concepts', as well as from the study of past and present state of affairs in architectural education, the findings were summarized in twelve propositions, seven of which were used as the interview agenda for a cross cultural *peer review*, conducted in Iran and in the UK. Those propositions will be discussed further, along with the comments made by the peer group. But before moving on that argument, it seems appropriate to give a short account of the very notion *conceptual framework.* It will help to better interpret the way those propositions are conceived.

3. 7. 2. WHAT COUNTS AS A CONCEPTUAL FRAMEWORK?

A framework is simply a template, or a list of agenda items, or a flow diagram. It is just a mental device that you can use to analyze... (Kyriacou)[1].

It might be appropriate to start with drawing on the authority of the *Longman Dictionary of Contemporary English*[2] to establish the meaning of the very two words that delimit the terrain of this discussion: *Concept* is defined, there, as 'a thought, idea, or principle; *Notion*'. Conceptual, would then mean 'of or based on the formation of concepts'. *Framework* is defined as 'a supporting frame; *Structure*'. Reducing these definitions to their essentials it can be said that, 'a conceptual framework for architectural education' constitutes a set of structured ideas and principles underlying the education of architects.

The very concept *framework* or *structure* is, by origin, an architectural metaphor, expediently employed to demonstrate the *skeleton* of any *system* in the broad sense of the term. It is associated with stability and strength. It indicates the constructive element which holds the parts together and determines the anatomy of the system, ie. the proportion of its supporting parts and its overall shape. Framework, itself, conforms to the concept of system. It comprises parts and joints, and to demonstrate any framework one has to acknowledge the parts, the connections (of parts) and the order in which the parts have come together.

With the above in mind and reflecting on the formation of a conceptual framework as a system of concepts, there are two major questions which should be addressed here to initiate the argument;

1. What are the principal concepts which underlie a system of education?

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1 In this Chapter, quotations are referred to *peer interviews* (See further), unless followed by the year of publication.

2 (LDCE) New edition, Fourteenth impression, 1992.

2. What is the organization of those concepts; their relations and interconnections which pattern the framework?

Educational framework, though, might be seen from different angles. The way a framework is structured and presented depends on what aspect(s) are to be highlighted or prioritized. It might focus, for instance, on sequence of stages a course is to follow. Or it might be presented as a set of 'key ideas or features that need to run through the whole course' (Kyriacou). Whatever shape it takes, a framework is a *mental device* facilitating further analyses and decision makings, to which it is a prerequisite. To cite Kyriacou: 'There is no way in which you can go about having a course design, or evaluating someone else's course, if you haven't got some framework... to make your judgements'.

What the present study has been seeking for, as a *conceptual framework*, is more of a set of guidelines or key concepts with *integration* as the main criterion. But what are those key concepts? There is a common sense classification of the means and ends of education which, with some variations, is widely referred to in educational academic circles. That classification defines any educational system as aiming to maintain a hierarchy of four outcomes; *knowledge, understanding, skills* and *attitude.*

According to that common sense view, any educational system, as well as any individual curriculum component, is designed to approach a set of accepted aims and *objectives*, through delivering a discipline-specific *content*, by adopting appropriate teaching *strategies*, and with assessment procedures to guarantee the desired outcomes, all brought together in a *structure* which defines the sequence and pattern of events. These are obviously seen with their contextual features. The four levels of achievement, ie. knowledge, understanding[3], skills, and attitudes designate the outcomes of the system, against which the graduates,

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3 *Knowledge* and *understanding* are put together here, with this in mind that organized or *meaningful* knowledge is always accompanied by understanding.

and therefore the system itself, are assessed[4].

To have a better understanding of the place of these components in the context of education, they are seen further in a diagram which illustrates a simple structure of educational systems[5].

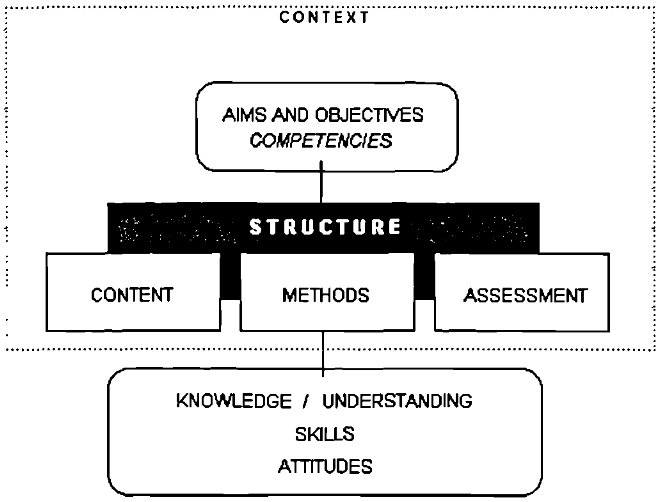

Figure 26 *General profile of educational settings*

Knowledge, in this sense, constitutes the acquired facts and information, while *Understanding* is seen as a higher level of knowledge which refers to the hidden relations of the facts, and also to why and how a piece of information is such as it is. Without *understanding*, bits and pieces of information will not form a 'meaningful whole' or to put it another way; a meaningful *body* of knowledge. *Skills*, though, follow knowledge and understanding, although it is not maintained that the acquisition of knowledge and understanding will necessarily end up with skills. *Attitude*, as the final in the hierarchy of objectives, has mainly to do with one's feeling of oneself as to how should s/he think, act, and react in situations. It has to do with beliefs, with value systems and with ethics. Attitude, itself, is a

4 As mentioned earlier, the shape an educational framework takes partly depends on what aspects are prioritized. For instance, Collins, et al. (1989) suggest four dimensions; *Content, Methods, Sequence,* and *Sociology.* It clearly signals their point of emphasis which is *situated knowledge.*

5 This diagram is a development of Dr. Kyriacou's sketchy idea; interview session of 14 September 1994.

high level of understanding which determines the orientation of the individual towards his/her academic, professional and social milieu.

What needs to be ascertained here is that the above learning outcomes/objectives are by no means isolated issues. They are interrelated and mutually interdependent. In addition, they can be further expanded to more detailed classifications, which are apparently beyond the purpose of the present argument[6].

With *integration* as its main concern, the present research has focused on the centre line of the above mentioned diagram. That is to say, the main argument has been conducted on the proper structure and methods that best lead to integrated learning outcomes, wherein knowledge and understanding serve to enhance the acquisition of skills and attitudes of mind, or looking from the other end of the diagram, to establish *competencies*. Content and assessment are tackled in so far as they are related to and determined by the core argument on structure and methodology.

Upon the above basis, the earlier mentioned propositions are demonstrated here in three categories to elaborate their significance in conceptualizing a framework for the discipline of architecture:

- ***Structural order***;
  1. advance organizer period.
- ***Means and measures of integration***;
  2. Multiple examples (generalization of case knowledge).
  3. Learning through episodes (integrated memory structures).
  4. Comprehensive design projects.
  5. Real life professional situations.
  6. Competence-based education (competence oriented courses).

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6 For instance, Bloom, et al., 1956, present their 'Taxonomy of educational objectives in the cognitive domain', consisting of six levels; *knowledge, comprehension, application, analysis, synthesis,* and *evaluation*. Taxonomies for *affective* and *psychomotor* domains have also been published by other researchers. (See Good & Brophy, 1990, pp. 128-131).

7. Academic apprenticeship.

■ ***General attributes;***

8. Learner-centred.
9. Multi-route.
10. Multi-disciplinary.
11. Culture driven.
12. Dichotomous (arts/crafts ~ science/technology).

To cut the argument short, further explanations of the above ideas will be given along with the input from the *peer review*, conducted to validate the first seven items. But a short account of the methods employed in the peer review will precede the treatment of the above propositions.

3. 7. 3. THE PEER REVIEW

To test an educational idea, the most promising way is to undertake a longitudinal study within the educational environment, time and resource permitting. Such a study, though, was obviously beyond the limits of the present research. 'Peer review', at the next stage, is among the comparatively effective and efficient ways of testing research results by drawing upon the already existing experience of select *peer groups.* The objectives are best achieved through panel discussions, where a group of experts reflect on a set of propositions. It was intended here to test the contributing ideas against a cross-cultural peer group from Iran and the UK. Given the limited resources available, bringing together of such a group was next to impossible. Therefore a series of interviews was organized and implemented in both countries.

The interviews were *structured* (Cohen & Manion, 1989, p. 309) in that they enjoyed a pre-set schedule or proforma which was sent to the interviewees at least one week before the interview sessions. The proforma consisted of a brief account of the research, followed by seven propositions, to serve as agenda items for discussion[7]. But to put it more precisely, the interviews were conducted

[7] The interviewees were also sent a copy of the Chapters 4, 5, and 6 which contained the core arguments.

as *standardized open-ended* [8] or *semi-structured* interviews. The latter type of interview, as Hitchcock & Hughes declare, '... tends to be most favoured by educational researchers since it allows depth to be achieved by providing... room for negotiations, discussions, and expansion of the interviewee's responses'. (1989 , p. 83)

Given the above considerations, the author tried as much as possible not to restrict the free flow of ideas and discussions, although it was at the expense of losing the ease of analysis. Some interviewees, though, did emphasize their points of interest rather than exactly conforming to the sequence of the proforma. 'The criteria for selecting the interviewees', as the proforma explained, were '... their influential commitment and experience in policy making, writing, or course leading in the field of architectural education'. Three interviewees in Iran and five in the UK constituted the architectural peer group, which was complemented by one interviewee from the discipline of educational psychology. This was to feed the specialist input of an educational scientist, given that the propositions were mainly rooted in that discipline. The peer group and the interview dates were:

■ ***Architectural faculty (Iran);***

1. Razjouyan, Mahmood (2/10/1995)	Ass. Professor, Course leader	Shahid Beheshty University	Tehran
2. Nadimi, Hadi (2/10/1995)	Professor[9], Chancellor	Shahid Beheshty University	Tehran
3. Navaee, Kambiz (1/10/1995)	Senior Lecturer,	Shahid Beheshty University	Tehran

■ **Architectural faculty (UK);**

4. Abel, Chris (20/11/1995)	Senior Lecturer	University of Nottingham	Nottingham
5. Cunningham, Allen (5/12/1995)	Senior Lecturer	University of Westminster	London
6. Nuttgens, Patrick (30/11/1995)	Professor		York

8 See Patton's classification in Chapter 1, under *The interviews*.

9 He also chairs the *Arts & Architecture* section in the *Academy of Science*, and the *Planning Committee for Arts and Architecture* in the Ministry of Higher Education.

7. Symes, Martin (7/11/1995)	Professor	University of Manchester	Manchester
8. Wise, Douglas (23/11/1995)	Professor		Newcastle

■ **Educational scientist (UK);**

9. Kyriacou, Chris (1/12/1995)	Senior Lecturer, Course leader	University of York	York

All interviews were tape recorded, the key comments were transcribed and further categorized to be used in the following analysis. It should be noted that the interviewees were asked to draw on; 1) the validity of the underlying theories and educational implications drawn from them, 2) identical experiences and/or examples, and 3) any reservations or additional comments. By and large, the peer group held the set of propositions as valid and covering 'all the major things' (Nuttgens). But, for the purpose of the present analysis, the author will suffice it to draw on the critical remarks as well as complementary points, to bring more insight into the argument. This will go parallel with explaining the propositions.

3. 7. 4. CONTRIBUTING CONCEPTS

Of the earlier mentioned twelve concepts, the general attributes (items 8-12) are covered throughout the dissertation. The first seven concepts, which constitute the main body of enquiry in the present research, are covered here incorporating the points raised by the peer group.

■ ***Means and measures of integration***[10]

This category covers proposals 2-7 of the interview proforma (Appendix 11), following the same sequence. But before drawing on individual propositions, a point should usefully be mentioned here regarding the two poles of integration. As also pointed out in the previous chapters, one of the strategies to enhance integration of *taught knowledge* and *design activities*, is to devise in-built elements in each of them so they might tend to orientate towards each other. Propositions 4 and 5 are to fulfil the above task by influencing *design activities*, while the rest (2, 3, 6, 7) address the other *pole* of integration, i.e.,

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10 The first category, i.e., *structural order*, is treated last, given the importance it enjoys in terms of curriculum design and implementation.

complementary taught courses. The propositions are cited here from the interview proforma with the same wording, but they will appear in single spacing.

3. 7. 4. 1. MULTIPLE EXAMPLES AND EXPERIENCES

Learning is situated or in other words, context-dependent. In order for learning outcome to be decontextualized and better transferred to future diverse situations, experience of multiple examples is vital. The core meaning of an issue is best revealed when it is seen in diverse situations.

Given the limited time duration available in an architectural course, multiple experience is only attainable through short term case problem projects, as well as short sketch projects or esquisses.

What is implied here is that the generalization of case knowledge is best possible through inductive reasoning on diverse cases. This was argued in Chapter 5, under *decontextualization.*

Reflecting on the proposition, Navaee suspected that multiple examples, although necessary (and facilitating), would be sufficient for the required generalization of knowledge. Rather, he argued, '... the tutor should explicate the matter by direct explanation'. Kyriacou held a complementary view to the above: 'Decontextualization [through multiple examples], does not necessarily ensure transfer of learning'. He further asserted that students might need help, through explicit statements, to be able to transfer.

But Symes observed the issue from another standpoint. He argued that generalization was also possible from an *individual case*, if it was carefully designed. Students would get general concepts through explicit discussions[11]. He also pointed out that using 'multiple examples' was rather favoured by those who take a behaviourist stand, aiming to change students' behaviour by repeating a case. ('... interestingly enough, to large extent used in architectural education', he uttered). This comment highlights the subtle difference between 'multiple' as distinct from 'diverse' examples. The proposition, though, was to build on diverse examples and not the repetition of a single example many times. To be more

11 The author observed one such discussion session, in a case problem exercise conducted by Symes, in the University of Manchester, October 1995.

precise, its wording needs to be modified in due course.

3. 7. 4. 2. LEARNING THROUGH EPISODES

Learning is based on four types of memory structures; propositional memory, procedural memory, images, and episodes. Transfer of learning is more likely to occur through the formation of integrated memory structures, i.e., learning simultaneously through verbal instructions, knowledge of procedures and strategies, images, and episodes or personal experiences. Episodic memory is the most effective of all, since it embodies memories of images and procedures as well. It follows that more emphasis should be put on the *project method of instruction*, where learners' commitment is at the centre of learning procedure.

For quite a number of years, audio-visual methods of teaching have enjoyed a world wide recognition as being more effective than traditional lectures[12]; building upon images as well as verbal memory structures. Instruction could be still more effective by taking other types of memory into account.

Perceiving the idea of episodic memory as relevant to 'case methods', Symes emphasized the significance of the idea to architectural education: 'It can be very strong indeed... It is much more useful for architects than most educationists realize'. In his view, '... the use of precedents, is normally unfortunately not properly explored'. It is seen '... only in terms of the final building solution, the product, and not in terms of the process or situation that brings it about'. It follows that precedent studies could be better 'exploited' in the light of the idea of episodic memory[13]. He further mentioned the time limitations for students' personal experience leading to formation of episodic knowledge. Having expressed a similar concern to the above, Nadimi pronounced, in due course, another problem existing in the Iranian context: 'Having been in tune with reception learning, as the prevalent mode of secondary education, students are reluctant (particularly in first years), to learn from personal experience and discovery. Rather, they hold more authenticity for what is taught through direct

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12 Although some believe that charismatic teachers would compensate the lack of so-called technological devices with their own direct instruction. Broadbent declared such a belief in his contribution to the author's Workshop, York, 15 February 1995.

13 This is reminiscent of the concept of 'design in the manner of' exercises developed by Abel, Simons and others, whereby the student's personal design experience is brought to bear on understanding of the precedents. (See e.g., Simons 1978, Abel 1981).

lessons'. The latter point, as a socio-cultural issue, complements what Kyriacou rightly mentioned, that is, the factor of individual differences between learners.

But Razjouyan took a different stand asserting that logical thinking can (should) take over personal experiences, given that it provides shortcuts to advancement of knowledge, particularly for well developed minds; '... you do not have to burn your hand to understand hot water'. This view is what was discussed earlier as *vicarious learning* as opposed to learning through experience. (See Chapter 4).

The above reservations, but, strengthen the merits of the theory underlying this proposition. The individual preferences are covered in wider variety, the more instruction accounts for *multiple* memory structures. Different types of memory, though, appear to be complementary means of organizing knowledge. It follows that different methods of instruction, as argued earlier, can be best effective when they co-exist.

Abel drew a beautiful parallel between the idea of episodes and Polanyi's analogy of the human body, whereby all human 'experiences of the world' are structured. In fact the body 'is the only thing we actually know', without experiencing it as an object. It can be inferred from Abel's analogy, that episodic memory is the closest possible experience to the original means of knowing.

Stimulated by this proposition, Nuttgens insisted on the importance of 'architectural memory', to mean in his words, 'memorizing the experience of going inside a building and using it'. This is clearly an episodic memory of architecture which forms the *repertoire* of design solutions and analogues, so vital to the process of designing. (See also Chapter 3, under *Design and architecture*, and Chapter 5, under *Creative act of designing*).

To close with a remark of Kyriacou's seems appropriate. Drawing on a definition of *learning* as 'the active process of getting information' (and therefore distinct from the notion of memory), he suggested a possible alternative for the first sentence in the proposition: '*Knowledge and understanding is organized in terms of four types of memory structures...*'

3. 7. 4. 3. COMPREHENSIVE DESIGN PROJECTS

In order to facilitate the timely transfer of taught material to application circumstances, design projects are suggested to be comprehensive and thus cover different aspects of design requirements. Sufficient time for design projects and a multi-disciplinary tutorial are among the prerequisites to meet the above end. Comprehensive projects aim, as much as possible, to draw on real conditions and resources and also real expectations. Reality, by nature, is multilateral and it leads architectural solutions to address all aspects of design from programming to working details.

Comprehensive design projects are seen here as a means of integration. Albeit there were no doubts about the validity of the concept, which is presently attended by a number of schools, some argued that the time consuming nature of such projects as a limiting attribute. The latter problem, in their view, makes it impossible to have more than two or three such exercises during the life span of architectural schooling (Nadimi, Navaee, Wise). More, there were disagreements with architectural education being exclusively structured on comprehensive projects. Navaee argued that 'comprehensiveness' could be seen as relative rather than absolute, meaning that in each project there might (or as Cunningham held, should) be one or more issues in the foreground with an eye to the comprehensive nature of design. 'The main target of all design projects', Navaee added, 'is to establish the student's *design process*'.

Comprehensive design projects, as Symes would suggest, '... is very common in the British system (except for some schools)'. But in his own view, comprehensive projects should only be part of the curriculum. 'I would rather have diverse approaches in education', he asserted.

Having expressed his strong agreement with this proposition (or *proposal*, according to Kyriacou), Abel conceded that '... some lecturers resist this idea', which is sometimes caused by 'lack of commitment'. 'I prefer myself longer projects', he added, to enable students 'to grasp everything'.

Despite all the above mentioned difficulties, since the integrating value of comprehensive design projects is unarguable, the existing hurdles should not prevent architectural education from taking them as a main target. With that in mind, the present author holds that having projects with certain foci and attending to the idea of comprehensive design projects are not mutually exclusive. The delicate point here is that the medium of *design* as the notation language of architects should not be divorced from the concept of 'buildability'. Drawing an analogy with the composition of music is perhaps telling, because a similar anxiety seems to be felt in music education circles. An anxiety as to whether or not young composers actually *hear* what they *write*. Drawing on the above issue, a commentator once pointed at the unwelcome lack of necessary competence among young student musicians[14]. It seems as if the *language* which is invented to be utilized as a means of communicating ideas[15], is attaining a life of its own, being no more bound to signify the reference objects.

Much of student projects in architecture schools, are born in such a virtual world. 'Almost none of the student projects are developed further than a mere conceptual design', Nadimi also stated. The idea of comprehensive design project is a reminder of the fact that any design commitment, in so far as it is a *design* exercise, is logically expected to be; 1) communicated with other members of the building team as well as with clients/users, and 2) implemented for the benefit of the users. Only then is it worth the *title*.

It might be argued here that education should provide an environment for enhancement of *imagination* and *creativity*, rather than putting restrictions such as the above . But it should not be overlooked that the *creativity*, as a human mental power, is context dependent when it comes to a certain discipline. *Creativity* is a means to an end, and that end is the *created* thing, which is clearly dependent upon the language of the discipline. Therefore, the same obsession could be professed as true for the so-called utopian design, where buildability refers to some time in the future. Even there, the subject should be made believable through some clues based on and traced in the available knowledge of the day.

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14 In a radio discussion on music education in Britain, BBC 3, 26 December 1995.

15 For a short account of areas of human knowledge and the corresponding language of each area (science, humanities, and design), see Archer, 1979.

Dr. Tadjvidi's account of artistic creation is clarifying here. He suggests[16] three determinants for all art forms; idea, imagination, realization. Masterpieces of all arts including the art of built form, are those that succeed to achieve a high level of attendance to the above trio, while doing justice to all of them in due proportions. By 'idea' he would mean the *initial thought, the substance,* and/or *purpose;* 'imagination', in his view, would be the *form, the mental image/scheme,* and/or *container* (while the *idea* is the *contained*); 'realization', though, would represent *the means, materials,* and/or *techniques.* For an idea or imagination to become an *art form*, it needs to be realized, and *design* is nothing but a recipe for that realization.

Comprehensive design projects bridge the gulf between conceptual design and realization, so vital to architecture. It should not be forgotten that, at the end of the day, architecture is the art and practice of modifying the man made *built* environment.

3. 7. 4. 4. REAL LIFE PROFESSIONAL SITUATIONS

Case problem projects and working in institutions such as school practices are among ways of putting students in real decision-making situations. School practice or other institutions of similar function, help to integrate education and profession. Therefore, such opportunities should be developed to be able to provide all students with a period of close encounter with reality. Case problem projects, on the other hand, try to facilitate decision-making exercises by *simulating* real situations. Design commissions for school practices will, in turn, function as good resources at hand for designing and developing case problem projects.

Regarding this proposition, despite overall agreement, there were some reservations voiced by the peer group, the most recurrent of which pointed at the fact of 'different time scales' in practice and education. This fact, they argued, makes it next to impossible to tie the two institutions. (Cunnigham, Razjouyan, Nadimi, Navaee, Symes, Wise). One possible means of bringing the professional climate into education, is *school practice*, which was also mentioned as facing practical problems. Since architectural practice is controlled by outside factors, 'school practices do not pace with educational progress', said Symes. More, it

16 In his interview with the author, April 1995. See also Chapter 6, under *attitude formation.*

might be argued, that certain fields of architectural knowledge, e.g., theory, are best learnt in *academia* (Cunnigham).

From a different angle, Wise recommended: 'You have got to let *idealism* go on'. The latter view does probably have many advocates among educators, but as noted earlier, it should not be overlooked that the *ideal* as well as *idea* enjoy a domain specific interpretation. The architectural idea(l) is clearly concerned with the physical environment, and thus it should be distinguished from, say, a graphic or musical idea(l), although it might incorporate all of them. There is always a constituent of materiality in architectural concepts. This link with reality helps to retain that materiality in the process of developing architectural ideas.

Admitting to the significance of real life situations, Nadimi asserted that to that end a prerequisite is to change what he called 'supermarket model of education[17]'. (which seems inherent in university disciplines). He further drew on an exceptional experience conducted under himself in Shahid Beheshty School of Architecture during the early years after the Islamic Revolution of Iran. A development project commissioned by the local authorities in the city of Garmsar[18], had generated various projects of different scales for students of different years. Both design tutors and specialist lecturers, he said, had moved to the region, the specialist lectures holding their sessions there, when necessary, while also involved in tutorial groups. Some last year students developed the case as their final project. More, having students of all years together there was a hierarchy of tutorship whereby both staff and higher degree students were involved. All that was made possible, Nadimi believed, by a sort of de-institutionalization of activities brought about by the revolutionary climate. In the succeeding years, he acknowledged, the more the situation settled down the more difficult it was to organize and administer such a massive group cooperation.

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17 This is reminiscent of what Gage & Berliner (1991) call 'smorgasbord education', when they criticise the present system which gives students '... one unit of this, one unit of that; one hour of this topic, thirty minutes of that topic'. (p. 318).

18 A city to the south east of Tehran.

A similar experience was also made possible, Nadimi recorded, for reconstruction of *Susangerd*, one of the war[19] damaged cities in the south west of the country. Such opportunities seem to be exceptional and, therefore, a full link with practice remains a hardly achievable goal for architectural education.

What the latter experience evidences is that the fully comprehensive project whereby all aspects of architectural reality are tackled and the specialist input is delivered 'on the spot', is dependent upon many factors that hardly co-exist in normal conditions. Various sorts of educational strategies are proposed as relatively approximating that goal. One-year-long *site diaries* through which students observe, document, and report the process of construction (Cunningham), Case problem approach (Marmot & Symes, and others), and more common teaching methods such as games and simulations are among the possible strategies to bring the real life professional situations to formal education.

To close the argument, another noteworthy point is cited from Wise concerning the changing nature of practice which makes the issue still more complicated. 'Are we preparing people for *practice* as we understand today?', he questions. Further he rightly points at the 7-year time duration of an architectural course that might challenge the idea of training architects for a *practice* which would have different requirements in 7 years time. Education, in his view, should aim to 'create a body of theoretical understanding', to be able to adapt to diverse situations; teaching of concepts and principles. Recall Bruner's idea of 'coding systems'. (Chapter 6, under *We know more than we are told*). But there is another issue which also deserves attention. That is, for the very concepts and principles to be better interpreted and transferred, they need to be *situated* in application circumstances and *structured* in *episodes* through experience. Perhaps a plural state of *situated knowledge* plus *decontextualization*, would bear a clue to the above dichotomy. (See also Chapter 6).

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19 The war followed the Iraqi invasion of Iran in 1980 and lasted for eight years until the retention of the occupied lands. Reconstruction of the damaged regions was a powerful pre-occupation for schools of architecture during and after the war.

3. 7. 4. 5. COMPETENCE-BASED EDUCATION

Architectural education is not merely about increasing the knowledge of facts and principles. It is also about developing a level of competence (both practical and intellectual) to make decisions in terms of patterning the built environment. There are a number of *core competencies* that could determine the direction and content of the curriculum components. Those are competence in a) identification of needs and requirements, b) creative designing, c) communication, d) management of material and human resources (technical sciences and humanities), and last but not the least, e) understanding of and making value judgements about architecture and architectural concepts.

Each component of the curriculum should orientate to enhance one or more of those competencies. To meet that end, learning should occur through learners' active participation in manipulating the given knowledge and skills in decision making situations. This is made possible by projects and exercises around the competencies aimed at by each component.

Orientating the curriculum elements towards competencies is clearly seen here as an integrating strategy. 'A great proportion of all university education', in Symes view, 'is really competence-based but almost all teachers do not recognize this'. 'Because', he added, 'they think what they are doing is transmitting knowledge'. But even though students, nevertheless, get competent in one way or another, Symes suspected that; 'what they gain is not necessarily the right competence that they will need', and 'whether the competencies will be valid *in future*'. This is again to address the changing patterns of profession and industry, also pronounced on by Wise earlier, which calls for more curricular flexibility to maintain multiple routes and various possible combinations of educational components.

A point which can usefully be made here to reduce the above worry is that although professional competencies might be constantly changing but the *core competencies*, few in number as they are, prove to have kept their validity over long periods. Recall the Vitruvian declarations which in most points are still held as valid. (See also Chapter 6, under *Setting the criteria*). Symes further drew on a curricular pattern once adopted in the Barttlet School of Architecture in line with the latter argument. Taught courses were offered in two categories; core courses (for all), and professional requirements (for groups), plus options for individuals. He, then, rightly added that in order to offer a variety of disciplinary tendencies, and satisfy a hierarchy of needs, bigger schools might be needed.

Pointing at the defining role of the teaching staff in conducting the course towards competencies, Nadimi ascertained that teachers themselves should enjoy what he called 'creative flexibility', to be able to stimulate students' active participation and discovery. 'They need, though, to constantly develop their capabilities', he continued.

But Navaee acknowledged another obstacle in due course, which is probably more prevalent in the Iranian context. That is, the primary and secondary education, oriented as they are to *increase knowledge* rather than *enhance competencies*, do not provide necessary ground for project-based instruction.

Stimulated by the proposition, two issues were perceived as being important grounds of competencies for architect students; 'information search and retrieval' by Cunningham, and 'verbal communication' by Navaee.

3. 7. 4. 6. ACADEMIC APPRENTICESHIP

Education for competence, learning through personal experience, and project method of instruction lead to what can be designated as *academic apprenticeship*. As a mode of learning, academic apprenticeship brings the properties of apprenticeship, i.e., observation, personal experience, coaching, and approximation (to expertise), to bear upon the higher levels of education for creativity and competence. In this mode of education, the student's mind is central, while the teacher/tutor also plays a vital role in scaffolding the student 's progress and *approximation*.

Academic apprenticeship, as stated in the previous chapter, is apparently distinct from the traditional apprenticeship, whereby '... the apprentice was posed to one master, whose personality was modeled'. 'The master, though, was the centre of education'. (Nadimi). But this can also have unwelcome consequences depending on *who* the apprentice and the master are. 'Indisputable obedience might replace the critical thinking abilities'. Having said the above, Navaee ascertained that in this respect, 'teacher (or master) should be, at best, the one who asks good questions... The ultimate goal should be to encourage critical contemplation'. He perceived such a relationship both promising and achievable. This is, of course '... much more demanding from the teacher's part than normal lectures', Abel conceded. 'It brings lecture and studio together, much more closely'. The latter point can be better explained in the light of what the present author argued earlier in terms of apprenticeship providing an identical model of learning to bridge the gap between design activities and taught courses. (See Chapter 6, under *Setting the criteria*).

■ *Structural order*

The other contributi

ng concept to be discussed, is the idea of *advance organizer period.* It is seen as more influential on the whole structure of the curriculum, given that it concerns the inter-relationship of successive courses. Following a similar format to the previous propositions, that will also be explained along with the peer group reflections.

3. 7. 4. 7. ADVANCE ORGANIZER PERIOD

Learning, by nature, is *organized, schema-driven,* and *knowledge-dependent.* The advance organizer period aims to provide architecture students with a general perspective of the subject matter of education, i.e., *architecture.* This mental picture of architecture will help students to organize the to be taught subjects by creating the necessary mental structures and developing a need for learning those subjects. This will lead to students' making sense of what they learn afterwards.

Study tours, site visits, surveying, free hand drawing, photography, visual note taking from traditional as well as contemporary architecture, are among the familiar vehicles employed in this period. There are also quick sketches, comprehensive design projects on topics such as rural architecture (where all aspects of architectural design are present but in an unsophisticated way), and in particular, practical experiments with building materials and simple structures.

What differentiates the *advance organizer* period from the so-named *foundation course,* is its emphasis on the students' direct encounter with the reality of architecture, contrasted to the abstract concepts of form, material and space which are conventionally dealt with in foundation courses.

The *advance organizer* model works in a variety of scales. In the classroom teaching scale, where the theory has originally emerged, it appears as a figure, a matrix, or a pre-designed question and answer. In a 5-6 year course in architecture, though, it might take a whole term or even one year to establish the *advance organizer.* The whole architectural course, in this sense, acts as an *advance organizer* to the lifelong continuing professional education of graduate architects.

What is contributed by this proposition is a new interpretation of the teaching technique developed by Ausubel (1960) to find application in direct instruction. Grounded in cognitive perspective[20] and based on the notion of schema, Ausubel's advance organizers are intended to provide the necessary ground for *meaningful* as opposed to *rote learning.* (See also Chapter 4, under *Cognitive trend*). By using 'advance organizers', the instructor provides students with 'a brief instruction about the way in which information that is going to be presented' is structured'. (Gage & Berliner, 1991, p. 282).

Ausubel himself, commences his research report on advance organizers with hypothesizing that '... the learning and retention of unfamiliar but meaningful verbal material can be facilitated by the advance introduction of *relevant subsuming concepts* (organizers)'. (Ausubel, 1960). Then drawing on what underlies that hypothesis, he continues: 'This hypothesis is based on the assumption that cognitive structure is hierarchically organized in terms of highly inclusive concepts under which are subsumed less inclusive subconcepts and informational data'.

Despite his consideration that the '... pedagogic value of advance organizers obviously depends in part upon how well organized the learning material itself is', Ausubel asserts that no matter '... how well-organized learning material is, however, it is hypothesized that learning and retention can still be facilitated by the use of advance organizers at an appropriate level of inclusiveness'. (1960). Endorseing the introduction of such organizers *before* the learning material, he acknowledges that, '... their integrative properties are... much more salient than when introduced concurrently with the learning material'.

He concludes his report by highlighting the core property of his proposed instruction procedure as follows: 'This procedure would also render unnecessary much of the rote memorization to which students resort because they are required to learn the details of a discipline *before* having available a sufficient number of *key subsuming concepts'.* (same source) (italics added).

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20 Which well goes back to the Gestaltist view.

Having conducted an interdisciplinary study of learning theories to better understand the requisites of an integrated architectural course, the present author perceives that the underlying notion of Ausubel's teaching 'device'[21], which is supported by extensive experimentations in the past three decades, is well capable of being interpreted in as wide a perspective as the whole course of architectural education. Hence choosing the title 'advance organizer *period* '. Ausubel's instruction model, thus, is seen as generating a framework for design, development, and evaluation of the curriculum.

According to this interpretation, it can be argued, the notion of advance organization of learning[22] process signifies the curriculum structure as well as the synopsis of each individual element. The logic behind this framework is that each component would bear an inclusive picture of what is going to proceed; a process of schema formation and development. As pointed in the 'proposition', architecture course is suggested to start with a set of exercises which aim to give a picture of what counts for architecture as well as for architectural education. In a long-shot view, an advance organizer period is designed to provide the necessary attitude of mind (schemata) for the learners to make sense of the succeeding courses[23], while, due to the same model, architectural education as a whole would serve as an advance organizer for further professional education, CPE, so to speak.

Perhaps a visual presentation is helpful to better approximate to the core argument. The following two pictograms elaborate the essential properties of *advance organization model*, whereby stages of learning process are as important as the elements, compared to the present system of delivering taught subjects in separate pigeon holes.

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21 As called by Good & Brophy, 1977, p. 164.

22 Other investigators who share Ausubel's ideas, have further studied other factors, such as analogies, metaphors, or concrete models, that can be also utilized to maintain the necessary organizational structure of the learning material. (See Good & Brophy, 1990, p. 201).

23 The length of the advance organizer period is dependent upon the learners' existing state of knowledge and understanding and the complexity of educational substance.

Needless to mention that this parallel should not be taken as a clear cut judgement, given the invaluable endeavours undertaken in schools of architecture, here and there, to overcome the problem. (A number of such undertakings were discussed in the previous chapter).

Figure 27 *Advance organization model of curriculum*

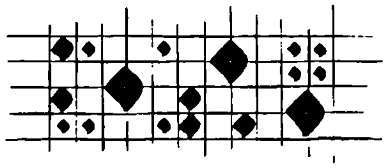

Figure 28 *The fragmented model of curriculum*

What is meant here is to highlight the current state of affairs and a possible way of re-conceiving them. A way in which, as the above pictograms indicate, emphasis is put on the sequence, structure, and successive periods of education rather than individual elements. A sort of cyclic structure where each cycle, deliberately, involves a panorama view of what is going to happen in the proceeding cycle; a move from highly *inclusive* demonstrations of the discipline to necessary *detailed* information.

What the reflections of the peer group were on this proposition, will foster the argument. Apart from expressions of agreement such as; '... an extremely important issue'. (Navaee), '... a very useful concept'. (Symes), '... absolutely essential'. (Abel), there were other noteworthy observations that put the concept under critical scrutiny. Those observations will be commented on next.

Navaee pointed at the particular significance of such an idea within the Iranian context were the entrants have hardly any pre-existing grounding in art and architecture, due to the sort of secondary education they receive. Having pronounced that, he wondered if it was that essential to incorporate direct practical experience in the advance organizer period. Rather, he maintained, students could get the necessary acquaintance through other means such as films, study tours, and such like.

Given that the course *Man, Nature, and Architecture*[24], according to Navaee, follows a similar objective to the proposed model, the question arises as to whether the very omission of practical experience is part of the reason underlying unsatisfactory results. Along a similar line of argument, Nadimi also conceded that the above omission was problematic. Another evidence for the vital role of direct experiencing the tools and materials, is the hardly arguable effectiveness of traditional apprenticeship, where education always begins with *building* rather than *designing*. This is analogous to the procedure followed by music students who start with *playing* an instrument before using *notation* or any other abstract way of communicating musical ideas. Gaining a full scale feel of materials which, at the end of the day, are the words and phrases the architect will need to speak with, proves to be essential.

It should be ascertained at this stage, that the acquaintance with the reality of architecture as intended in 'advance organizer period', is relative rather than absolute. As Nuttgens rightly observes, '... many people only *discover* what architecture is, after many years of effort'. Having admitted that, it should also be acknowledged that whatever one *discovers* is by no means, from scratch. Rather, it is rooted in the mental structure one has developed so far.

To start with, mental organizers prove to be more vital in such cases as architectural education where students are to enter a field of study with little (if any) preceding attitude of mind towards it. 'Ausubel believes that', Good & Brophy report, 'advance organizers are specially useful when the material to be learned is not well organized and learners lack the knowledge needed to be able to organize it well for themselves'. (1990, pp. 200-201). To cite Ausubel himself (1960): '... the more unfamiliar the learning material..., the more *inclusive* or highly generalized the subsumers must be in order to be proximate'. (italics added).

Nuttgens and Wise highlighted the merits of the so-called foundation course in

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24 This course is presently part of the national curriculum of architectural courses in Iran, and is offered in the first three semesters.

terms of visual education, geometry, and communication skills. Pointing at the fact that the entrants enjoy 'no visual education', nor have they any 'three dimensional experience[25]', Wise recommended not to ignore foundation course. But he further admitted that the incorporating exercises do not necessarily need to be based on abstract formal instances which are more to do with visual arts. Rather, those exercises can be developed around architectonic examples and more relevant issues.

A noteworthy point was raised by Symes which seems to be admissible. He pointed at a contradiction that might occur in the mind of teachers and students as what the objectives of such courses are. Each exercise in the advance organizer period has a double objective; as a learning substance, and as an advance organizer. The problem will show itself when it comes to the inescapable issue of assessment. 'How to measure performance?', he wondered. To substantiate that charge, he drew on an experience conducted by one of his colleagues with first year students. Students were assigned several short projects on separate elements of a house (kitchen, veranda, etc.), with this in mind that they would be able to bring together all the knowledge and experience they attain, to design a whole house in the following term. 'Each exercise was something in its own right', Symes expounded, '... he couldn't find a way of assessing it as a preparatory exercise'. A similar problem was pronounced by Symes as facing his *case problem approach* where the objective is to stimulate thoughts and decision making, rather than mere conveying of a learning substance.

In a similar line to the above, Nadimi ascertained that 'The preparatory nature of advance organizer period should not be dismissive of acquiring knowledge and skills'. This will clearly call for co-existence of the two objectives. This is, in fact, a valid issue which needs to be sorted out, particularly through experimentation and further research. But for the time being, some comments might be made to provide a clue to possible solutions.

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25 This is ironically similar to the worry pronounced by Navaee regarding the state of entrants to architectural education in Iran.

First of all, distinction must be made between the above mentioned experience and what constitutes the advance organizer period. In that exercise, students start with *particulars* and then move on to the *whole*, whereas the essential idea in advance organization model is to start with a general picture of the whole and then move to the particulars. It is the way learners are made able to make sense of the particulars within the context of the whole. The above mentioned difference, though, will not cancel out the validity of the problem raised by Symes, but it can certify that those call for different solutions. In the above example, perhaps the best possible way of assessing students' achievements regarding the preparatory objective of the course would be the final project where they design the whole house.

Given the composite nature of advance organizer period which involves a variety of learning/instruction strategies as well as personal experiences, the best possible way of assessing the students' progress is mainly through what is called the 'portfolio'. It might be argued here that portfolios are also reflecting the learning achievements and skills acquired, and that they have little to do with assessing the future performances in the light of those achievements, which is clearly the aim of advance organizer period. This sounds logical, but bearing in mind the nature of advance organizer period whereby the general picture of the subject is a *learning substance* in its own right, then proper learning achievement, would be most likely to enhance the proceeding learning as well. The authority of the cognitive theories of meaningful learning can be drawn to support the above hypothesis.

Identical to the *conduct* of this period which is done by a multi-disciplinary group of instructor/tutors, the *assessment* of the portfolios is also done by that group[26]. The portfolio is expected to consist of performances such as drawings, sketches, reports and papers, building surveys, case studies, photographs, monographs, and small scale design projects. This will surely be accompanied by the students' three dimensional works on building materials. Bringing together of various exercises in one collection and further assessing it on the whole is in line

26 It can be done either individually or through discussion and consultation.

with the underlying theories which account for the idea of *whole* preceding *particulars*. In portfolios, the total performance is demonstrated and the powerful and weak points of each student can be observed. Such an assessment is best exploited if it is given the authenticity of defining whether or not the student is capable of passing to the next stage of education.

With all the above in mind, it should also be considered that, as Nadimi acknowledged, 'such a scheme will, by no means, guarantee the end results'. Having been involved in the practice of curriculum design and development, the present author concedes that curriculum structure and course synopses are at best half of the story, the other half determined by the contributing actors in the implementation phase, at the forefront being the instructors. To use the music analogy, a written piece of music, no matter how carefully composed, is a piece of paper before a competent player(s) realize it. What is more, assuming that a general picture of the subject, once and for all, will make all the proceeding detailed learning meaningful, is over simplifying the educational process. The interpretation of the general picture itself, is subject to development and change in the light of the detailed and specialized knowledge. Abel's account of Polanyi in terms of constant switching between two terms of tacit knowing, is very subtle; one does 'need to focus on details', he noted, but one must also be able 'to pull oneself back out of that' to the whole. This is what designers always do and also the way education should be conducted; attending to the holistic picture while going to details. Advance organizer period is an start for that process.

To conclude with, perhaps Kyriacou's expression of the subject is appropriate. Reflecting on the idea of advance organizer period as compared with the parent theory, he said: 'In educational psychology when people talk about advance organizers, they tend to be specifically referring to things that the teachers might say at the very start of a lesson or perhaps at the start of the topic that they are going to cover over the series of lessons... They try to draw students' attention to how some of what they are covering, is going to relate to previous knowledge or understanding that they need to have'. He then added: 'But, here, I think you are using the phrase *advance organizer period* almost to refer to an orientation course... I would actually say this is an original idea'.

3. 7. 5. CONCLUDING REMARKS

The argument thus far went on to elaborate the major findings of the research as components of a conceptual framework for architectural education. Those findings were put under three categories; structural order, means and measures of integration, and general attributes. The first two categories, presented in seven propositions, were tested against a cross-cultural peer group of both Iranian and British contexts. The peer group views were also analyzed and reported parallel to the short account of those propositions.

Having visualized a common sense classification of means and ends of education comprising of *objectives, content, structure, method*, *assessment*, and a hierarchy of *learning outcomes*, it was noticed that the above mentioned propositions were mostly referring to and focusing on *curricular structure* and *methods of delivery*, as the most contributing factors to the main concern of the present research, i.e., the issue of *integration*.

The advance organization model was highlighted as a possible way of theorizing a structure for integrated architecture courses. It was argued that *advance organizer period*, would help students to develop necessary mental patterns into which the proceeding teaching material could be organized and therefore better subsumed.

What follows in the closing chapter, is the set of possible conclusions and reçommendations with an eye to implementation requirements. The resulting set of guidelines, structured on the basis of the above treated propositions, is hoped to provide the necessary theoretical back up for further evaluation of the present curriculum in architectural education of Iran towards timely developments.

CHAPTER 8.

CONCLUSIONS

3. 8. 1. INTRODUCTORY POINTS

If we agree that there are different ways of knowing, different unknowns to be known, different propensities of knowers for knowing and different aspects to be known about the same phenomenon, then perhaps we can develop appropriate criteria for knowing from what we do know, and then, for knowing what we want to know. (Quoted in May, 1994, p. 11).

The argument thus far covered various avenues of thought which could be brought to bear on the issue of *integration* in architectural education: It commenced with *Background concepts* (Part I), and further moved on *Core concepts* (Part II), leading *Towards a framework* (Part III). Part I, was devoted to setting the problem, justifying the adopted approach and methodology, and a statement of research undertakings (Chapter 1). Further, it portrayed the subject matter in an historical landscape, past and present (Chapter 2), and then moved on to perceive the subject with a panorama view (Chapter 3).

To construct a theoretical basis for a better understanding of integrity in architectural education, Part II undertook a critical review of theories of *learning* (Chapter 4), and those of *transfer of learning* (Chapter 5). By doing so, it paves the way for the reconstruction of the problem within that sphere, and further contemplation of the possible solutions (Chapter 6).

The aim of the Part III, is to articulate the major findings of the previous Parts, to discuss those findings with an eminent group of experts, and draw an analysis of their reflections (Chapter 7). What is intended to be fulfilled by the present Chapter, is to a) provide a general summary of the previous Chapters and, b) put forward a set of recommendations for improvement of architectural education, drawing on the *insight* as the well as *knowledge,* achieved from this research.

3. 8. 2. SUMMARIES

After the brief statement given in the previous Section, it seems appropriate now to pull together a general summary of the preceding Chapters, before drawing on the concluding recommendations:

Based on this view that, research has an evolutionary characteristic whereby the *question* and the hypothetic *answers* develop alongside, through a *spiral-like* process of research undertakings, **Chapter 1** set out to give an account of the research focus and approach in its stages of development . The initial problem was cited from the *research proposal* as being the '*... insufficient integration of lecture courses and their inadequate influence on design projects*'.

To tackle that problem, different approaches could be adopted; the socio-economic, the ideo-cultural, and the pedagogic approach, each prioritizing one aspect of the problem. It was argued that the first approach would lead, in large, to the question *what* should be taught to meet the needs of society (content of education), while the second approach was mentioned to deal with the question *why*; the attitudes. To address the question *how*, through a pedagogic approach, was suggested to have been the intent of this research. Furthermore, the Chapter argued that what exacerbates the problem in such contexts as Iran, is not restricted to the fact that educational system has been adopted from the West. More it is rooted in the intellectual gap between the adopted institution and the *users;* the absence of a conceptual understanding of why that institution is shaped as it is.

Against such a background, the objectives and the methodological peculiarities of the research were observed. It was acknowledged that the present research would fall into the category of *basic* rather than *applied* research, meaning that its aim is more of a contribution to theory rather than to problem-solving. *Literature investigation, correspondences, interviews* and *workshops* were noticed as the main methods employed in the theoretical development of the argument, not to mention a number of research undertakings which were reported to have used survey methods of enquiry to develop the research problem.

To elaborate on the methodology and instrumentation, Chapter 1 drew on the fact that the present research falls into the *qualitative* category, wherein 'the researcher is the instrument', and methods are utilized to 'seek insight rather than statistical analysis'. The process was described as following these stages in a spiral progression; immersion into the data until meaningful patterns emerged, leading to the formation of convincing interpretations of the case under investigation.

Chapter 1, was finally concluded with a report of the research undertakings, maintaining the significance of tackling the problem of *disintegration* or *fragmentation* in the architectural education of Iran. It was argued that the most enduring aspect of the problem (and perhaps the most difficult to handle) lies in the pedagogic debate; the issues of *curricular structure* and *methods of delivery*.

Having covered a statement of the research, **Chapter 2** was planned to explore the issue in its historical context, both in the global and local dimensions. Architectural schooling was traced back to 15th century Florence, the Medici's *Academia Platonica*, moving on to the French *Academie Royale d'Architecture* of the 18th century; up to the renowned *Ecole des Beaux-Arts,* its parallel in Britain, i.e., the Pupilage, and their successor, the German *Bauhaus.* It was proclaimed that after the break down of the Modern Movement in the 1970s (and its educational counterpart, the *Bauhaus*), architectural education no more enjoyed a dominant theoretical basis and thus, it could be characterized by plurality of educational philosophy and approach.

Against this background, Chapter 2 presented a brief history (or sub-history) of the half-century old architectural schooling in Iran. Pointing at the Westernization of higher education of the country from the mid Nineteenth century, the first institution to train architects (School of Fine Arts), was proclaimed to have been moulded according to the Beaux-Arts model, that lasted for three decades. Post Revolutionary changes in policy making procedures and in university curricula, was another issue covered by Chapter 2. The mainstream architectural education was identified as being a 'continuous 6-years Masters course' leading to professional registration, after a further two years of practical experience.

What differentiates architectural education in Iran from that of, say, the UK is the existence of a national curriculum which is implemented by all the eight schools. A short account of that curriculum, though, was addressed. The overall structure of the course was cited as consisting of four realms of study; *Architectural Design, Construction Technology, Human Settlements,* and *History & Conservation.* Further on, a sort of *componentization* of the curricular elements, was suggested to underlie that programme. Three such components, namely, *Tarkeeb; Man, Nature, and Architecture;* and *Village* (rural settlements), were introduced in due course.

Chapter 2 concluded by reporting a survey conducted to examine the level of acquaintance with the discipline, among the entrants to five Schools of Architecture in the academic year 1995-96. The results were reported to indicate that little provision is made and few opportunities exist to familiarize the applicants to schools with what constitutes the discipline of architecture. Hence, the vital plea for an introductory period in the structure of the course.

The review of literature in **Chapter 3**, highlighted a number of issues most recurrently voiced by those concerned with architectural education. It commenced with the encyclopedic definitions of *architecture*, which appeared to be, paraphrasing, in different words, the Vitruvian view of architecture as 'the achievement of *firmness, commodity,* and *delight*. Treated were also the analogous statements of architecture, each underscoring an aspect of the subject; architecture as a *science,* as an *art*, as *frozen music*, as *inhabited sculpture*, and as a *language*, what underlies the idea of meaning and symbolism in architecture.

The Chapter then reflected on the *interdisciplinary* (as distinct from multidisciplinary) approach to architecture and to its education. It was proclaimed that *reality* of the built environment, being of a multi-dimensional nature, calls for architects' ability to 'understand and evaluate the contributions of other disciplines'. Citing the two models of interdisciplinary approach to education (the *tree* and the *woods*), it was argued that the latter, by elaborating the interdisciplinary collaborations between construction disciplines, was probably more reasonable and practical, while the former with a common core course leading to separate disciplines would leave the common course with a vaguely defined content which is counterproductive to students' motivation and orientation.

Further, Chapter 3 underlined the issue of *design* as the core of architectural education, elaborating a wider interpretation of the term than *image making*, to embrace the whole range of decisions in terms of shaping the built environment. With the above perception, the *design method* movement was briefly reviewed, drawing on its three major streams; *the analysis-synthesis, the participatory design,* and then *the conjecture-refutation* model which enjoys a comparatively wider subscription at present.

After treating what was designated there as *dichotomies* (art/craftsmanship, science/art, training/education, pupilage/schooling, theory/practice, locality/globality, explicit/tacit learning, and creativity/tradition), Chapter 3 was brought to a conclusion with a short argument on the core issue propounded so far, highlighting *problem-solving* as a metaphor to characterize both architecture and education. By doing so, it identified the following key questions: a) What areas of knowledge contribute to defining and structuring the architectural *problem*?, b) How the missing relevant knowledge/information is *identified* in the process of designing as well as that of learning to design?, c) How is the relevant knowledge/information *acquired*, in the course of designing, and transmitted, in the course of education?, and d) How is the relevant knowledge/information retained and *applied* in the process of designing?. Bearing in mind that the first two questions relate mainly to content of education while the rest tackle the process and methods, it was ascertained that the latter two were the main concern of the present research.

Holding the fact that learning is the common aspect of all educational endeavours, **Chapter 4** set out to explore the meaning, the process, and the corresponding theories of *learning.* It was done by consulting the discipline of educational psychology, whose main concern is 'the study of learners, learning, and teaching'. Different classifications of learning theories were reviewed, elaborating on two dominant perspectives in theorizing the mechanisms of learning; *the behavioural* and *the cognitive* trends. That review was conducted to pursue the contributions to *applicability* and *transferability* of knowledge, with this in mind that learning in an architectural education setting is, at the end of the day, meant to inform the *act* of designing in its broad sense.

Having briefly analyzed the relevant theories, Chapter 4 corroborated that the Behavioural perspective is mostly concerned with the outcome of learning as *observable behaviour*, focusing on 'stimuli, responses, reinforcement, and types of, rates of, and change in performance', while the Cognitive trend, on the contrary, emphasize the *unobservable mental processes* that lead to learning achievements. They are interested in studying the internal factors rather than external manipulations. The fact that the two trends are rather complementary than contradictory, was also substantiated by citing the intellectual attempts to build on both bases.

Pavlov's *stimulus-response* theory, Thorndike's *instrumental conditioning* as well as his *laws* of *exercise* and *effect* were reviewed in the Behavioural stream, leading to its apogee which is associated with Skinner and his *operant conditioning*, mentioning its subsequent educational developments such as *programmed* and *self-pace* learning and the idea of *teaching machines.*

Having observed the Behaviouristic developments of the turn of the century onward, Chapter 4 moved on to the Cognitive perspective of the second half of the century. Bearing in mind that the Cognitive psychology builds on many of the basic concepts of the short-lived Gestalt movement of the 1920s, a short account of that movement was also rendered. Comparisons were drawn between the Aristotelian view of *learning through associations*, whereby human mental process constitutes *ideas* and *associations*, and the Gestalt concept of *learning through restructuring*, where the learner does so by producing a new mental organization to make sense of the incoming information.

Having briefly denoted the basics of the Gestalt movement, Chapter 4 moved on to the Cognitive trend, taking three influential figures in that sphere; Piaget, Bruner, and Ausubel. By doing so, the major contributions in due course were debated. The *constructivist* approach, whereby learning is seen as an active process of *reconstruction* of information, the notion of *discovery* as compared with *expository* learning, and *meaningful* as opposed to *rote* learning, were among the main lines of argument. The Chapter then drew on the concept of *advance organizers* which is well rooted in the basic creeds of the Cognitive perspective, holding that instruction should start with a general picture of the whole content to help students construct the necessary mental schemata (knowledge structures) for acquiring the more detailed information meaningfully.

Finally, a treatment of the information processing model of memory revealed the significance of *attention* in determining the extent to which a piece of information is ever processed. Further, the transitional function of the *short-term* (or working) memory and its limited capacity maintained that the received information is due either to be forgotten or to be *encoded* to pass on to the *long-term* memory; a process which calls for making the to-be-stored information *meaningful*, i.e., mapped in the learner's existing *schemata*. Given the importance of the concept *schema* in the process of learning, Chapter 4 concluded with a short discussion of the *schema theory* as a corner stone of the Cognitive psychology.

Chapter 5 examined the theories and concepts more specific to professional education, referred to as learning for competence. The significance of *transfer* was substantiated, pointing at the limited time duration of any academic course which makes it inevitable to go for cultivation of general abilities which can be transferred to future situations, rather than conveying volumes of specific knowledge. Theories of transfer were traced to the turn of this century with Thorndike's as well as Judd's contributions; the *theory of identical elements,* and *transfer value of principles*, respectively. It was also debated that these early Behaviouristic theories were further developed within the Cognitive sphere, by incorporating the *mental constructs* to what was then believed to constitute the *identical elements*, i.e., the learning *substance* and *procedures*.

Having mentioned the basics of transfer, the Chapter continued to argue two closely related issues to transfer, i.e., *problem-solving* and *creativity*, leading to a debate on *the creative process of design.* Any problem situation was defined to have certain constituents; *Givens, Goals, Obstacles.* Open-ended problems, though, were characterized as not providing the necessary *givens* to achieve the *goals,* an instance of which being design problems. Citing a four-fold model for stages involved in problem-solving, it was suggested to be a rather more comprehensive scheme of design process. Those stages were; *preparation, incubation, illumination,* and *verification.*

To develop the *creativity* debate, Chapter 5 drew mainly on two contributions by Spearman and Koestler. Examining the different avenues of thought around the nature of creativity, the argument was conducted to support the view that creative act, or in a sense creative *leap*, is the discovery of *hidden analogies*, establishment of *new relations*, and putting the already existing constituents into *new patterns.*

Building on the problem-solving and creativity debates, Chapter 5 drew on the issue of *design* as a *creative* as well as *problem-oriented* process. The various positions towards design process were mentioned; those emphasizing on the intuitive and creative nature of design, and those insisting on the sequential, methodical, and *scientific* process of designing. Those positions were also interpreted against the learning styles dichotomies to substantiate the fact that the variety of approaches to design is rooted in the variety of learning strategies.

Having ascertained the central position of *transfer* in problem-solving, creativity, and design, Chapter 5 explored the possible ways to enhance the transfer of learning. That argument identified two major determinants for transfer; *decontextualization,* and *memory retrieval.* It was maintained that *decontextualization* is possible either through inducing from diverse examples or through an individual case, provided the existence of two essential factors; the learner's cognitive capability, and the exhaustive case. Citing the concept of *integrated memory structures* (combination of *propositions, procedures, images,* and *episodes*), it was mentioned that the likeliness of retrieval will increase to the extent which the learning substance is structured in multiple types of memory.

Finally, Chapter 5 concluded by summarizing the key issues of learning as well as those of transfer, underlining the significance to transfer of pre-existing background knowledge/skills, identical elements in learning and transfer situations (life/job), multiple application of knowledge/skills in diverse situations, and organization of the given knowledge/skills in patterns.

In the light of the analyses of learning and transfer theories, presented in Chapters 4 and 5, **Chapter 6** commenced by reconstructing the initial research problem and its hypothetic solutions regarding the nature and process of human learning. It argued that the initial problem, i.e., the inadequate influence of the taught courses on design activities, is one of *learning transfer. Integration*, though, would be an educational strategy whereby learning outcome of taught courses is made *transferable* to performance situations, be it design studio projects or real life decision making. That said, the Chapter identified three levels of transfer/integration;

1. from content knowledge to studio design projects (curricular integration),
2. from design studio to practice office (academia/practice integration), and
3. from practice office to construction site (design/construction integration).

According to those three levels, several alternative proposals were further analyzed, discussing their merits as well as shortfalls. Among those proposals were; Cunningham's *interest groups* model, Teymur's *experimental integrated education*, Quantrill's *platform-based structure*, *Componentized curriculum* of the Iranian schools, Gulzar Haidar's *interface framework,* Marmot & Symes's *case problem approach*, Le Corbusier's *reform proposal*, UK system of *practical training*, and the idea of *academic practice.*

Having given an analysis of the above contributions to integration, it was ascertained that each of the proposals bears a portion of the whole truth which can well be useful in certain circumstances. And given that success or failure of any proposal is largely dependent upon the reality of educational practice, the Chapter suggested that it would be more wise to take a pluralistic stand in due course. Having said that, Chapter 6 expanded the argument to the dichotomy of integration/flexibility, both taken as necessary constituents of a desired education. It was propounded that in order for integration not to contradict flexibility, it should not be interpreted as the fusion of curricular elements in one composite whole. Rather it should be retained by a *thread of coherence*. Competence-orientation (as opposed to subject-orientation) of curricular elements was further suggested to help attain that coherence. The latter argument was reinforced by an analogy with the idea of *core competency* in the discipline of industrial management.

To maintain the possibility of retaining separate courses while attending to the criterion of integration, the Chapter moved on to discuss two theoretical contributions by Bruner and Polanyi, asserting the human ability to go beyond the given information, and his power of tacit knowing. By doing so, it was ascertained that the learner's mind is the ultimate integrator, provided that they are aided to make a meaningful whole out of what they are taught, and construct their own *theory of practice*. Chapter 6, finally concluded with a discussion on the concept of *academic apprenticeship* as a possible means towards that end, putting forward an addition to the six-fold attributes of apprenticeship, propounded by other authors. Those six attributes were; *Modeling, Coaching, Scaffolding, Articulation, Reflection, Exploration,* and the suggested addition; *Attitude formation.*

Chapter 7 was dedicated to testing the propositions, derived from the preceding study, against a peer group comprising of nine scholars, eight in the discipline of architecture and one educational scientist. The Chapter commenced with an account of the very notion *conceptual framework* to establish a structure for the treatment of those propositions. Aims and objectives, structure, content, methods, and assessment, were mentioned as characterizing any educational setting, with three levels of learning outcomes; knowledge/understanding, skills, and attitudes.

Within the above framework, the earlier mentioned propositions were organized in 12 categories;

Structural order:

1. advance organizer period.
Means and measures of integration:
2. Multiple examples (generalization of case knowledge).
3. Learning through episodes (integrated memory structures).
4. Comprehensive design projects.
5. Real life professional situations.
6. Competence-based education (competence oriented courses).
7. Academic apprenticeship.
General attributes:
8. Learner-centred.
9. Multi-route.
10. Multi-disciplinary.
11. Culture driven.
12. Dichotomous (arts/crafts ~ science/technology).

The first seven categories which address the curricular structure and methods of delivery, were used as the agenda items forming the interview proforma for the *peer review* sessions, an analysis of which constituted the rest of the Chapter. After a statement of the methods employed to conduct the peer review, an analysis of the peer reflections were organized under the agenda items, mentioned above. The treatment of each item commenced by citing the statement of the corresponding proposition from the interview proforma, followed by the discussions stimulated by the peer interviews. The advance organization model was elaborated as a possible way of structuring integrated architecture courses, while the other six items were suggested as means and measures, contributing to methodical aspects of education.

The treatment of the propositions in Chapter 7, underlies the *concluding recommendations* in **Chapter 8**, which is to be recorded next.

3. 8. 3. CONCLUDING RECOMMENDATIONS

Having highlighted the conceptual findings of previous chapters, it is time now to draw some concluding recommendations in relation to prospective applications. But before moving on, a useful remark sounds opportune here. Any research endeavour is obviously conducted towards a certain set of objectives in terms of verifying or refuting the initial assumptions. But apart from those outcomes which are derived from, and thus can be traced to, what have been carried out, there is another achievement that is by no means of less significance. That is, the researcher is elevated (or upgraded) to a higher latitude providing a better command over the issue under investigation and thus enabling them to make more reasonable decisions, although not explicitly traced to certain parts of the whole research. That is again the function of tacit knowing which underpins human learning. The quotation at the outset of this chapter highlights the very complexity of 'knowledge building'. (May, 1994).

Bearing the above point in mind, the present author will not delimit himself to those recommendations that are explicitly traced to arguments presented in the dissertation. Rather, he will draw on the *insight* as well as the *knowledge* achieved in this research. This will be used as a 'conceptual leverage' (May, 1994), to draw useful recommendations for a more appropriate architectural education in Iran. The author must acknowledge here that these recommendations are, by no means, claimed to provide a blueprint for action. Rather, they are to serve as stepping stones for further experiments in the field.

Following the same framework as the one presented in Chapter 7 (under *What counts as conceptual framework?*), those recommendations will be put in five categories with necessary references to the Iranian context. Those are: 1) Aims and objectives, or *competencies.*, 2) *Structure*, 3) *Methods*, 4) *Content*, 5) *Assessment.*

3. 8. 3. 1. AIMS AND OBJECTIVES; COMPETENCIES

Aims and objectives are apparently the main determinants of any educational system. They underlie planning, implementation, and assessment procedures. Those objectives, as was argued in previous chapters, tend to be demonstrated by *competencies*, when it comes to professional education or as Henry puts, *applied disciplines.* (1994, p. 46)[27]. The following recommendations address the question how to set proper aims and objectives of the courses for education of architects.

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27 He writes: '... the use of project work is particularly common in applied disciplines such as, research, management, agriculture, nursing, engineering, environment, design, and architecture'. (Henry, 1994, p. 46).

1[a]. Aims and objectives of architectural education should be redefined in accordance with a number of core competencies rather than knowledge transmittance. This is to highlight the action-oriented attribute of architectural education.

1[b]. Individual courses too should be competence oriented, in that each is defined as a means to enhance one or more of those competencies.

1[c]. It is important to recognise the multi route nature of architectural education and further facilitate the accommodation of multiple pathways to replace the rather straightjacket and uni-route system which runs counter to diverse needs of the profession as well as to students' different tendencies and capabilities. (Chapter 2, under *Mainstream architectural education in Iran*).

1[d]. Architectural education should take into account the core as well as specialized competencies. It is recommended, though, that the architectural course be conducted in a multi-staged organization, providing space for enhancement of specialization and thus better utilization of country's limited resources. Medical education model is suggested to be brought to bear on this issue; a comparatively shorter course, *Karshenasi*, for educating *general practitioners*, followed by a higher level of specialization, *Karshenasi-e Arshad*[28], for *specialized architects*[29].

1[e]. Such strategy should also be utilized to compensate some of the inescapable deficiencies in terms of student selection by providing opportunities for more flexible outputs.

1[f]. Given its dichotomous nature, architectural education should observe competencies in both fields of art/craft and science/technology. This is more vital in the general level of education (*Karshenasi*).

1[g]. The interdisciplinary relations between disciplines of the built environment, must receive higher attention in the university level and the multi-route, multi-staged structure of the discipline should facilitate such relations.

1[h]. To achieve that objective, it is recommended that certain pathways be developed in the specialization level (*Karshenasi-e Arshad*), in order to intake graduates from other relevant disciplines such as Civil Engineering, Mechanical Engineering, Archaeology, Stage Design, Industrial Design, and even Social Sciences.

1[i]. To foster the quality of taught courses, one of the promising pathways in

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28 In the Iranian context, *Karshenasi* and *Karshenasi-e Arshad* are degrees equal to BA/BSc and Ma/MSc respectively.

29 It might usefully be recalled that the mainstream architectural education in Iran is a continuous 6-year course leading to graduation as architects; a course which practically takes a much longer time (8 years or more on average) for a number of reasons. (See also Chapter 2 under *The common programme of architecture courses*).

Karshenasi-e Arshad could be 'architectural education' itself. This will meet one of the major requirements of architectural education in Iran, namely, shortage of qualified teaching staff in complementary courses. Thus the incoming graduates from other disciplines will be able to develop their own specialization to suite an architectural environment. Such graduates are more likely to act as *integrators* in their future career as architectural faculty.

1^{j}. Architectural education should aim to provide organic links with real life professional situations by allocation of resources to 1) development and support of school practices; 2) to bring under educational umbrella the already existing tendency among students to concurrently work in architectural firms and/or construction industry. It should be recalled that at present, the accreditation process has little to do with schools and the required practical experience of graduates (3 years for BArchs, 2 years for MArchs, and 1 year for PhD holders), is assessed by non-academic institutions. That process is recommended to become as part of education, during the specialisation stage when students have attained the necessary core competencies.

1^{k}. Each course/stage of architectural education should aim to provide students with a general and inclusive picture of the successive courses/stages to help students to build a meaningful and organized hierarchy of the taught material.

1^{l}. To implement such goal might take years, and therefore, a research and monitoring body is vital to conduct constant evaluation of strategies and methods through longitudinal studies.

1^{m}. Attitude development is one of the major goals of education particularly for a discipline such as architecture which is naturally culture-driven. Although this is probably the *unteachable* side of education, but taking the tacit dimension of learning into account, that fact should not undermine the responsibility of education in due course.

1^{n}. Architectural education should devise variety of strategies to form, develop, and strengthen different levels of attitude (opinions, attitudes, values, and personality) among students. Recall Oppenheim's *tree model*, Chapter 1, under *Alternative approaches*. Commitment to social needs, cultural values, and professional ethics are among goals to be targeted by the educational environment.

1^{o}. To achieve such goals, they have to be addressed by relevant *exemplars* to activate the tacit power of learning process. The vital role of the exemplary and committed teaching staff in due course should be recognized.

1^{p}. It is important that students be exposed to and involved with architectural exemplars of cultural value. Students' competence to design in the mode of local architecture should be aimed at. Mere *acquaintance*, though, would not be sufficient.

1[q]. To provide a favourable environment for implementation of the above goal, historic cities of rich architectural heritage are recommended to accommodate the to-be-established schools of architecture. The latter point is of a policy making rather than educational nature but having considerable influence on educational environment, it is suggested to be observed when planning for new architectural education institutions.

3. 8. 3. 2. STRUCTURE

Drawing on the rather lengthy discussion in Part II on *learning, transfer,* and related concepts, it can now be pronounced that *structure* of an architectural course is no less important than its *content.* This is not, of course, to undervalue the significance of *content.* Instead, it is to draw attention to the defining role played by the organization of learning process, in successfully transmitting of the content. The following set of recommendations addresses the issue of organization or structure of architectural curriculum.

2[a]. Architectural course should adopt a sequential structure in order to be able to *organize* the content of each sequence in advance, by those preceding it.

2[b]. To implement such a structure, architectural course should start with an *advance organizer period,* whose aim is to provide an inclusive picture of architecture as well as architectural curriculum. More detailed knowledge disciplines, though, would proceed that period.

2[c]. Length, content, and design of such period should be based on a careful qualification assessment of the student intake in terms of their existing knowledge, understanding and attitude of mind related to architecture.

2[d]. It is important to recognize that part of necessary learning substance of advance organizer period can be incorporated in secondary education. This is clearly beyond the remit of architectural education and calls for an inter-ministerial collaboration, given that secondary and higher education in Iran are conducted by two separate Ministries.

2[f]. To implement that goal in Iran, the present system which offers a uni-route, 6-year course is recommended to transform to a two sequence system (as other engineering courses are); a generalization sequence (4-5 years, *Karshenasi*) and a specialization level (2-3 years, *Karshenasi-e Arshad*).

2[g]. Graduates from the first level would be accredited as *general practitioners* who can well meet a great proportion of the professional requirements throughout the country[30].

30 This would apparently be after a period of professional experience.

2^{h}. Practical training of graduates (3 years for BAs and 2 years for MAs), is recommended to be monitored and assessed by the schools, which is not the case with the present system. Despite all shortfall, the British system of practical training, particularly the first *year-out*, bears useful lessons to be learned in this regard

2^{i}. Part of the practical training, which is now isolated from the course of study, is recommended to take place before graduation, to maintain fruitful relations between education and profession[31].

2^{j}. Following the same model of *advance organization*, the first sequence (Karshenasi) should bear the seeds of various specializations, acting as an advance organizer period for the succeeding sequence (Karshenasi-e Arshad).

2^{k}. To achieve such a goal, it has to be set into clear workable objectives in terms of specialized input to the first sequence. Taught courses, though, should clarify the place of their related speciality in the comprehensive map of architectural education.

2^{l}. Besides the normally recognized specializations such as planning and design for settlements, industrial architecture, interior design, conservation, and design of particular building types, it is recommended that a separate specialization pathway be made available to those who intend to develop their future career in architectural education.

2^{m}. Such a goal is best implemented through supervised individual research, the subject of which could be various specialist subject disciplines contributing to the architecture curriculum.

2^{n}. The multi-route specialization sequence should be also exploited to facilitate the interdisciplinary links with other departments. This is made possible by offering admission to interested graduates from other disciplines to do their MSc degree in inter-disciplinary courses such as the one suggested in 2^{l}, i.e., MSc in architectural education.

2^{o}. It should be recognized that post graduate students from other disciplines would need to pass an *advance organizer period*, preferably designed for that purpose based on the similar period in the generalization sequence.

2^{p}. It is important to acknowledge that, in order for the graduates from the second sequence (Karshenasi-e Arshad) to be entitled and accredited as *specialized architects*, they should have done their BA (Karshenasi), in architecture. Otherwise they would be offered the degree of MSc in architectural studies. Useful experiences in a number of UK schools are

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31 As mentioned in the previous section, working in architectural offices is already occurring concurrent to education, but it is mostly seen as a way of student's *earning* rather than *learning*.

suggested to be observed in this regard[32].

3. 8. 3. 3. CONTENT

Content of architectural curriculum, like any other discipline, is determined in general by two variables; the educational objectives or *aimed competencies,* and the state of entrants to education or the *target group.* What education is all about is to modify the capabilities of the target group according to a set of aimed competencies.

The core competencies of architects were proclaimed earlier to be derivable from the definition of architecture. Architecture, though, was suggested to be; '... the creative process of making decisions with the intention of shaping or patterning the built environment due to the real needs of people, while retaining its socio-cultural values, and in harmony with the natural determinants'. (Chapter 6, under *Setting the criteria).* But how is such a general definition interpreted in certain contexts, is to a large extent determined by what can be called the 'going paradigm'[33]. That paradigm could be manifested in certain *styles, traditions,* or even *movements,* where and when they are prevalent.

But what signifies the present state of affairs, Broadbent acknowledges[34], is the existence of 'rival paradigms each with its own *shared values,* Minimalist, High Tech, Classical, Post Modern, Deconstructive or whatever. Most of all it is such values that teachers insist on teaching'. The irony here is that a similar account applies in the Iranian schools. It makes the confusion even more dramatic, given that none of those paradigms are actually rooted in the cultural grounds of the country. This is clearly a socio-cultural issue of wider dimensions than architectural education and can well be subject of separate research. Although the content of education, as mentioned earlier, was not the focus of the present

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32 See e.g., *Course Handbook* of the School of Architectural Studies, University of Sheffield, third edition, p. 10.

33 Paraphrasing Cuhn's idea that 'scientists working in a particular field do so within a "paradigm"', Broadbent maintains: 'So, it seems to me, do architects'. He then adds: 'In fact I am certain that what we teach *is* "paradigm"'. (Quoted from a letter of his to a colleague, 5/1/1995, a copy of which was made available to the author). (His own emphases).

34 In the same letter, mentioned in the previous footnote.

research, but a set of issues are recommended here to serve as a stepping stone for further studies. These are based on architects' core competencies in a general level, as well as the relevant contextual concerns.

3[a]. The crude categorization of curriculum areas used in the *Survey* (Chapter 1), can also be applied here to give a general picture of the content. That is; *Design activities, Science & Technology,* and *Humanities.*

3[b]. Creative act of designing should be the main component of architectural curriculum, particularly in the first sequence of generalization.

3[c]. It must be recognized that *design process* is prior to problem-specific knowledge. It follows that students' attention should be drawn to procedures and strategies, to enable them to transfer their acquired competencies to new problem solving situations.

3[d]. It is important to acknowledge that design method studies is not about promoting certain design strategies. Instead it should aim to help each student to gain an awareness of their own way of designing; a metacognition of design.

3[e]. Subject of design projects is suggested to follow one or more of these criteria: 1) considering major needs of society, 2) pursuing particular educational purposes, 3) tackling cultural/architectural values of the region.

3[f]. The brief of design projects should be devised to highlight the comprehensive nature of architecture. Namely, most possible aspects of architecture should be addressed in each project.

3[g]. The latter recommendation should not undermine the need to emphasize one or more aspects in each project according to specific educational purposes.

3[h]. It is important to note that design projects are the best vehicles to convey the accepted (or to-be-accepted) *paradigm.*

3[i]. To better exploit that vehicle in fostering cultural values of environment, it is highly recommended that the content of as many projects as possible be on precedent studies, particularly as *design in the manner of* projects (See the *peer review,* in Chapter 7), with Islamic/Iranian architecture (either historic or vernacular) as their *paradigm.*

3[j]. Scientific and technological content of curriculum should capitalize the prospective view of knowledge, i.e., making the learners familiar with the ways knowledge is generated, rather than transmittance of a mass of scientific and technological information. (Chapter 3, under Dichotomies, and Schon, 1988).

3[k]. Observation, case studies, and practical experiments should be an indispensable part of content in courses, that deal with applied knowledge, such as *structures, construction materials and techniques,* and *environmental control.*

3^{l}. History and theory of architecture should widely draw on Islamic/Iranian issues[35].

3^{m}. Such concern should be emphasized and reinforced by incorporating case studies, monographs, and 'paradigm' projects, stimulating students to challenge the content rather than simply retaining it.

3^{n}. Subjects such as sociology, research methods, statistics, which are to be applied as means of problem identification and data gathering, are recommended to be incorporated in and delivered through comprehensive projects rather than as fragmented courses which do not usually give more than a general information of little use. (See Chapter 6).

3^{o}. It is important that the content of each course be organized to meet the specific requirements of the sequence in which it is likely to be offered; advance organizer period, generalization period (*Karshenasi*), or specialization period (*Karshenasi-e Arshad*).

3^{p}. Given that the main objective of all taught courses is, in one way or another, to inform design, the prevalent tendency in curriculum design should be to reduce the number of separate courses as much as possible to leave more room for students to be able to absorb the *relevant* and *transferable* content.

3^{q}. To meet that objective, it is recommended that separate course contents be componentized in cohesive groups. Individual subjects, thus, will make better sense within those components.

3. 8. 3. 4. METHODS OF DELIVERY

As argued earlier in Chapter 6, students are the main integrators. All sorts of instruction strategies should be devised to help them to integrate discrete subject disciplines of architectural curriculum. Learner-centredness, which is underpinned by the argument on integration (Chapter 6), leads to a plea for a wide spread utilization of project method of instruction, given the attributes of that method. The major reasons for using project method are mentioned by Henry (1994, pp. 45-46) as follows: a) 'to ensure students are able to *apply their knowledge*'; b) 'to *teach higher cognitive skills*'; c) 'to *motivate* students by offering activities of greater relevance to them'; d) as an *assessment*-sorting device'; e) 'as a means

35 Post-Revolutionary revisions of the national curricula, though, do show such a tendency. According to the latest revision (issued on 18 September 1995), 57% of the contact hours of *architectural history* course is allocated to the Islamic and Persian contexts.

of offering students greater *autonomy*'; and f) *preparation for working life*'. (italics of the original). These attributes are clearly in line with propositions summarized in Chapter 7.

4[a]. Project method of instruction must be adopted as the mainstream method of delivery; not only in design activities but also in subject disciplines.

4[b]. It should not be neglected, though, that project method needs to be complemented by direct instruction. This is particularly vital in the Iranian context where expository learning is prevalent in secondary education. (See also Chapter 1 and 7).

4[c]. It is necessary that students are kept active in searching for and manipulating the information in order for them to get the heuristics of learning rather than a collection of facts and findings. Project method is but one of the possible (and effective) strategies. Other strategies should be pursued to meet the above need in every single subject area.

4[d]. To provide an apt environment for students' personal commitment to experience and discovery, the learner-instructor relationship must tend towards what was designated earlier as *academic apprenticeship*, where in a mutual relationship between tutor (a more suitable term than teacher, in this context) and learner is central. (See Chapter 5, under *Academic apprenticeship*).

4[e]. Such mutual relationship which is inherent in apprenticeship model, should aim to upgrade the learners' attitude to learning from guided participation to guided discovery, either in design activities or in taught courses.

4[f]. It is vital that knowledge delivery follow a succession of highly inclusive and generalized to detailed and specialized subjects to help learners to gain an organized and meaningful body of knowledge.

4[g]. Generalization of case knowledge should be taken into account, in order for learning to be *transferable* to new situations.

4[h]. To achieve that goal, two strategies must be considered as workable means; a) by inducing the *general* out of diverse cases or *examples*; or b) through explicit explanation. These two, of course, can coincide to accelerate the results.

4[i]. Instruction should be devised to facilitate the organization of learning in an integrated memory structure, by presenting the learning substance in various forms; verbal, visual, procedural, episodic. (See Chapter 5, under *Memory retrieval*).

4[j]. It is important to recognize that formation of episodic memory (as the most powerful and lasting), involves students' personal experiment and experience, which must be considered in teaching process.

4^{k}. In teaching specialized subjects, no matter what technique is employed, there should always be explicit references to the whole, which is *architecture*, or in a more general sense, *environment*. This is to help students to retain and develop their mental map of the whole subject matter, so vital to transferability of learning.

4^{l}. It is recommended that tutors (in design or other subjects), do themselves work parallel to students in order for students to be able to *observe* expert performance and competence.

4^{m}. To implement such goal, they have to be able themselves in areas of competency they are going to nurture.

4^{n}. Coordination and collaboration of tutors, particularly in those subjects that form a curriculum component, is vital. It is highly recommended that teaching methods and their subsequent results be under constant scrutiny, by the tutors themselves to approximate the central criterion of integrity.

4^{o}. It is important, after all, to recognize the fact that the whole battery of instruction strategies and techniques are but aids to the teacher's personality[36]. And therefore, prime importance should be put on recruiting well qualified and talented instructors. That is what, to a large extent, guarantees the successful utilization of those strategies.

3. 8. 3. 5. ASSESSMENT

Assessment procedures, by and large, are determined by two factors; methods of instruction, and educational objectives. Or in other words, as Kyriacou put it[37], 'assessment process should be consistent with learning process'. Having been determined by learning process, assessment process does also have a supporting effect on learning itself. It explicates the competencies that students are expected to acquire through the learning process.

If the project method of learning and its subsequent *academic apprenticeship* are prevalent in architectural education, then the assessment process should be harmonized with that mode of education. Upon such bases are the following recommendations built.

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36 '... it seems to me, it is *charisma* and *personality* that get things over- whatever the subject- not the use of formulae to structure lectures, etc.', Broadbent wrote (27/2/1995) in his reflection on the author's Workshop, York, 15 February 1995.

37 In his *peer review* discussion with the author.

5[a]. Memorization and retention of information should not be targeted in assessment procedures.

5[b]. To observe such a rule, it should be recognized that written examination is the least effective way of assessing competencies, so significant in architectural education.

5[c]. Assessment strategy must take into account the learning *process* no less than the learning *outcome.*

5[d]. In assessment of design projects, the prime attention should be paid to student's design process. It is recommended that presentation of design projects include a clear and explicit[38] demonstration of the student's design steps. This will also help the student to reflect on their own work and better organize their ideas by self-criticism through explication; a way of exploiting the *meta-cognitive* value of design process awareness.

5[e]. Subsequently, assessment should occur also parallel to learning progression, rather than at the end of the process and as a detached event.

5[f]. Assessment of each curriculum element should be fulfilled in relation to the whole component or group of curriculum elements it falls into. This is to support and reinforce the curricular integration in both teaching and learning sides of education.

5[g]. To implement the above goals, it is necessary that the teaching staff cooperate in approximating their assessment strategies to devise integrated assessment procedures.

5[h]. Such assessment procedures must be used to assess the overall performance of each student as well as their powerful or weak points in separate fields.

5[i]. With instruction based on projects (inclusive of non-design as well as design projects), assessment should emphasize on students' portfolios consisting all their performance within a certain period of time.

5[j]. It is necessary that subjects like communication skills be assessed *continually,* along with portfolio of each term (or any academic sequence), rather than, once and for all, as a separate course content.

5[k]. It should be recognized that such comprehensive assessment of portfolios is even more vital when it comes to *advance organizer period,* wherein the acquisition of an inclusive picture of the subject is the prime objective.

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38 In his *peer review* discussion with the author, Abel explained a number of experiments with his own students, where the flow of design ideas and successive preparatory studies were presented in a clear and understandable way addressing the lay audience. He held that experience quite a promising way of using *presentation* as a means of *learning* and *criticism.*

5'. It is important to acknowledge that assessment can also be exploited as a means of learning, as it underlines the final expectations from learning progression. This is more important in contexts like Iran where disciplined examination-based education is the prevalent convention.

3. 8. 4. HINDSIGHT AND PROSPECT

Before closing the main body of the research report, it might be appropriate to sit back and reflect on the way one has gone through and the prospective tasks one should be planning for.

The methods and strategies, applied in this research, were observed in the first Chapter, drawing on their merits as well as shortfalls. What remains to be tackled here, though, is an overall evaluation of the process to provide a stepping stone for future research/actions. This was felt appropriate, provided that inherent in any research endeavours is that, '... when one reaches the end..., one could usually start all over again, time permitting...' (Saran, 1985, p. 208).

After three years of involvement as *the instrument* of research, the most satisfying feeling, for me, is when I look back and realize the long distance between my vision and attitude to the subject, and those of three years ago. I owe such a feeling, I suspect, to the qualitative approach which was dominant in this research. So if I were to start again, I would take a similar approach, where one is involved with every single moment of the process, as part of one's life, rather than with the two ends of the task. It is indeed highly demanding on the part of the researcher and their nervous system, but the virtues are promising. This is, of course, with a bit of exaggeration, since no research seems to be able to exclude qualitative decisions, particularly one concerned with Humanities.

Another useful remark to be made for those who might wish to start such an endeavour, is the significance of every single bit of thought, however small and seemingly irrelevant, to the process of constructing an argument; hence the importance of recording and encoding ideas. Getting a clear feel of the above fact, is perhaps best achieved through a research of this scale. For me, it is reminiscent of a piece of advice by the Prophet Mohammad[(S)], which reads: '*Capture the knowledge by inscribing it*'. I benefited from that advice whenever

I did apply it, and regretted when I did not. Even seemingly remote data are likely to reveal relevance and meaning if put in a right *pattern*. And meaningful patterns are most likely to emerge through the process of *immersion* into the data.

Fighting with uncertainty while being alert to grasp the emerging patterns, is a challenging process which bears the seeds of *meaning* and *understanding.*

What I would not have done, had I been in the position to start all over again, is to use the survey enquiries of the sort implemented in this research, which is not offset by a proportionate feedback, although useful to develop the problem and justify the approach. A rather limited scale survey, probably complemented by interviews, could have better paid back the time and resources spent to conduct it. This is more valid when dealing with theoretical issues wherein the logic and the reasoning is more significant than the number of agreements and disagreements.

But what remains to be done in prospect, is a rather more complicated task, because it will necessarily deal with implementation which involves the management of a larger number of factors, as well as actors. First of all, the literature assembled in this research on *integration*, needs to be communicated with the colleagues in Iran to get more contextual feedback. This might call for circulation of a number of papers in Persian language; possible workshops or similar gatherings; and/or visits to schools.

Secondly, the current programmes need to be put under further revisions through the *PCA* meetings. This would involve long and convincing debates on the issues raised by this study, given that some of the proposals will tackle issues and ordinances of the university, as well as the higher education contexts.

And lastly, administering the necessary resources for the conduct of experimental (action) research to examine the practical aspects of the proposals. These, of course, should be concurrent with an attempt to keep myself updated by retaining some of the links established in this research, with corresponding institutions as well as with individual scholars.

Although it appears to be a long and painstaking process - as no shortcuts seem possible, a citation of Euclid's wise answer to his king gives telling advice on this point: 'Euclid, the ancient Greek mathematician who wrote the first geometry text book, was asked by the king if there were any shortcuts he could use to learn geometry, since he was a very busy man. *I am sorry*, Euclid replied, *but there is no royal road to geometry.*'
... architectural education is similarly placed[39].

39 The last paragraph is taken from the authors contribution to the EAAE Forum, Weimar 1995. (See Appendix 5).

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APPENDICES

APPENDIX 1

IN THE NAME OF GOD

Proposal 1

Considering architecture as the "space materialized for man", the first and foremost element playing the crucial role in this respect is geometry. Since, although it might be possible to omit or minimize the effects of the other elements in materialization of the architectural space, the factor of geometry - dimensions, sizes, and the comparative relation between them - cannot be abstracted from the concept of space.

In other words, architecture is to make the space geometric. This geometry or spatial orderliness, although consisting of a limited number of elements, is the mysterious factor behind the astonishing and unlimited variation in the material world.

It is the dodecahedral geometrical structure of Chlorophyll molecule in plants which provides it with its property of absorbing and transforming sun-rays to what is, in effect, the essence of life. Also, it is the geometrical structure and the spiral shape of DNA molecule which gives it the holy mission of perpetuation of life. In a word, architecture of the physical being is materialized by the invisible and immaterial world of absolute shape and geometry.

To the same extent, materialization of the architectural space depends on geometry. Therefore, in the process of creation of any architectural work, the geometric tool, how it has taken shape in architect's mind and the process gone through by the architect for its application are the important factors which determine the value of the work.

Doubtlessly, a thorough understanding of an architectural work is gained if and when one is sufficiently acquainted with the design process and the way the architect has used different tools in designing. When the architect aims at the revival of a historical building or designing a new building in continuation of and beside the existing buildings, gaining an insight as to the disciplines governing their designing process is of special importance.

Here the assumption is that simulation and utilization of similar methods in the procedure of moving from question towards an answer, itself the basis of the design process, can lead to a number of corroborative and harmonious answers which form the body of the architectural work.

If we believe in the historical and cultural continuation in the field of architecture, it is necessary to know the designing methods of our ancestors. The main emphasis and the focal point in this research is gaining knowledge of the methods of architectural design, especially on application of geometry in the process of designing.

It starts from a universal scale and then moves on to the works of one of the brilliant ages of Iranian architecture. Finally, one of the prominent works of that period will be the subject of a geometric analysis in which its architectural values will be demonstrated.

Proposal 2

'*The quality of a PRODUCT is determined by the quality of the PROCESS that produced it.*' (White, 1972, p. 47).

Architecture, on the whole, is the result of operations in the design process. Having the above fact in background, this research intends to look at different approaches to the design process, it then tries to focus on the most critical and creative area in the process which deals with synthesizing of the programmatic data by formulating and developing a proper concept for the project.

The main objective of the present research would be finding the adaptability of the process to different projects and conditions by going through some samples especially among successful pieces of architecture. This study would lead to a separate piece of research on the ways of developing a design process which could be applicable in such projects as physical development of higher educational complexes in Iran.

APPENDIX 2

The major problems and shortcomings facing architectural education in Iran are cited hereinafter from the minute of the meeting (December 1993), held by the Iranian Planning Committee for Arts, Supreme Council for Higher Education Planning, to discuss the matter in response to the author's question:

Item 1.	General lack of a consistent culture, accepted values, and distinct manners in architectural design and construction which is seen as '*identity crisis*'. This has been the outcome of ignoring the Islamic culture of the country for decades.
Item 2.	Lack of balanced relationship between the so-called Westernized education and the regionally conventional system of training (learning by doing).
Item 3.	No recognition of and coherency between the professional codes and legal planning and building regulations (in private practice and government organisations) and architectural education.
Item 4.	Little or no relation between architectural education and the education of other relevant professional building disciplines.
Item 5.	Insufficient integration of lecture courses and their inadequate influence on design projects.
Item 6.	Staff deficiencies to cope with the increasing number of students.
Item 7.	The inappropriate mechanism of entrance examinations for selecting the best applicants.
Item 8.	Poor facilities and insufficient resources.
Item 9.	Lack of proficient management.

APPENDIX 3

List of Interviewees:

(Those with *, have been tape-recorded)

In Iran:

1. Aboulghasemi, L.
2. Badiee,* (11/5/94)
3. Dargahi,* (3/5/94)
4. Diba, D.
5. Hadj Ghasem, K.* (8/5/94)
6. Memaran, R.
7. Nadimi, H.* (2/10/95)
8. Navaee, K.* (8/5/94, 1/10/95)
9. Noghreh-kar, M.
10. Pirnia, M.K.* (8/5/94)
11. Razjouyan, M.* (2/10/95)
12. Saheb Zamani, N.* (15/5/94)
13. Sha'arbaf, M. & A.* (25/4/94)
14. Tadjvidi, A.* (12/5/94)
15. Tusi, A.
16. Zargar, A.

In the UK:

1. Abel, C.* (20/11/95)
2. Aboutorabi, M.
3. Broadbent, G.
4. Cunningham, A.* (3/11/93, 5/12/95)
5. Gibs-kenet, P.* (3/11/93)
6. Kyriacou, C.* (1/12/95)
7. Leaman, A.
8. Lister, I.
9. Marchant, P.
10. Nadjarian, B.
11. Nuttgens, P.* (30/11/95)
12. Suttcliffe, S.
13. Symes, M.* (23/10/95, 7/11/95)
14. Teymur, N.
15. Watt, C.
16. Wise, D.* (23/11/95)

APPENDIX 4

A short report of the EAAE Forum, held at Weimar, 31 May- 4 June 1995

It was as if Henry van de Velde was present, even more so than Gropius, at the informal opening of the EAAE Forum on 31 May. The gathering took place, after registration, in the central staircase of the building whose image is so much associated in the minds of so many architects around the world with the short-lived but influential Bauhaus (1919-1925) in Weimar.

Around 90 participants from more than 20 countries[40] were there to discuss architectural education in relation to *reality of the past, industrial reality, urban reality* and *reality of the future*, the four themes of the Forum.

After the keynote speeches[41], each addressing one of the above themes, we were divided into groups for the four workshop sessions. Therefore, a complete account of all the contributions is beyond the scope of this report, but clearly over the four days some general observations can be usefully made.

With *English* and *French* as the parallel formal languages of the Forum, without any translation facilities, it was very confusing for the author. The noticeable political 'politeness' of keeping a balance between the two languages certainly exacerbated the confusion. The EAAE President, for instance, started his address in French but continued it in English, and worse, a number of sessions had French speaking chairmen resulting in most participants not being able to follow their comments. Perhaps it would have been more useful if the sessions had been split into two parallel language based sessions.

The general impression one could get from the contributions which is partial due to the above mentioned problems, can be put as follows; despite the core intention of the Forum's organizers, many of the contributions, although interesting, dealt with 'architecture' rather than 'architectural education', or at best explained the teaching experience of the authors. Perhaps he was reflecting on the same issue, when one of the members of the Scientific Committee pointed to the rarity of research focusing on architectural education. It can be inferred that educators seem to prefer to indulge in the *practice* of education, with trial-and-error as their strategy, rather than subscribe to a theoretical framework.

Other counterproductive arrangements were, a)the poorly organised sessions - only shortly before the start of each session did we know who was going to talk,

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40 List of participants consisted of 122 names, majority of whom were present. 66 papers were scheduled to be presented.

41 Keynote speakers were Professor Robert Maxwell from London, Professor Heiko Bartels from Weimar, Professor Bernardo Secchi from Milano and Professor Kari Jormakka from Helsinki.

and b)the shortage of time -given that most presentations that address personal teaching experiences, consisting of slides of students' work are very time consuming. This left little or no time for discussion and many sessions were, in fact, collections of different presentations with little interaction of ideas.

The frequency of presentations on teaching design by computer applications and clearly in activity of designing itself, was more manifest in the session addressing the 'future reality'. Interestingly, as far as could be gathered, those computer applications were mostly introduced as separate and discrete courses or at best, as part of design studio projects, with little influence on the general structure of education. This area of enquiry still seems to be a matter of enthusiastic experiment which enjoys highly motivating factors for both staff and students. The seemingly great amount of time given voluntarily by students to do computer experiments, was given as evidence for the effectiveness of such courses.

Undoubtedly the notion of designing in the medium of electronic space is a rather new but ambitious trend, seemingly inescapable for schools to indulge in, and bears much promise for shaping a better informed design process, as well as developing a more universal method of design teaching.

Another preoccupation voiced by some contributors was the so-called dichotomy of theory *versus* practice; the lack of research in schools, on the one hand and the loose relationship of architectural education with the realities of society and profession on the other. The author's contribution fell into this category and found companions among other contributors. The author elaborated the plea for integrating the real needs of society (practice) with educational activities (theory) within a hypothetical institution, designated as the *academic practice*, eventually with both educational and professional components fully integrated.

Apart from the deficiencies mentioned above, which might partly be inevitable on such occasions, the Forum on the whole went well, not to mention the by-products which were no less promising; the coffee time negotiations, visits to museums. But perhaps the most exciting of all, which also provided a happy-ending to the programme, was the visit to the famous building of the Bauhaus in Dessau. The very place where Gropius introduced one of the most influential archetypes of modern architecture.

Construction of such a large building within one year (1925-1926), demonstrates the burning enthusiasm and will power of the founders to realize their ideas and ideals. No matter what value is given to their ideas, the very liveliness and motivation they had provides inexpensive lessons for today's architecture teachers. It perhaps also helps to explain the most widespread influence of such a short lived school on international architectural education of this century. Perhaps it was the only moment in the history of architectural schooling, that a school was so linked with the requirements of its time that it could stand at the leading edge of practice instead of merely following it.

The selection of Weimar to host the 20th anniversary of the EAAE proved to be, in its own right, a meaningful and inspiring decision, although it could be gathered that the decision was partly aimed at encouraging the German speaking schools to enter the Association, whose present formal languages are English and French. It should also be noticed that Weimar is preparing itself to be the cultural capital of Europe in 1999.

Referring back to the content of the event, it must be mentioned that the abstract of papers, although with some missing, was issued but the complete proceedings will be published after the authors have further summarized their papers to 4-8 pages (a limit which could have been set from the beginning).

The overall outcome of the event for me was an experience of lasting significance. It provided me with a clearer understanding of the state of affairs in western architectural education as well as in architectural education circles of an international scale. Regarding the objectives and approach of my current research on the topic, the Forum had reinforcing implications in two ways: First, it was corroborated that setting a theoretical framework was vital in order to organize current and further research into architectural education. Diverse individual experiences need to be put in a pattern to complement one another and provide the ground for a whole body of knowledge.

Second, given the extensive research findings and theories developed in the field of educational psychology, although mostly biased to focus on the primary and secondary levels of education, interdisciplinary studies, to bridge the gap between architectural education and educational psychology, seem to be among promising approaches[42]. This latter point is rarely attended to in architectural education circles such as the EAAE Forum, albeit Donald Schon's works[43], for instance, are heavily referred to. Interestingly enough, Schon was originally based in the discipline of education.

To conclude this report, perhaps the short statement by Pressley[44] is the most telling:

> *Years and thousands of pages can go by before there even begins to be a resolution of a mystery tackled by educational researchers.*

Hamid Nadimi / June 1995,
Institute of Advanced Architectural Studies,
University of York

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42 Interestingly, there is a growing interest in 'apprenticeship' as a successful mode of learning even for the primary levels of education; so familiar a term in the context of architectural education. See for example Collins, A., Brown, J.S. & Newman, S.E. (1989): "Cognitive Apprenticeship: Teaching the Crafts of Reading, Writing, and Mathematics", in Resnick, L.B. (ed.)(1989): *Knowing, Learning, and Instruction,* Lawrence Erlbaum Associates Publishers, New Jersey, etc.

43 Donald Schon's arguments on 'design studio' and 'reflection-in-action'.

44 See Pressley (1995), in the Bibliography.

APPENDIX 5

EAAE Forum in Weimar, 1995

INTEGRITY, REALITY, AND ARCHITECTURAL EDUCATION

a) The perennial concern in architectural education is the relationship of given knowledge to design activity; to 'integrate' what, for academic convenience, has been 'disintegrated'. (Allen Cunningham, 1980)

b) The fragmentation of issues taught by different professionals, spread out in days and months. (Birgit Cold, 1994, Norway)[1]

c) Detachment of *design projets* and *theoretical courses*. (Latif Abolghasemy, 1995, Iran)[2]

d) "Almost every school of architecture today makes a basic curricular split between lectures and studios. In the lectures, it is assumed, students will first learn the general principles and fundamental bodies of knowledge which guide and inform all aspects of the designing activity. Later, in design studios, the students are expected to apply this universal information in order to solve a particular design problem.... The abstract principles offered in the lectures do not seem to be generating or shaping the students' architectural forms in the studios with any reliability." (Gelernter, 1988)

The first three statements spell out the very issue of curricular disintegration, elaborated in the last quote, as one of the main short comings of modern architectural education. It therefore follows that *Integration* is a key concept or an improved education for architects.

A review of the literature evidences a similar state of affairs voiced by several authors from different standpoints[3]. The short statement of Patrick Nuttgens which addresses a similar problem in education as a whole, is quoted here to lead to the main line of argument. He concedes: '... one of my basic conclusions is that the conventional form of our education... which presents the student first with the theory and then moves on to practical application if time allows, is in fact the inverse of the natural psychology of the learning process.' (Nuttgens, 1988, p.3).

A distinction should be made between architectural education and teaching other university disciplines. Architectural education unlike ordinary disciplines is not about to convey a body of knowledge and its objectives go beyond the transmittance of facts and principles[4], as is usually the case with university norms. Conversely, it is intended to lead to competence and creativity. '... learning is not enough, you have to *do* something' [5].

In the light of the above points, the relative problems facing architectural education is identified, in a general perspective, as referring to the areas of; 1) knowledge acquisition, and 2) knowledge application.

Having pointed at the problem of *disintegration* in architectural curricula, this paper mainly attempts to; i) review the theoretical aspects of its occurrence from a 'psychology of learning' perspective, and then ii) examine different avenues of thought, trying to offer solutions. It will conclude with a suggestive question leading to alternative solutions.

i) Review of theoretical aspects

The core of architectural education can be defined as; *teaching how to make workable decisions to shape the built environment, most notably the act of designing*[6]. With the above definition in mind, the act of learning here constitutes the acquisition of knowledge that, either explicitly or implicitly, contributes to physical intervention in the environment. Therefore, the *retention* and *availability* of the acquired knowledge, when coping with design problems, is of vital importance. This is what, technically speaking, is referred to as the *transfer* of learning; what constitutes the 'applicability' of the knowledge gained in one situation to other situations; in fact the final goal of all education. But what makes knowledge transferable?

Using the vocabulary of educational psychology, the problem areas of architectural education (stated earlier) can be associated with the concept of *meaningful and transferable learning*. To summarize, in order for a piece of information to be *transferable* it should be *meaningful*, and to be meaningful it should be *related* to the learner's *pre-existing knowledge pattern*. Meaningfulness of learning, though, is widely believed to be the outcome of *discovery learning*, which is acquired through the practice of solving problems. (See Wittrock, 1987).

Instruction, in this view, would be the provision of situations for the learner's rediscovery of principles through problem solving experiments, rather than attempting to teach them verbally. This obviously accentuates the merits of projects as a vehicle for studying even the theoretical contents of architectural courses.

In a similar line to the above, Carl Rogers holds that instruction , 'should not aim to transmit knowledge, which is quickly outmoded. Instead, instruction should aim at teaching the heuristic of discovery, by which knowledge is acquired. *Learning how to learn and how to change* are primarily goals of education.' (quoted from Wittrock, 1987).

Having taken the above position, the question here would be whether or not direct instruction, as in the case of 'lectures', is still valid. David Ausubel maintains that meaningful learning can also be achieved through 'reception learning', as well as through 'discovery learning'[7]. In his view, the necessary condition for new information to be learned meaningfully, is when it is '*relatable* to relevant concepts in the learner's cognitive structure' (quoted from Wittrock, 1987), which clearly conforms to the schema theory[8]. As Good & Brophy acknowledge (1977, p. 167), 'We store and retain only a fraction of all the available inputs. Apparently, our selection is based on *adaptational* and *motivational* factors'

Having information does not at all guarantee that one can bring it out and use it when appropriate. Therefore students must be taught how to use skills in diverse situations to which learning is expected to transfer. They should be exposed to *a variety of problem-solving experiences*[9].

The latter line of argument on the transferability of learning accentuates the validity of the plea for integrating theory and practice in architectural education. If facts and principles are taught through decision making situations they will be more likely to be retrieved when necessary. As Slavin(1991, p. 182) asserts, '... in teaching concepts, one way to increase the chance that the concepts will be appropriately *applied* to new situations is to give *examples* from a range of situations' (italics added). It must be noticed here that design situations can show the 'principles' in operation and thus lead to more applicable learning outcomes.

Another contributing notion to the present argument is that of 'motivation'. As stated earlier, the *motivational* factors underlie the selection of information to be stored and retained. Hence, the motivational value of curricular integration can be seen in due course, but only after defining what is meant here by motivation.

Cognitive theories emphasis *subjective perceptions*, such as *needs* and *interests*. Maslow classifies basic human needs into a hierarchy from physiological to rather more intellectual needs[10]. Need for knowledge, need for understanding and aesthetic needs are different levels of what is called in his hierarchy, 'being and growth motives'. They spring from within, are gentle and continuing, and *grow stronger when fulfilled* '.

With the above in mind, the motivational factor underlying the selection of to-be-retained information will be put in perspective. It can be argued, on this basis, that the learners select information which they *need* to know. Thus, their attitude towards information might act in a similar way to what was developed by David Ausubel as *advance organiser*[11] to help the learner to encode and make sense of information.
The above notion signifies one of the merits of curricular integration. If the theoretical subjects are closely related to the projects, so that students are given particular information only when they need it, then the act of selection, retention and meaningful learning is much more likely to happen. More significantly, as the facts and principles are absorbed in the course of their application they enhance the learners' ability to transfer and apply the acquired knowledge in future circumstances. As Slavin notes, 'Students need to know *why* they are learning what they are learning, as well as *what* they will be learning.' (1991, p. 198)

ii) Addressing the problem
Given that the stated problem can be mostly associated with the academic mode of education, some might argue that the very evolution of architectural education to a university discipline has been an unfortunate one. They hold that there are inherent contradictions between the attributes of the two modes of education. Therefore they would suggest a revival of the apprenticeship, and its more organised version, the pupillage system. In the latter, they would argue, the final product, which both education and practice are concerned with, ie. the design and construction of the building, is the focus of the whole process of teaching and learning.

Not many would question the validity of

learning through direct contact with a master at work - somewhat analogous to learning a language through direct exposure to native speakers. As in language training, in an apprenticeship system, competence is achieved through frequent imitating of a procedure; starting from simple tasks up to the most sophisticated ones towards the final totality, be it 'building' or 'design decisions'.

Taking the above position, the question is, if the old system of training architects did work so wonderfully, what then was the point of shifting education to the universities? Some argue that apprenticeship works well when architecture is in a 'good condition'[12], which is not always the case today. This sounds likely but the term 'good condition' needs to be defined more closely.

In traditional and pre-industrial societies, where the boom in urbanisation was not critical, the limited volume of construction activity allowed the rather randomly organised process of training architects to meet the needs of 'building guilds', as well as those of the society at large. More importantly, architecture enjoyed well established and accepted principles and paradigms, which left little other than learning how to do it. This was the case with the Gothic period or as Broadbent (1983) holds, with Islamic architecture where the art of building had acquired a high degree of perfection.

But is it possible to subscribe to the same model in the present situation? There is no one answer to this question. But two points are self evident: first, the complexity of building techniques, the introduction of new materials and industrialised systems and more importantly complicated socio-cultural variables are factors which make research inevitable to professional practice. Second, there is the lack of a dominant culture to accommodate architecture as a cultural commitment. This is manifested in the expression of hesitations, uncertainty and a common sense of 'value crisis' among some academics and practitioners, who are keen to make value-laden decisions rather than ad hoc ones. These and many more are the 'real' issues which need to be contemplated in a value-oriented atmosphere, less likely to be available through 'pupillage' in business-oriented practices.

By those who accept academia as the proper setting for architectural education, some attempts are being made and proposals put forward to enhance the level of integration in the structure and curriculum of courses. Such developments, to be enumerated here, are the *case problem approach*, for teaching contextual subjects through putting students in the position of 'real' decision- makers (Marmot and Symes, 1983, 1985; Joroff and Moore, 1984), or the proposal for *experimental integrated education* that involves all staff and students in a comprehensive design/learning situation (Teymur, 1979). Others are the *platform-based* structure of the curriculum, suggested as a substitute for today's subject-based one to organize the curriculum elements in purposeful groups with vertical co-ordination (Quantrill, 1984), and the *interest groups* structure to allow students to decide what and when to learn (Cunningham, 1980).

The above proposals, having taken the curricular disintegration as problematic, try to find solutions within the confines of academia. Along with these, there are other contributions which build on the assumption that both academic and apprenticeship modes of education should contribute to educating architects. But since these alternatives view the two modes of education as controversial, they suggest an amalgamation of the two, occurring in separate time sequences. Le Corbusier's *reform* proposal and the UK system of architectural education are two instances of the above approach.

Le Corbusier's *reform* proposes to 'teach technical subjects in schools but let students learn design by working in an architectural firm of their choice. This system, in his view, is 'none other than the traditional workshop of former times. It connects us with that era prior to the institution of architectural schooling, which produced real architecture.' (Guiton, ed., 1981). The same idea is elaborated by Crinson & Lubbock (1994, p. 48) when they write, 'Indeed... a well-organised office [acts] as a kind of nursery of talent'.

The present system in the UK schools of architecture is an alternative instance of the above amalgamation. After an introductory first-year course and two years of design projects and lectures, students spend a year out in an architectural practice followed by a further two years of study leading to a Diploma in architecture (RIBA Part II).

Either in Corbusier's proposed reform or in the British system, the incompatible cultures of practice and academia are taken as given, so it is the student who is expected to live both cultures separately within time intervals of different length, and ultimately integrate what he gains from those cultures.

Concluding remarks
Underlying the present argument, the suggestive question as to whether the dichotomous controversy of the two cultures, *academia* and *practice,* should ever be taken as given.

Neither 'academia' nor 'business practice' has proved to offer a comprehensive model for architectural education. There seems to be a vital need for an alternative institution, free of either bias toward abstraction (as the major attribute of academia) and/or pragmatism (as the characteristics of professional practice). That hypothetical institution is what might be designated here as *academic practice.*

Academic practice acts (or should act) analogously as the *master* in the apprenticeship system, but at the scale of an institution rather than an individual. The simple logic behind this lies in the very broadening dimensions of the required knowledge for taking design decisions in the sense of patterning the built environment.

There are several experimental schemes which can be referred to as being in line with the above goal. The idea of a *practice arm* for schools (Dittmar, 1984) is among the most promising ones. It is reminiscent of 'school practices' established and run in a number of UK schools of architecture during the 60s. and 70s., although unable to survive in the 80s. In his response to the author's recent enquiry, Stuart Sutcliffe[13] reports three such enterprises. He observes the recessions of the 80s. as the main problem underlying their failure to survive.

Albeit the practice arm (school practice) can serve as a step towards the realization of the proposed *academic practice*, they must be differentiated in a number of attributes: Firstly, *school practice* is an appendix to education, providing a chosen few students with working opportunities. *Academic practice*, on the other hand, is suggested as an integral part of education and rather as an educational institution having at the same time professional commitment. Secondly, school practice is bound to compete in the market for obtaining commissions, while *academic practice,* like other educational institutions, is subject to state support and investment. There is a constructive interchange of resources and opportunities between education and practice under one organization. Finally, in *academic practice*, as an educational enterprise, each project is planned to generate several sub-projects and case studies to suit students of different levels. Whereas the competitive atmosphere of the profession would not allow the school practice to invest time on these matters, and thus the students' involvement is minimized to minor jobs, to let the project follow its pre-planned time schedule.

The realization of such an ideal as *academic practice* calls for fundamental decisions within academic, professional and government circles and more importantly an 'action plan', which is clearly beyond the purpose of the present paper. But it can be suggested here that the movement should begin both from the practice and academic sides, until the final integration of the two cultures is realized in an alternative institution, whose vision is neither purely intellectual nor exclusively pragmatic.

Leading to that goal, a single supervising body, *unbiased towards either side*, should preferably look after both schools and offices; conduct qualification examinations; accredit those practices which intend and qualify to have educational commitment; and help the existing schools to administer competence of playing practical roles in the course of shaping the built environment by increasing the involvement of their staff and students in practice.

It might be argued, here, that even if projects are undertaken by the proposed academic practice, the very educational nature of the institution involves a longer period of time necessary for implementation of the project, which might go beyond the clients' expectations in a way that they might preferto use more conventioal professional practices instead. The point to be made here is that a great proportion of development projects involving construction activities are still originated, in one way or another, by or through the State - more noticeably in developing countries. These projects may best be implemented through *academic* practice, far better than any commercial body.

What this proposal implies, in short, is that the true remedy to the present dilemmas of curricular disintegration is partly dependent on the social/professional fabric that accommodates architectural education. What was offered here, is meant to serve as a stimulus for fundamental thought and discussion, without which the theory-practice dichotomy seems to be more resistant to a solution through partial remedies.

Although it appears to be a long and painstaking process - as no shortcuts seem possible, a citation of Euclid's wise answer to his king gives telling advice on this point: 'Euclid, the ancient Greek mathematician who wrote the first geometry text book, was asked by the king if there were any shortcuts he could use to learn geometry, since he was a very busy man. *I am sorry*, Euclid replied, *but there is no royal road to geometry*.'[14]

... architectural education is similarly placed.

The author shares the realization of this paper with Charles Cockburn for his comments and encouragement.

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ENDNOTES:

1. In her response to the author's inquiry letter about the major attributes and problems of architectural education. (She is Professor of Architecture, University of Trondheim).

2. In his response to the author's inquiry letter. (He is Assistant Professor of Architecture, Tehran University.)

3. See for example, Gelernter 1988; Schon 1988; Gulzar Haider 1957; Fethi, et al. 1993; Dittmar 1984.

4. This is, of course, the common trend in nearly all schoolsb of architecture, albeit alternative cases also exist (e.g., 'Bartlett' school of architecture in UK), which focus on 'education' as distinct from 'training' and therefore reject "design" activities as being central.

5. Patrick Nuttgens (1994); in his response to the author's enquiry letter of September 1994.

6. *Design activity* should be interpreted in its broad scope of *shaping the built environment,* throughout this paper. The author owes this necessary emphasis to Martin Symes; his letter of 22 May 1995.

7. In discovery learning, 'the essence of learning is not given but must be derived by the learner', whereas in reception learning, 'the essentials to be learned are given or are taught directly to the learner'. (Wittrock, 1987).

8. The most important principle of schema theory is that information that fits into an existing schema is more easily understood, learned, and retained than information that does not fit into an existing schema.' (in Slavin, 1991, p. 164).

9. In his reflection on a draft of this paper, Stuart Sutcliffe (see endnote 13) suggested to take architecture as 'a creative response to the interaction of social needs and physical settings', rather than *solutions to problems.*

10. Maslow's hierarchy of needs as modified by Root (1970) is quoted here from Gage & Berliner, 1992, p. 333.

11. For Ausubel's *advance organizer,* see Slavin, 1991, p. 167; Gage & Berliner, 1992, p. 282. For further developments of the concept, see Pressley 1995, p. 311.

12. Broadbent, 15 February 1995, Workshop on Architectural Education, IAAS, York.

13. Stuart Sutcliffe was until recently the Assistant Director of the Institute of Advanced Architectural Studies.

14. In Slavin, 1991, P. 337.

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Professor Charles MacCallum
Department of Architecture
Glasgow School of Art
Glasgow University
177 Renfrew Street
GLASGOW G3 6RQ

Christopher Jones Esq
School of Architecture
University of Humberside
Strand Close
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Douglas Wall Esq
Department of Architecture
Liverpool John Moores University
98 Mount Pleasant
LIVERPOOL L3 5UZ

Mohsen Mostafavi
Architectural Association
School of Architecture
34 - 36 Bedford Square
LONDON WC1B 3ES

Professor Peter Jacob
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Kingston University
Knights Park, KINGSTON upon THAMES
SURREY KT1 2QJ

Professor John Worthington
Institute of Advanced Architectural Studies
University of York
The King's Manor
YORK YO1 2EP

REPUBLIC OF IRELAND

Professor Cathal O'Neill
School of Architecture
University College Dublin
Richview, Clonskeagh
DUBLIN 14, REPUBLIC OF IRELAND

NON-EUROPEAN SCHOOLS

PAKISTAN

Mr. Naeem Irfan
Chairman, Department of Architecture
Mehran University of Engineering and Technology
JAMSHORO, SIND, PAKISTAN

Mr. Tanveer Hassan
Head, Architecture Department
National College of Arts
LAHORE, PAKISTAN

Mrs. Sahida Vandal
Principal National College of Arts
Shahrah-e Quaid-e-Azam
LAHORE, PAKISTAN

Mrs. Noor Jehan Bilgrami
Indus Valley School of Art & Architecture
ST-33, Block 2, Scheme-5, Clifton
KARACHI-75600, PAKISTAN

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Professor Dr Ibrahim Wahab
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University Sains Malaysia (USM)
11800 PULAU PINANG, MALAYSIA
Fax: 04-6576523

Professor Azman Awang
Dean, Faculty of Built Environment
Universiti Teknologi Malaysia (UTM)
Karung Berkunce 791
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7-3-1 Hongo
Tokyo 113, Japan
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Waseda University
School of Architecture
1-6-1 Nishi Waseda
Shinjuku-ku
Tokyo 160, Japan
Tel: 03 203 4141

Meiji University
School of Architecture
1-1 Surugadai
Kanda
Chiyoda-ku
Tokyo 101, Japan
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JORDAN

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TURKEY
(not in EAAE list)

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Mimar Sinan Universitesi
80040 Findikli
ISTANBUL, TURKEY

Mimarlik Fakultesi
Ortadogu Teknik Universitesi
ANKARA, TURKEY

EGYPT

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Faculty of Engineering
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ASSIUT, EGYPT

Professor Dr A. Mounir
Department of Architecture
Faculty of Engineering
University of Alexandria
ALEXANDRIA, EGYPT

Professor Dr Ahmed Aziz Kamal
Faculty of Engineering
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Faculty of Engineering
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ISLAMIC REPUBLIC OF IRAN

updated 2 August 1995

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Mr. Raisie Samiei
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APPENDIX 7

September 1994

I am carrying out a survey of architectural education as part of a PhD research project. My aim is to study the relationships between major components of the architectural curriculum. I have broken down the curriculum components into the following three broad areas:

1. Design Activities (**D**):
Courses which are intended to enhance students' design abilities and communication skills fall in this category. They include *Foundation Course, Design Process and methods, Architectural Design Project, Graphic Representation, Drawing, Photography, CAAD Project, Briefing,* and *Programming.*

2. Science & Technology (**S**):
Courses such as *Construction and Materials, Architectural Structures, Light and Colour, Building Services, Acoustics, Architectural Technology,* and *Environmental Control.*

3. Humanities (**H**):
This area covers such courses as *History of Architecture, Theory of Architecture, Urban Studies, Landscape Architecture, Town Planning, Social Studies, Architectural Psychology, Cultural Studies, Research Process and Methods, Archeological Studies,* and *Practice and Client Management.*

You have been selected as a specialist in one of these fields at your University. Please could you fill in the enclosed questionnaire and kindly return it to me by the end of September.

A short report of the main findings will be sent to you.

Thank you in advance for your contribution.

Yours sincerely

Hamid Nadimi

Institute of Advanced Architectural Studies,
University of York,
The King' s Manor, York, YO1 2EP, UK.
Fax. 0904 433949

1. **Name:** (Please write in) ....

2. **Job title:** (Please write in) ....

3. **Qualifications:** (your specialist area by training) ....

COURSE DESCRIPTION:
Please describe in this questionnaire the course for which you are primarily responsible. I am interested in how courses operate as entities in themselves and their connections to other courses.

4. **Course title:** (Please write the full title) ....

5. **Area.**
For the course named in question 4, which area does it primarily fall into?
(Please tick. For definition of areas see front page)

Design Activities (D)		Science & Technology (S)		Humanities (H)	

6. **Content / Synopsis.**
Please list below all the *subjects* tackled: (If any of these *subjects* are designed to relate to other areas, please write the corresponding initial(s) - ***D***, ***S***, or ***H*** - in the brackets)

subjects tackled **Area initials**
6.1 .... [ ]
6.2 .... [ ]
6.3 .... [ ]
6.4 .... [ ]
6.5 .... [ ]
6.6 .... [ ]
6.7 .... [ ]
6.8 .... [ ]
6.9 .... [ ]
6.10 .... [ ]

7. **Goals and Objectives.**
Please list below, up to three major goals and objectives of the course named in question 4, in their order of importance:
(If any of the goals is meant to relate your area to the other areas - ***D***, ***S***, or ***H*** - please write the initials of the corresponding area in the square brackets)

Area initials
7.1 .... [ ]
7.2 .... [ ]
7.3 .... [ ]

8. Process and Methods. What methods do you apply in your teaching ? (Please tick)
If any of the methods is meant to relate your area with the other areas - ***D, S,*** or ***H*** - please write the initial(s) of the corresponding area next to the tick box.

A short definition of each method is given below. Perhaps it is better to speak about elements of teaching methods, because in practice all sorts of combinations occur.

Method	Definition	TICK	Area initial(s)
8.1.Lecture:	▸ The subject matter is presented orally to a group of students, covering either all the topics or only selected topics commented by the teacher. It might be performed as group discussion sessions on pre-studied subjects.	8.1	
8.2. Reading:	▸ Literature (books, articles, monographs, documents) is studied, either passively or actively, accompanied by exercises independently made.	8.2	
8.3. Exercises:	▸ Series of practical exercises, designed and programmed by teacher, executed either individually or in groups.	8.3	
8.4.Practical experience:	▸ Professional apprenticeship. Supervised participation in professional and/or scientific work. Observation of a real life situation.	8.4	
8.5.Independent work:	▸ Oral or written presentation followed by discussion. Research report including designs and drawings.	8.5	
8.6.Tests:	▸ Oral or written examination. Evaluation of process of work as well as the product, eg. report, design, etc.	8.6	
8.7.Other methods:	▸	8.7	
8.8.Other methods:	▸	8.8	

Quite a number of names of teaching methods are used in educational circles, which do not occur above. Most of these can be translated into one or more of the types mentioned above. Still, in case an important category has been overlooked, there is no objection to adding categories to the classification.
(If you added other methods, please give a short definition)

This section intends to examine the relationship between your area and the other areas of the curriculum. 'Relationship' is defined by three items in three questions (questions 1, 2 and 3 in the table below).

Please answer each question by ticking the rating scales opposite to each question.

As the questionnaire is designed to cover all the areas, you will have to ignore the column which identifies your own area and put your answers under the other two columns.

Rating Scale items:
I NEVER
II SELDOM
III SOMETIMES
IV OFTEN
V ALWAYS

	ITEMS OF RELATIONSHIP	area (D)	area (S)	area (H)
1	How often do you have Joint sessions with tutors or lecturers of the other two areas to co-ordinate the synopses or assess the results of your courses?	*I*	*I*	*I*
		II	*II*	*II*
		III	*III*	*III*
		IV	*IV*	*IV*
		V	*V*	*V*
2	How often do you address the other two areas in your teaching process (such as in examples and experiments, case studies, etc.?	*I*	*I*	*I*
		II	*II*	*II*
		III	*III*	*III*
		IV	*IV*	*IV*
		V	*V*	*V*
3	How often do you implement joint projects and/or joint programs with the other areas?	*I*	*I*	*I*
		II	*II*	*II*
		III	*III*	*III*
		IV	*IV*	*IV*
		V	*V*	*V*

APPENDIX 8

IN THE NAME OF GOD

Dear study fellow

We congratulate your admission to the architecture course.

The following questions are part of a survey in line with planning for architectural education, the discipline you have succeeded to be admitted to. These questions are designed only to get your opinion of the points raised and thus there are no *right* or *wrong* answers to them. Therefore, try to response drawing upon *your own views and interpretations.*

1. In your opinion, what are the main competencies of an architect?

2. Please tick the way(s) you came to know about architecture, leading to your applying for it.

    a. through relatives or acquaintances who are in this field (please mention the cases if possible).
    b. reading books or articles on architecture (please mention the cases if possible).
    c. preparatory entrance-exam courses (please mention the duration).
    d. working in architectural offices (please mention the type and duration of work if possible).
    e. working in construction sites (please mention the type and duration of work, if possible).
    f. watching TV programmes dealing with architecture.
    g. other ways (please mention).

3. If you were to determine, with complete freedom, changes in the *architecture* of the very room you are sitting in, to make it more comfortable and correct, what would you wish to change?
    a.
    b.
    c.

4. What would you usually do during your leisure times and holidays in your school years? (please mention three items in order of your preference).
    a.
    b.
    c.

5. If you were allowed to change your discipline, what other course(s) would you prefer to transfer to? (please mention three cases in order of your preference).

6. In which city did you attend your secondary education?

Please mention your name only if you do not mind.

APPENDIX 9

The six-year programme of the Masters course in Architecture,
School of Fine Arts, Bulletin (SFA, 1992-93)[45]
University of Tehran

Year One, 1st Semester	**units**	**Year One, 2nd Semester**	**units**
Geometry I	2	Geometry II	2
Composition[46] I	6	Composition II	6
Mathematics I	2	Man, Nature, and Architecture I	3
Foreign Language I	*2*	Mathematics II	2
Islamic Ethics	*2*	*Foreign Language*	*2*
Physical Education	*1*	*Islamic Education I*	*2*
Total	**15**	*Physical Education II*	*1*
		Total	**18**
Year Two, 1st Semester	**units**	**Year Two, 2nd Semester**	**units**
Geometry III	2	Architectural Design I	5
Composition III	6	Structures II	2
Man, Nature, and Architecture II	3	Building Materials	2
Structures I	2	Environmental Control of Buildings I	2
Surveying	2	Islamic Architecture I	3
Farsi I	*2*	*Farsi II*	*2*
Islamic Ethics II	*1*	*Islamic Education II*	*2*
Total	**18**	Total	**18**
Year Three, 1st Semester	**units**	**Year Three, 2nd Semester**	**units**
Architectural Design II	5	Architectural Design III	5
Structures III	2	Village I	3
Building Construction I	2	Architectural Theory	3
Environmental Control of Buildings II	2	Structures IV	2
Islamic Architecture	3	Building Construction II	2
Computer Programming	2	Environmental Control of Buildings III	2
History of Islam	*2*	*Origins of the Islamic Revolution*	*2*
Total	**18**	Total	**19**
Year Four, 1st Semester	**units**	**Year Four, 2nd Semester**	**units**
Architectural Design IV	5	Architectural Design V	5
Village II	3	Construction Practice Management	2
Structures V	2	Building Technology Design II	3
Building Technology Design I	3	Industrial Production Methods	2
World Architecture	2	Contemporary Architecture	2
Islamic Texts	*2*	Research Methods	2
	Total **17**	Professional Language	2
		Total	**18**
Year Five, 1st Semester	**units**	**Year Five, 2nd Semester**	**units**
Architectural Design VI	5	Architectural Design VII	5
Estimates	2	Preservation Design	3
Building Technology Design III	3	Design Principles of Residential Communities I	2
Preservation and Revitalization Theories	2	History of Urbanism	2
Principles of Urban Planning Theories	2	Total	**12**
Total	**14**		
Year Six, 1st Semester	**units**	**Year Six, 2nd Semester**	**units**
Architectural Design VIII	5	Thesis	6-8
Philosophy of Islamic Art	2	Residential Community Design II	3
Design Principles of Residential Communities II	2	Total	**9-11**
Residential Community Design I	3		
Total	**12**		

45 In this citation, course codes are removed, and the *General Courses* are specified with italics.

46 *Synthesis* seems to be a better translation for the original title of this course (*Tarkeeb*).

APPENDIX 10

SCHOOL PROFILES

1

DEPARTMENT OF ARCHITECTURE AND URBAN PLANNING & DESIGN **SCHOOL OF FINE ARTS / UNIVERSITY OF TEHRAN** *GOROOH-E MEMARI VA SHAHRSAZI / DANESHKADE-YE HONARHA-YE ZIBA DANESHGAH-E TEHRAN* ENGHELAB AVENUE, TEHRAN, ISLAMIC REPUBLIC OF IRAN, TEL: 7454052			
ESTABLISHED	1940	NUMBER OF STUDENTS	650
AVERAGE ANNUAL INTAKE (1989-1995)	60	AVERAGE ANNUAL GRADUATES (1989-1994)	49
NUMBER & AREA OF DESIGN STUDIOS	5 x 450m^2	NUMBER & AREA OF BUILDING MATERIALS WORKSHOPS	1 x 200m^2
STAFF/STUDENT RATIO IN DESIGN STUDIOS	1 / 11	EACH YEAR IN ONE STUDIO / ALL YEARS MIXED	all years mixed
COMPUTING FACILITIES	15 PCs available	SCHOOL PERIODICAL	Fine Arts Magazine
Full time STAFF: 1 Professor, 5 Associate Professors, 4 Assistant Professors, 20 Lecturers. Part time STAFF: 33		PARTICULARITIES : The first school of architecture in the country. Architecture, visual arts, and performing arts together.	

2

SCHOOL OF ARCHITECTURE AND URBAN PLANNING & DESIGN / **SHAHID BEHESHTY UNIVERSITY** *DANESHKADE-YE MEMARI VA SHAHRSAZI* / DANESHGAH-E SHAHID BEHESHTY EVIN, TEHRAN, ISLAMIC REPUBLIC OF IRAN, Fax: + 2040440			
ESTABLISHED	1960	NUMBER OF STUDENTS	680 + 92 ^{UP} + 42^{UD}
AVERAGE ANNUAL INTAKE (1989-1995)	52	AVERAGE ANNUAL GRADUATES (1989-1994)	50
NUMBER & AREA OF DESIGN STUDIOS	5 X 200 m^2, 3 X 100 m^2 3 X 150 m^2 (Urban P/D)	NUMBER & AREA OF BUILDING MATERIALS WORKSHOPS	concrete workshop 150m^2
STAFF/STUDENT RATIO IN DESIGN STUDIOS	1 / 15	EACH YEAR IN ONE STUDIO / ALL YEARS MIXED IN STUDIOS	each year in one studio
COMPUTING FACILITIES	12 PCs to be available	SCHOOL PERIODICAL	*Soffeh* (quarterly issued from 1991)
Full time STAFF: 6 Associate Professors, 11 Assistant Professors, 31 Lecturers On contract: 3		PARTICULARITIES : The teaching staff have played an influential role in the Planning Committees at the Ministerial level. The national curricula is best followed.	

UP = Urban Planning, UD = Urban Design

3

SCHOOL OF ARCHITECTURE AND URBAN PLANNING & DESIGN / UNIVERSITY OF SCIENCE AND TECHNOLOGY *DANESHKADE-YE MEMARI VA SHAHRSAZI / DANESHGAH-E ELM-O-SANAT* NARMAK, FARJAME SHARGHI, TEHRAN, ISLAMIC REPUBLIC OF IRAN, TEL: 7454052			
ESTABLISHED	1968	NUMBER OF STUDENTS	580
AVERAGE ANNUAL INTAKE (1989-1995)	57	AVERAGE ANNUAL GRADUATES (1989-1994)	38
NUMBER & AREA OF DESIGN STUDIOS	10	NUMBER & AREA OF BUILDING MATERIALS WORKSHOPS	3 X 200m^2: carpentry, ceramics,construction
STAFF/STUDENT RATIO IN DESIGN STUDIOS	1 / 15	EACH YEAR IN ONE STUDIO / ALL YEARS MIXED IN STUDIOS	all years mixed
COMPUTING FACILITIES	1 computer cite, 200 m^2	SCHOOL PERIODICAL	none
Full time STAFF: 7 Assistant Professors, 16 Lecturer Part time STAFF: 27, On contract: 2		PARTICULARITIES : Located in an engineering university, the technical aspects of architectural education is elaborated.	

4

DEPARTMENT OF ARCHITECTURE / SCHOOL OF ART AND ARCHITECTURE/ UNIVERSITY OF YAZD GOROOH-E MEMARI / DANESHKADE-YE HONAR VA MEMARI / DANESHGAH-E YAZD IMAM AVE., KOOYE SAHN BEN ALI, YAZD, IRAN, TEL: + 28229, FAX: + 248089			
ESTABLISHED	1989	NUMBER OF STUDENTS	260
AVERAGE ANNUAL INTAKE (1990-1995)	36	AVERAGE ANNUAL GRADUATES (1990-1994)	first graduates this year
NUMBER & AREA OF DESIGN STUDIOS	6 x 35 m^2	NUMBER & AREA OF BUILDING MATERIALS WORKSHOPS	1 x 50 m^2
STAFF/STUDENT RATIO IN DESIGN STUDIOS	1 / 15	EACH YEAR IN ONE STUDIO / ALL YEARS MIXED IN STUDIOS	each year in one studio
COMPUTING FACILITIES	3 PCs available	SCHOOL PERIODICAL	none
Full time STAFF: 12 lecturers Part time STAFF: 10, On contract: 4		PARTICULARITIES : Accommodated in a traditional housing complex in the old fabric of the city of Yazd.	

5

DEPARTMENT OF ARCHITECTURE / DANESHGAHE BEINOLMELALIE GHAZVIN
Noorabad Road, University Boulevard, P.O. Box: 288, GHAZVIN, ISLAMIC REPUBLIC OF IRAN, Tel: + 34099

6

DEPARTMENT OF ARCHITECTURE / ISFAHAN FACULTY OF ART / UNIVERSITY OF ART *GOROOH-E MEMARI / DANESHKADE-YE HONAR-E ISFAHAN (PARDIS) DANESHGAH-E HONAR* P.O.Box: 1744, ISFAHAN, ISLAMIC REPUBLIC OF IRAN. Fax: + 248089			
ESTABLISHED	1990	NUMBER OF STUDENTS	140
AVERAGE ANNUAL INTAKE (1990-1995)	24	AVERAGE ANNUAL GRADUATES (1990-1994)	first graduates 1996
NUMBER & AREA OF DESIGN STUDIOS	2 x 200 m^2	NUMBER & AREA OF BUILDING MATERIALS WORKSHOPS	none
STAFF/STUDENT RATIO IN DESIGN STUDIOS	1 / 17-20	EACH YEAR IN ONE STUDIO / ALL YEARS MIXED IN STUDIOS	all years mixed
COMPUTING FACILITIES	6 PCs available	SCHOOL PERIODICAL	to be published
Full time STAFF: 7		PARTICULARITIES : Accommodated in a refurbished traditional building in Isfahan. The tendency of school is to study conservation (both of objects and buildings).	

7

DEPARTMENT OF ARCHITECTURE / ISLAMIC AZAD UNIVERSITY *GOROOH-E MEMARI / DANESHGAH-E AZAD-E ESLAMI* No. 995, Enghelab Ave., TEHRAN, ISLAMIC REPUBLEC OF IRAN, Tel: 6407192			
ESTABLISHED	1989	NUMBER OF STUDENTS	
AVERAGE ANNUAL INTAKE (1989-1995)	96	AVERAGE ANNUAL GRADUATES (1990-1994)	first graduates 1996
NUMBER & AREA OF DESIGN STUDIOS	600 m^2	NUMBER & AREA OF BUILDING MATERIALS WORKSHOPS	none
STAFF/STUDENT RATIO IN DESIGN STUDIOS	1 / 18	EACH YEAR IN ONE STUDIO / ALL YEARS MIXED IN STUDIOS	separate
COMPUTING FACILITIES	none	SCHOOL PERIODICAL	three bulletins
Full time STAFF: 8		PARTICULARITIES : Not dependent on the state budget, Azad University enjoys more flexibility in student intake. It is staffed, in large, by the visiting faculty.	

8

SCHOOL OF ARCHITECTURE / DANESHGAHE GILAN Kilometer 12, Rasht-Tehran Road, RASHT, ISLAMIC REPUBLIC OF IRAN, Tel: + 60272-9

The data about two Schools, in *GILAN* (8) and *GHAZVIN* (5), was not made available in time.

APPENDIX 11

INTERVIEW PROFORMA

The discipline of Educational Psychology has been consulted to conceptualize a framework for architectural education. The initial problem addressed in the study, has been the perennial disintegration of taught courses and design projects which seems to have been associated with the academic architectural education.

What follows is a set of guidelines proposed within the above scope of study. These are to serve as stimuli for discussion to feed more input in the study.

A review of the theories of learning and transfer followed by a study of aspects of integration in architectural education underlie these guidelines. Some of these propositions might be already existing here and there, but it is intended to bring these lines in a system of thought based on the above mentioned theories. The corresponding theories to each guideline will be pointed out in case required.

To test the validity of these concepts, a *peer review* technique is being employed. To fulfil this task a number of interviews is implemented with a cross-cultural group of top decision makers and thinkers both in the UK and in Iran. The criteria for selecting the interviewees have been their influential commitment and experience in policy making, writing, or course leading in the field of architectural education.

Please discuss the following thoughts drawing upon your own experience of the subject matter.

1. Advance organizer period

Learning, by nature, is *organized, schema-driven,* and *knowledge-dependent.* The advance organizer period aims to provide architecture students with a general perspective of the subject matter of education, i.e., *architecture.* This mental picture of architecture will help students to organize the to be taught subjects by creating the necessary mental structures and developing a need for learning those subjects. This will lead to students' making sense of what they learn afterwards.

Study tours, site visits, surveying, free hand drawing, photography, visual note taking from traditional as well as contemporary architecture, are among the familiar vehicles employed in this period. There are also quick sketches, comprehensive design projects on topics such as rural architecture (where all aspects of architectural design are present but in an unsophisticated way), and in particular, practical experiments with building materials and simple structures.

What differentiates the *advance organizer* period from the so-named *foundation course*, is its emphasis on the students' direct encounter with the reality of architecture, contrasted to the abstract concepts of form, material and space which are conventionally dealt with in foundation courses.

The *advance organizer* model works in a variety of scales. In the classroom teaching scale, where the theory has originally emerged, it appears as a figure, a matrix, or a pre-designed question and answer. In a 5-6 year course in architecture, though, it might take a whole term or even one year to establish the *advance organizer.* The whole architectural course, in this sense, acts as an *advance organizer* to the lifelong continuing professional education of graduate architects.

2. Multiple examples and experiences

Learning is *situated* or in other words, *context-dependent.* In order for learning outcome to be decontextualized and better transferred to future diverse situations, experience of multiple examples is vital. The core meaning of an issue is best revealed when it is seen in diverse situations.

Given the limited time duration available in an architectural course, multiple experience is only attainable through short term case problem projects as well as short sketch projects, or *esquisses*.

3. Learning through episodes
Learning is based on four types of memory structures; propositional memory, procedural memory, images, and episodes. Transfer of learning is more likely to occur through the formation of integrated memory structures, i.e., learning simultaneously through verbal instructions, knowledge of procedures and strategies, images, and episodes or personal experiences. Episodic memory is the most effective of all, since it embodies memories of images and procedures as well. It follows that more emphasis should be put on the *project method of instruction*, where learners' commitment is at the centre of learning procedure.

***4.* Comprehensive design projects**
In order to facilitate the timely transfer of taught material to application circumstances, design projects are suggested to be comprehensive and thus cover different aspects of design requirements. Sufficient time for design projects and a multi-disciplinary tutorial are among the prerequisites to meet the above end. Comprehensive projects aim, as much as possible, to draw on real conditions and resources and also real expectations. Reality, by nature, is multi-lateral and it leads architectural solutions to address all aspects of design from programming to working details.

5. Real life professional situations
Case problem projects and working in institutions such as school practices are among ways of putting students in real decision-making situations. School practice or other institutions of similar function, help to integrate education and profession. Therefore, such opportunities should be developed to be able to provide all students with a period of close encounter with reality. Case problem projects, on the other hand, try to facilitate decision-making exercises by *simulating* real situations. Design commissions for school practices will, in turn, function as good resources at hand for designing and developing case problem projects.

6. Competence-based education
Architectural education is not merely about increasing the knowledge of facts and principles. It is also about developing a level of competence (both practical and intellectual) to make decisions in terms of patterning the built environment. There are a number of *core competencies* that could determine the direction and content of the curriculum components. Those are competence in a) identification of needs and requirements, b) creative designing, c) communication, d) management of material and human resources (technical sciences and humanities), and last but not the least, e) understanding of and making value judgements about architecture and architectural concepts.

Each component of the curriculum should orientate to enhance one or more of those competencies. To meet that end, learning should occur through learners' active participation in manipulating the given knowledge and skills in decision making situations. This is made possible by projects and exercises around the competencies aimed at by each component.

Project method of instruction, in this sphere, will bridge between taught courses and design projects. The learner's activity, here, would be the decisive factor.

7. Academic apprenticeship
Education for competence, learning through personal experience, and project method of instruction lead to what can be designated as *academic apprenticeship.* As a mode of learning, academic apprenticeship brings the properties of apprenticeship, i.e., observation, personal experience, coaching, and approximation (to expertise), to bear upon the higher levels of education for creativity and competence. In this mode of education, the student's mind is central, while the teacher/tutor also plays a vital role in scaffolding the student 's progress and *approximation.*