ARCHITECTURAL EDUCATION: PEER CULTURE IN DESIGN STUDIO AND ITS RELATIONSHIP WITH DESIGNING INTEREST

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A thesis submitted for the requirements of the degree of
Doctor of Philosophy

The University of Sheffield
School of Architecture

January 2008

'In the name of the Almighty, the most compassionate and the most merciful'

In the loving memory
of my beloved mother

Acknowledgements

I am grateful to the Almighty for giving me the opportunity to accomplish the challenging task of completing this thesis. It was a long and winding journey filled with difficult and enlightening moments. In the beginning, it was emotionally demanding. I had to endure the shocking news of losing my beloved mother who passed away in the early stages of my research study. Nevertheless, I am thankful for her unseen prayers which have been answered with the completion of this thesis.

The guidance of my supervisor, Professor Lawson, whom I respect for his dedication, resourcefulness and critical thinking, has played a significant role throughout the progress of this research. His valuable insights, as well as his patience and thoughtfulness, have given me inspirations, encouragements and the motivation to work with a critical mind and positive attitude.

My beloved wife, Salina and children, Amir, Azfar and Amirah have been consistently very thoughtful and supportive throughout my research work. They were willing to sacrifice their needs for my love, affection and commitment while I was juggling my responsibilities as a husband, father and research student. Their love and patience gave me additional psychological strength to face this arduous task.

Research peers have also contributed constructive ideas and comments on this thesis. Discussing and sharing research ideas with Masran, Khairul, Xin, Paramita, Alex, Garuth, Hazri, Shahruddin, Kamil, Razani, Azari, Rokshaid and Mustafa helped with my confidence to make progress in my research.

The students and staffs (both academic and support) in the Architecture and Engineering Department of the University of Sheffield were very generous and cooperative throughout the entire period of my research study. They provided a pleasant and friendly academic atmosphere.

Finally, my appreciation goes to the recommendation made by University Technology MARA and the funding from the Malaysian Government that have made it possible for me to pursue this research study in the first place.

Abstract

Architectural design studio is an active educational site: it is not only to be defined as a visible space: it is also a way of thinking and learning. Within its physical and virtual qualities, there seems to be the presence of unique peer cultural signifying practices that are influential to the learning and social process of the design students. Nevertheless, there is a lack of knowledge concerning this intriguing and invisible phenomenon. As a result, there are several concerns on the possible negative impacts of such culture in the design studio. It seems to create a hidden conflict which manifests into inequalities and miscommunication among learners and tutors in the process of learning and disseminating architectural knowledge.

Naturally, in the form of tangible and intangible manifesting elements (e.g. symbols, norms, values), culture plays an important role in various communities or groups of people (e.g. peers, organizations). It provides a sense of belonging and sharing among people through interpersonal relationship. In other words, culture is considered as a potential ground for the purpose of human socialisation and development process. However, a culture may transform into positive or negative due to the way people in a particular group play their roles, constructively or unconstructively. Therefore, the main underlying intention of this investigation is to look at the cultural phenomenon from its potential perspective rather than its process of positive or negative transformation.

This study is an attempt to investigate this phenomenon by unfolding its hidden manifesting elements and their relationships to the multiple events of design and social cognition. At the same time, this investigation examines its possible benefits for the learning of design among students both at personal and interpersonal level. This study also attempts to identify the fundamental differences between studio peer culture and other cultures, in different fields of study. It is considered as a useful approach by looking at this phenomenon from a different point of view to verify its possible significant influences.

A multiple-strategy that combined qualitative and quantitative approach for comparative measures was employed in this investigation. Such a strategy allows for the triangulation of results and findings in order to provide a richer picture of the cultural phenomenon being studied. The unfolding process began with qualitative investigation by using individual interviews to identify possible shared commonalities among the studio learning peers. Following this investigation was a focus group study that involved participants who had dual learning experiences in the design studio and other learning environments. Subsequently, a survey study was formulated based on 'constructs' identified in earlier findings.

From the various stages of investigation, several interesting findings were revealed. There were notable commonalities shared among the design studio peers. Findings indicated that they had particular ways of learning and socializing with their peers. These were manifested in the form of meaningful words, models of references, non-verbal behaviours and intrinsic values. These shared commonalities were further exemplified by the differences in the way they construed their learning, situational and social events in comparison with peers from different learning environments.

One of the key contributions of this study is the provision of a more meaningful approach to understanding the studio peer culture and its influences on design learning. Such understanding is very essential to identify the intrinsic potentials of peer culture as part of instilling effective and constructive cultural practices between members of a community. In the design studio community, students may be encouraged to communicate using words that reflect set of design ideas to build up their design thinking process. At the same time, the tutors may act as a facilitator by creating series of open-group discussions that allow students and their peers to learn how to communicate effectively on exchanging ideas as part of an active, constructive learning process. Consequently, each member of a learning community is playing an equal share of his/her roles and responsibilities for a more coherent learning and teaching experiences in architectural education.

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Chapter 1
Introduction

1.1 Background

In architectural education, students acquire the essential design knowledge, experiences and skills from various sources in different learning environment. Lectures in the classroom, training in professional offices and design studio are a few main examples of those sources and environments. Among these environments, the design studio is considered as the central learning environment for the architectural students (Goldschmidt 1983; Dutton 1987; Aravot 1998; Demirbas and Demirkan 2003). In this studio-format environment (Lawson 2004), they practice, experience and learn the process of designing architectural artifacts. These become the core activities in their architectural education. As a dynamic learning site, design studio creates a virtual 'holding environment' (Schon 1988) of multiple events that encourage students to play a more active role in learning and socialising by interacting with their design tutors and peers. As a result of this, the students are able to make series of design moves (Goldschmidt 1983) and conversations with design learning materials (Schon 1992) to generate prospective design solution ideas to a given, ill-defined design problem (Cross 1982; Cross 1999). In short, they are learning by doing to integrate the theoretical and practical design knowledge to produce potential design (Teymur 2001). It is a constructive, generative learning process that requires 'parallel lines of thoughts' (Lawson 1993) and 'reflection in action' (Schon 1987) at the personal level of design cognition. Subsequently, at the interpersonal level, these students communicate their design ideas to tutors and design peers through critic sessions and peer group discussions. Their communications are combinations of the verbal and visual representations that include sketches, drawings, models and also computer-aided graphics. These learning activities are part of the integral, complex and distinct process of designing.

According to Cross (1982), design which also includes architectural design has its own intrinsic qualities described as the 'designerly ways of knowing'. He considered that these qualities are as equally essential as to the 'scientific ways of knowing' and 'scholarly ways of knowing' which are considered dominant in the primary education for young learners or students. In other words, design ability is as important as the numeracy and literacy ability which are associated with 'scientific ways of knowing' and 'scholarly ways of knowing', respectively. These unique qualities of designing were demonstrated by an experiment conducted by Lawson (1997). From the experiment, it was found that the strategies used by the science and design students in solving a similar given problem were different. The

science students used a problem-focused strategy while the designers used a solution-focused strategy. Based on these findings, Cross (1982) considered that design is an intellectual culture. It is not a science but it is a discipline by its own nature (Cross 2001). Therefore, he suggested that young learners should be given equal exposure to the fundamental knowledge in science, literature and also design. This will encourage them to utilise both hemispheres of the brain in order to promote parallel, convergent and divergent thinking (Hudson 1968; Lawson 1993) for a more meaningful intellectual growth.

Design studio can also provide the appropriate psychological habitat and ambient of environment (Parr and Townsend 2003) toward a possible formation of a sturdy, influential studio culture. Such formation is likely due to the socialisation process that takes place between the studio peers while they are in the process of learning to design. This studio peer culture can be revealed by observing the shared commonalities of the cultural manifesting elements (Persell 1990; Macionis and Plummer 1998) among those students. Those elements are language, symbols, norms and values that are shared among design student peers in the studio. A culture may take into the form of a positive or negative culture. Dalton and Petrie (1997) stated that a positive peer culture influence will enhance a student's development of commitment to perform effectively and possess high self esteem about learning. Meanwhile, a negative peer culture may distract a student away from the meaningful intellectual life toward deviant behaviours which later may influence their learning interests, progress and academic performances. In architectural education, a student's interest and performance in design is considered crucial to his or her overall academic accomplishment.

The peer culture which seems to operate within the complex and interrelated designing and socialising events in the studio-format environment (Lawson 2004), may have an influential role that shapes the signifying practices (Storey 1993) and designing interest among the design students. One interesting study on the architectural students from various institutions across the United Kingdom by Wilson (1996) showed that there were patterns of convergence in designing interest among students from various schools of architecture. From this study, Lawson and Dorst (2005) stated that there was a clustering phenomenon about the underlying standard of subjective judgment among architectural students of a particular architectural school in the United Kingdom. This study seems to suggest that these students may have shared commonality of signifying practices (Storey 1993) that are shaping their 'mental software' (Hofstede 1991) to maintain the structure, context and activities of their peer community. This is closely related to the idea of 'designerly way of knowing' by Cross (1982) when he was describing education culture of design against the two main culture of sciences and humanities. This idea about the 'designerly way of knowing' was further

explored by Cross and Cross (1995) and they suggested that designing is better understood by observing the relationship between the technological, cognition and social process. This was based on their findings from the study of collaborative work between designers. A study by Gero and Kannengiesser (2003) also seems to support the notion of dynamic relationship between internal (personal) and external (social) events that take place within a situated multi-agents or designers' interactions.

Hence, there are several key questions for this research investigation. Those questions are as follows:

- Are there any signifying practices commonly shared among the design studio student peers?
- What are those signifying practices and their characteristics, if such practices exist among the students?
- What are the possible learning benefits from such signifying practices?
- Are there any differences of signifying practices between the architectural design students and those from other fields of study?

1.2 Research objectives

This study investigates and examines the cultural phenomena among the design students within the dynamic design and social events in the design studio which serves as the locus of architectural learning environment. It focuses on the shared commonalities among these students that may be influential on their designing interest.

The first objective of this research is to explore the cultural manifesting elements which involve the areas and level of commonalities that are hidden in the underlying standard of subjective judgments among the architectural students.
The second objective is to explore the relationship between this cultural phenomena and the underlying subjective standard of judgments among these students.
Finally, the third objective is to illustrate the inter-connected events of design cognition, social cognition and design situations in the studio as the functioning of the whole that represents the studio peer culture.

1.3 Significance of the research

Currently, there are many researchers who examine design as individual activities. However, there are fewer researchers who study design as multi-designers activities that involve social process. It is recognised that there is a culture operating within the design studios (Koch,

Schwennsen et al. 2002). However, little is known on the peer impacts as part of the studio culture. Despite the increasing research on cultural phenomena in the higher education, there is still limited information on studio peer culture. Thus, there is lack of adequate understanding on the relationship of the peer cultural phenomenon and learning process particularly in the studio-format environment (Lawson 2004). Such phenomenon may have considerable influences on designing and learning interest among the design students. Furthermore, many of the peer-related studies are mainly focused on the delinquency aspects of the peer cultural phenomenon such as anti-social and deviant behaviours. Therefore, this research attempts to investigate the peer culture and its possible influences on design learning among architectural students. The outcome of this research study may contribute useful knowledge on the studio peer culture and its influences. Consequently, this knowledge will promote better understanding about design learning and socialisation process among the design student peers within the studio-format environment.

Koch, Schwennsen et al. (2002) stated that studio learning has great values to the architectural education and it can be an excellent educational model to other fields of education. This is mainly because studio learning allows one to one interaction between teachers and students, whereby students receive immediate feedbacks on their design work and progress. However, they also discovered that there are some major setbacks in design studio learning. Among those setbacks are as follows:

- Studio has its own culture, myths and values that are very influential on students' education
- This culture contributes toward the resistance to change
- Arrogance and ignorance as a result of isolation from the outside world
- Placing more emphasis on final design products than design process
- Students graduate with narrow base of architectural knowledge

In addition to those setbacks, Ward (1990) stated that there is a 'mastery-mystery game' between students and tutors in the studio learning. He considered this game evolved as part of the 'hidden curriculum' (Ward 1990; Brown and Moreau 2003). It is the unseen tacit factors which are influential to the determination of a certain outcomes, even though when there are clear set of rules, standards and regulations. In addition, Ward (1990) stated that hidden curriculum may have negative impact to the democratization of learning and teaching of a particular knowledge including architecture because of its tendency to maintain the status quo without being challenged by new ideas. He further suggested that this unseen 'teaching-learning game' and 'hidden curriculum' needs to be demystified to allow for a more transparent structure of teaching and learning design. This helps to foster the constructive and

real growth in design learning experiences especially among the student peers in the studio-format environment.

Therefore, another significance of this research is to reveal the underlying standard of subjective judgments within the cultural practices by means of eliciting 'constructs' based on the Theory of Personal Constructs (Kelly 1955; Kelly 1963). These 'constructs' can be further developed into a useful educational instrument which can be utilized to observe and analyse peer cultural phenomena in studio learning more objectively. It is also applicable to examine the convergence and divergence of signifying practices among the design studio peers. Consequently, this is beneficial to identify the possible potentials and setbacks of those signifying practices to the design learning process.

1.4 Organisation of the thesis

This thesis is organized into eight chapters. The content summary of each chapter is described as the followings:

Chapter two discusses general perspectives on learning theories and the intrinsic qualities of designing which shape the design cognition of the architectural students. Some studies of learning preferences in architectural education will also be discussed. These are followed with several discussions on 'designerly ways of knowing', historical overview and critical views of the studio-format learning environment.

Chapter three reviews literatures which are related to peer socialisation. These reviews include the definition of peer and its mechanisms which involve group processes. Following these reviews, there will be several key discussions on the definition of culture and its manifesting elements.

Chapter four discusses the process of the multiple, inter-connected events of design and social cognition that take place within the design interaction among agents, designers or architectural students. Theory of Personal Constructs will also be discussed in relationship to design and social process.

Chapter five discusses general overview on major research approaches which involve their strengths and weaknesses. The last section of this chapter discusses the framework of this research investigation which begins with exploratory phase and follows by explanatory phase.

Chapter six discusses the qualitative investigation that involves method of collecting and analyzing data. This is followed by discussions on findings from interview and focus group sessions.

Chapter seven discusses the quantitative investigation that involves formulating of survey by using 'constructs' identified from the qualitative findings. It also discusses findings from several statistical tests that will be supported by visual illustrations.

Chapter eight is the conclusion of the thesis. It will include the key findings of this research and their implications. Finally, this will follow with the discussions on the limitation of this study and some directions of further research.

Chapter 2
Learning, Designing and Studio-Format Environment

2.1 Introduction

The human species is endowed with remarkable abilities to think and learn. These abilities are primarily derived from the ways in which human being interact with their surroundings using their senses i.e. by means of sight, hearing and touch. However, the way they think and learn in order to form their 'knowledge' and 'interest' varies from one individual to another. This is mainly due to their different experiences of interacting with people, objects and events in diverse times and place. Furthermore, as human societies progress, they establish educational systems that allow them to create a 'proper' way of learning. Therefore, schools and institutions have become an important feature of the modern civilization. In the lower tier of education, encompassing the elementary and primary schools, young learners are taught basic knowledge mainly in the area of literacy and numeracy. As learners progress and mature, they encounter different disciplines of knowledge mainly science, literature and art or design and these are dealt with more in depth at the higher level of education in institution like universities and colleges.

According to Cross (1982), each of these disciplines has its own way of knowing, doing and learning. He described science as 'scientific ways of knowing', literature as 'scholarly ways of knowing' and design as 'designerly ways of knowing'. Cross (1982) further stated that design is commonly perceived to be a specialist, extrinsic knowledge rather than part of the essential, intrinsic knowledge (e.g. like literacy or numeracy) that each human being needs to acquire. However, he also considered design to be an intellectual discipline with intrinsic qualities that are vital for everyone's learning development. Similarly, Schon (1984) proposed that the model of architectural design education exemplified in the studio-format environment, has the professional exemplary and artistry values. As such, it is considered to be a model of reflective practices that could benefit other practitioners in various fields of study such as medicine and engineering.

This chapter begins with a discussion of several perspectives on theories related to learning. These discussions are followed by several descriptions and explanations concerning the intrinsic qualities of design that support its contribution as part of the human essential knowledge. Finally, the history and role of the studio-format environment in design learning will be discussed.

2.2 Learning

Learning is an internal process that differs from one person to another. In psychological terms, learning is referred to as the 'relatively permanent changes in an organism's behaviour that occur as a result of experience in gaining new knowledge or skills' (Lindgren and Suter 1985; Hergenhahn and Olson 2005). Such gains are mainly acquired through cognition which includes perceiving, thinking, solving problems, remembering and reasoning (Lindgren and Suter 1985). According to Lindgren and Suter (1985), there are basically four types of criteria that may be observed in order to indicate whether or not learning has occurred. Principally, these involve observing the changes in the performance of a person and are as follows:

- **Change in probability of response**
  Learning occurs when a person spends more time on one activity than the other. For example, he/she prefers painting pictures in an art class rather than to playing games on the sports field. In other words, he/she is learning to prefer paintings to playing.
- **Change in latency or delay of response**
  Learning is also taking place when he/she begins to demonstrate improvements with regard to the time that he/she spends working on a particular learning task. For example, he/she solves a mathematical problem five minutes faster than the day before.
- **Change in rate of response**
  Learning has occurred when a person produces a greater quantity of work in a given time after series of practices. For example, he/she writes 50 words in five minutes in the first week of a language lesson and after the second week, he/she is able to write 100 words in five minutes.
- **Change in magnitude of response**
  Learning occurs when he/she display better quality in their performance or work. For example, he/she can sing with a louder voice or draw using more accentuating colours.

These criteria suggest that the learning process for each person does not occur sequentially or progress in prescriptive stages. Learning for some individuals may be indicated by changes in one of those criteria, while for others it may be demonstrated by change in all of those criteria. Therefore, learning circumstances may not only vary between different individuals or groups of individuals but also between different learning practices, subject areas and disciplines.

2.3 Perspectives on learning theories

There are many different kinds and ways of learning and, furthermore, the contexts in which learning takes place differ with respect to their complexity: some are simple, while others are

very complex. For instance, there are situations that involve the acquisition of knowledge whereas some involve the mastery of skills. Therefore, there is more than one type of learning and currently, there is no single comprehensive theory of learning (Phillips and Soltis 1998). Many of the earlier influential learning theories were the contributions of psychologists from various fields of specialization. However, due to different approaches and interests, these psychologists may be divided on the basis of several major orientations which eventually developed into a number of different perspectives of learning theories. For instance, one group of psychologists was interested in the environmental stimuli that encourage particular responses to initiate learning, whereas another group of psychologists who focused on the cognitive process and there is also, a group of psychologists who was interested, primarily in social processes as part of learning. In relation to the context of this research study, four perspectives on theories of learning will be discussed.

- **Behaviorist theory**

Behaviorists view human beings as passive learners similar to a machine that needs programming before they can function (Pope and Keen 1981). Thus, they considered that the human mind to be somewhat like an 'empty box'. Therefore, on this view, learning only takes place once the human mind's box is filled and structured with new information or input as result of his/her interactions with the environmental stimuli. These theories focused on 'conditioning' and 'reinforcement' principles in which learning is better understood through observable behavioral responses. The two most prominent psychologists who adopted this perspective were Ivan Pavlov and B. F. Skinner.

Ivan Pavlov is best known for his classical conditioning experiment based on the 'stimulus-response' approach (Pope and Keen 1981; Phillips and Soltis 1998; Hergenhahn and Olson 2005). This experiment implied that learning is produced by means of 'reward' and 'reinforcement' in which 'reward' and either positive or negative 'reinforcements' provoke change in behaviour and these allow the responses to the learning situation to become apparent. 'Operant conditioning' was a method used by B.F. Skinner to observe visibly the occurrence of learning using scheduled reinforcement (Pope and Keen 1981; Phillips and Soltis 1998; Hergenhahn and Olson 2005). In this method of conditioning, possibilities of reinforcement or stimulus are progressively changed in the direction of the desired behaviour in order to initiate learning.

As far as education is concerned, this perspective views a learner or student as a 'recipient' while a teacher is the master or 'provider' of knowledge. Thus, knowledge is gathered externally away from the mind and internalized by learners by means of explicit instructions.

Therefore, this approach is repetitive, objective and mainly concerned with the search for a single, absolute truth. In short, learning advances from the simple to the complex and all learners have similar ways of learning. Their performances can be conveniently measured by standardized measurement procedures using rewards and reinforcements such as good grades, incentives and praises. In this way, students become highly dependent on their teachers for learning and gaining knowledge.

This perspective shows that the principles of behaviour modifications are a helpful mechanism for learners when it comes to acquiring basic literacy and numeracy as well as more physical skills such as writing, calculating and cycling. According to this perspective, effective learning comes about through the visible, mechanical process of gathering knowledge in parts and segments until the whole body of knowledge is assembled and realised. However, it neglects the importance of the learner's internal mental activities that involve thinking and reasoning processes. Such processes create and modify the mental structure that allows learners to interpret, organize, store and retrieve information.

- **Cognitivist theory**

In contrary, the cognitivists view humans as active learners with minds that have an innate capacity to learn without having to interact with the environmental stimuli. This school of thought is interested in what learners do or achieve rather than in what happens to learners in the learning process. Their studies on learning are focused on the mental insights or structures that are able to construct 'mental maps' consisting of meaningful patterns or organized wholes (Phillips and Soltis 1998).

Wolfgang Kohler, a Gestalt psychologist, is fascinated with the cognitive process involved in organizing and configuring meaningful patterns. He devised an experiment to observe how a chimpanzee deals with a series of problematic situations, for example, getting hold of a banana that is outside its cage. Surprisingly, the chimpanzee was observed to attach two short sticks together in order to create a longer stick that was used to pick up the banana outside the cage. This raised an interesting question: 'How did the chimpanzee learn, think or 'see' to put the sticks together even before it was rewarded with the banana?' As a result of this notable experiment, Kohler concluded that learning takes place by means of an act of insight that produces meaning by understanding the totality of a situation. As such, he considered learners to be problem solvers who begin by familiarizing themselves with the elements that constitute a problem prior to generating a solution. According to Kohler, learners seem to activate an internalized process in order to mentally manipulate those various elements until they arrive at a situation in which those elements become 'mentally connected'. This is the

'Aha!' or 'Got it!' moment (Phillips and Soltis 1998) where the solution is 'seen' and then put into action. Therefore, Gestalters and other Cognitivists reject the 'mechanical' and 'molecular' Behaviorist notion (Hergenhahn and Olson 2005) that learners begin with simple ideas and later combine them into complex ideas.

Therefore, Cognitivists encourage active and meaningful interactions between the students and teachers. Such interactions involve a 'give and take' relationship in which teachers guide their students into making connections and organizing their experiences into meaningful patterns to deal with ambiguities (Hergenhahn and Olson 2005). On this basis, teachers divided their teaching materials into meaningful units and the units that are related to an overall concept or experience. This helps students to construct relationships that link information and make it easier to retain information in the long term memory and retrieve it whenever it is required (Lindgren and Suter 1985). Furthermore, they avoid using methods that require rote memorization of facts or rules: such acts when undertaken without an understanding of the underlying principles or nature of a problem will cause mistakes. As such, students experience a form of learning that is both insightful and satisfying because it comes about from discovery and solving problems, as opposed to being the result of conditioning process that is associated with the Behaviourist perspectives.

- **Constructivist theory**

Constructivists stress in common with the Cognitivists, the importance of learners' active inner thought processes as part of meaningful learning occurrences and experiences. However, they view learning development as a progression of ordered, sequential stages. This is quite unlike the view of the Cognitivists, who consider learning to be an insightful, instantaneous process of total discovery learning that is free of conflict (Pope and Keen 1981). Although all child learners have similar level of potential to learn, biologically speaking, they need to undergo a proper developmental growth process characterized by experience. The idea of learning from experience was drawn from the insight of John Dewey that human being are considered as inquiring organisms with a capacity for active thinking (Phillips and Soltis 1998). Such active capacities are stimulated by cognitive conflicts that call for learners to act as problem solvers. Gathering experiences from problem solving situations allows learners to organise and reorganise their own knowledge while improving their thinking processes and problem-solving capabilities (Pope and Keen 1981; Lindgren and Suter 1985). As a result, it provides learners with structure, direction and evaluation as they mature and accumulate meaningful experiences as a result from learning by actually doing things (Lindgren and Suter 1985). Two distinguished figures who have adopted this perspective on learning are Jean Piaget and Jerome Bruner.

As a biologist and developmentalist, Piaget was particularly interested in the intelligent abilities of children (Phillips and Soltis 1998; Hergenhahn and Olson 2005). He conducted many experiments on children of various ages and as a result of these experiments, he noted that older children tend to perform better when it comes to solving similar problems than do younger children. Piaget claims that older children have more intellectual maturity because they have gathered more complex schemata as a result of their interactions with the environment. According to Piaget, both humans and the environment are constantly changing. As such, a new born child with the absence of language has no word with which to represent surrounding objects. Therefore, his/her interactions with objects are strictly sensorimotor like touching and handling. In contrast, a teenager with a more highly developed mental apparatus in the form of schemata is able to deal with both concrete and abstract elements of the surrounding world. Consequently, as a child moves through stages of development, he or she accumulates sets of concepts which are later constructed into the interrelated schemata that form the cognitive structure. This involves the dynamic, continuous processes of assimilation (matching) and accommodating (modifying) between human cognitive structures and the physical environment. Within these processes, there are moments of equilibrium where a learner reaches states of familiarity when interacting with certain problematic situation. However, once a new conflict or problematic feature is encountered, the process of accommodating and assimilating is regenerated again in order to reconstruct a more complex schema (Hergenhahn and Olson 2005). Therefore, generating and structuring schemata are regarded as continuous and cyclical processes in human learning development.

Jerome Bruner proposed the key idea of discovery in learning. This is an inductive process of learning in which learners must learn by themselves in order to determine what it is to learn and discover. This process is related to the idea of 'a man have to do something to the things when they wish to find out something' espoused by John Dewey (Pope and Keen 1981). Thus, learning by discovery encourages learners to observe and classify new information they have gathered by means of translation and transformation: they are looking for what is similar and different to the existing knowledge established in their cognitive structure. Subsequently, learners form a framework of reference for learning actions such as inventing and devising rules to solve unfamiliar problems (Pope and Keen 1981; Lindgren and Suter 1985). This framework of reference consists of various invented categories which are similar to the notion of self-constructed schemata outlined by Piaget. As such, Bruner regarded invention as an important aspect of learning.

Based on the Constructivist perspectives, educational settings should provide more authority for students in their learning activities. Teachers or tutors are to serve as guides and advisors

to learners in the process of discovering and constructing personalized schemata and meaningful references through problem-solving activities. At the same time, however, learners are given encouragement to interact and learn with their learning peers. Nevertheless, teachers and tutors do play an important role by providing learning materials which are relatively unknown and thus mildly challenging to the learners. This method, therefore, allows students to begin with familiar sets of ideas before proceeding to explore new possibilities in their own capacities as individuals. In other words, learning is not restricted to subject matter provided directly by teachers or textbooks (deductive), but also concern with developing and interpreting new ideas from learning experiences (inductive) as highlighted by Pope and Keen (1981) and Lindgren and Suter (1985).

- **Social learning theory**

The perspectives previously outlined regard learning as an individual phenomenon: the learner is seen as a lone inquirer of knowledge (Phillips and Soltis 1998). However, these perspectives under-emphasise the recognition that learners also belong to social groups. Learners have parents, siblings, teachers, friends and learning peers. These become part of their world of realities, and they communicate and interact with these diverse people and receive guidance and stimulation from them. Consequently, learning can be seen to evolve as the result of social interaction between individuals. Thus, according to Phillips and Soltis (1998), the bodies of knowledge in the sciences, literature and history are socially constructed products because these bodies of knowledge are constructed by scientists, researchers, writers and other scholars on the basis of social processes such as discussions, critics, demonstrations and collaborations. Therefore, Phillips and Soltis (1998) also suggested that language becomes a primary, social communication medium or 'psychological tools' in the formation of higher forms of learning, problem solving and the acquisition of skills. Two notable figures in this 'social' perspectives on learning are Albert Bandura and L. Vygotsky (Phillips and Soltis 1998).

Bandura recognized that humans are social beings who have the ability to learn by imitating others through a process of socialisation. Thus, he introduced the notion of 'social learning' or 'observational learning'(Lindgren and Suter 1985) in order to represent a type of learning that results from the continuous interaction of cognition and observation. According to Bandura, a learner's interactions with others such as peers and tutors in cooperative social settings gives him/her the opportunity to observe and imitate and consequently, develop higher mental capabilities. Observational learning by means of a process of 'modeling' based on the actions of others involves attention, retention, reproduction and motivational processes that are transformed into coded information (Phillips and Soltis 1998). Subsequently, this

information serves to the actions and responses of learners, and thus, role models who have expertise, talent and status become influential in setting up standards for others to pursue. Therefore, this process encourages learners to make improvements to their skills, performance level and problem-solving strategies by means of self-evaluation and criticism based on those role models (Hergenhahn and Olson 2005).

Vygotsky, a Russian psychologist, also looks at the importance of social interactions and settings in learning environment where young learners accomplish their learning potentials with the guidance of peers and adults (Phillips and Soltis 1998). He recognized that learners vary in their learning potentials due to their exposure in different social learning settings. Thus, he stressed that much of what people learn comes from the context of learning from others in their own learning community which may also include the studio peer community. On this view, people in societies and communities invent 'psychological tools' such as logics, concepts, forms of notation, signs, numbers and words that they can be used to construct a view of the world they inhabit together (Phillips and Soltis 1998). Such tools allow them to communicate and learn from each other more effectively and progressively by creating new tools as a result of their interactions. Thus, Vygotsky invented the notion of a 'zone of proximal or potential development' (Fosnot 1996; Phillips and Soltis 1998) which suggests that a student has better learning potentials when placed in groups guided by competent peers and expert teachers.

Vygotsky's ideas of 'zone of proximal or potential development' has inspired a number of current scholars who have developed such ideas into what have been characterized as ideas of 'situated cognition' or 'situated learning' (Brown, Collins et al. 1989; Phillips and Soltis 1998). These scholars criticize the view that learning is mainly a cerebral process of internalization. In other words, human learning, thinking and problem solving are not regarded as processes that solely involve the internal affairs and processes of the human mind. For example, in actual learning, architecture or science students, say, are not thinking about a building or DNA models, but, rather are thinking with their models. Thus, their thinking is also concerned with talking with others (peers, tutors or experts), moving around, manipulating apparatus, mumbling, looking for other references and so on. The occurrence of learning is more effective and natural in 'situations' where the students are located and actively engaged with people, events within those 'situations'.

2.4 Learning in design

Learning in the sphere of architectural design involves a blend of the various perspectives contained within learning theories. This is because design has its own unique way of learning

process aimed at dealing with ill-defined problems that involves modeling and 'graphicacy' for generating potential solutions. Although the solutions to such problems end in the form of a visible product, the underlying process of arriving at those solutions is very complex and challenging. It is a particularly integrative process involving knowing, doing and learning in which architectural students both take on the roles of problem-solvers and problem-seekers and switch between them. In other words, while engaged in the process of arriving at possible solutions, they are also generating new problems. Therefore, design learning is not restricted to a specific perspective on learning as discussed earlier, although on the face of it, it seems more closely related to the Cognitivist and Constructivist perspectives.

There are two examples of study that investigate the learning characteristics or preferences in designing. The findings of these studies seem to suggest the unique way of learning in design in which there are interchanging of learning preferences among the students during the various stages of designing process while they are dealing with diverse domains of knowledge and information.

- **Study 1 by Demirbas and Demirkan (2003)**

This is a study that uses the model of Experiential Learning Theory outlined by Kolb in order to observe and analyse the effects of learning styles or preferences on the performance of design students in the design process. According to Demirbas and Demirkan (2003), each architectural student has a diversity of learning preferences in the various stages of the design process. They hypothesized that:

  - Various architectural students displayed different learning preferences while engaged in the various stages of design process.
  - A properly structured of integrative design instructions and design tasks can improve the design capabilities of architectural students even if, they have different learning preferences among them.

Therefore, on the basis of this study, some key indications on the relationship between designing and learning preferences can be established. Furthermore, these indications may provide some ideas for improved understanding of the learning and designing undertaken by architectural students in the studio-format environment that are central to this research.

Although there are several learning theories, Demirbas and Demirkan (2003) decided to use Kolb's model of experiential learning theory because it had been tested many times in other researches related to education. There are some similarities between Kolb's theory and the ideas on 'reflective practitioner' outlined by Schon (1987). Furthermore, their ideas are also closely connected to the learning perspectives of the Cognitivists and Constructivists.

According to this theory, learning occurs in cycle: it begins with experience, proceeding to reflection which later, leads to action that in turn becomes a concrete experience for reflection Within that cycle, there are four stages of experiential learning. Those stages are as follows:

- Concrete Experience (CE)
- Reflective Observation (RO)
- Abstract Conceptualization (AC)
- Active Experimentation (AE)

Each student is assumed to experience all these stages to varying levels of intensity and order. Based on Kolb's model, it is further suggested that an individual learner's style may be identified by using a test named the 'Learning Styles Inventory' (LSI). Scores were taken from the answers and rankings given on 12 open-ended questions related to learning preference in any learning setting. These scores were then calculated and later positioned on the following bipolar scale:

- CE-RO (diverging)
- RO-AC (assimilating)
- AC-AE (converging)
- AE-CE (accommodating)

From this position, the learning style of an individual can be identified and described as follows:

- *Diverging learners* are interested in people, emotional and imaginative.
- *Assimilating learners* experience their world symbolically and transform it through thought and not through action.
- *Converging learners* have the opposite learning capabilities to the diverging learners. They are logical, pragmatic and unemotional to any situation.
- *Accommodating learners* like doing things. They transform information using action.

By using the LSI test as a reference model, Demirbas and Demirkan (2003) prepared a simple design project for year one students as experiment to test their hypotheses. The project involved designing a staircase for a three-storey house. There were four stages that the selected students had to follow:

- Stage 1 – research and report on the information about stairs
- Stage 2 – lecture and initial design work(schematic)
- Stage 3 – making a model
- Stage 4 – detailed drawing

The assessments of learning styles were made on the basis of the products rather than the processes. These were based on *design, technical drawing and artistic features*. The findings from the results of those assessments are as follows:

- In stage 2, the accommodating students have higher mean score because the tasks in this stage suit their learning preferences that are learning by doing and experiencing.
- In stage 3, the assimilating students showed the highest mean score because model making was assumed to be an abstraction of the real staircase. They were learning by reflecting and thinking.
- Since stage 2 and 4 were similar with regard to tasks and correlated, the analysis showed that there was considerable progress for all learning styles. This was most likely because the tasks in stage 4 were an extension of the tasks in stage 2: therefore, the students had the opportunity to refine and improve the drawings by reflecting on their previous experience in stage two.

Demirbas and Demirkan (2003) concluded that there appeared to be some relationships between learning styles and the different stages of the design process. More interestingly, they also found that there were shifts from one learning preferences to the other throughout the cycle of the design process. Subsequently, they suggested that design learning is not bounded by a specific learning styles or preferences. Instead, it involves basically all the learning preferences including assimilating, accommodating, diverging and converging by the students. Another interesting observation arising from this study was that the students demonstrated differences with respect to preferences at various stages of designing. This suggests that each student uses and constructs his/her personal design schemata while designing, even though he/she is tackling problems similar to his/her design peers. As a result, students have varieties of design solutions. Therefore, they are more focused and interested to a solution rather than the problem encountered. Thus, this is considered to be a solution-focused (Lawson 1997) learning situation.

- **Study 2 by Aravot (1998)**

Aravot (1998) conducted a simple study on the learning styles of architectural students based on a previous study of engineering students. The results and findings from the two studies were compared by Aravot (1998) to look into the possible learning differences between architecture and engineering students. Comparatively speaking, there were some indications of learning differences between architectural and engineering students in higher education and these will be briefly discussed in the latter part of this section. However, it is important to note that these studies mainly emphasised learning at the personal level rather than learning at the interpersonal level or in other words, learning while socialising with fellow peers. According to Aravot (1998), learning styles may be described into five learning style dimensions. Each learning style has two opposing poles which act as reference points of

inclination in order to determine the learning profile. The learning styles and related opposing poles are as follows:

- **Perception – Sensing or Intuition**

  Sensing learners are those who prefer real and logical data. They are comfortable when dealing with standard forms of work and study in their learning process. On the contrary, the intuitive learners always look for meaning by means of abstraction memories. They prefer models and theories.

- **Input Modality – Verbal or Visual**

  Visual learning relies on pictures, diagrams and sketches which give ease of comprehension to the learners. Verbal learning depends largely on text and lecture. Interestingly, based on the study of engineering students, a large percentage of them are visual learners. However, in the engineering education, most teachings are done verbally, whereas, according to Aravot (1998), visual methods are used widely in architectural education.

- **Organisation – Deductive or Inductive**

  Inductive learners prefer to begin with specific data and then, principles and rules are deduced from the data. Deductive learners proceed from the general toward the specific. Induction is the natural way of learning, while deduction is the natural way of teaching. However, the current explosion of knowledge has affected the amount of lecture time available, as well, as the quality of teaching and learning.

- **Processing – Active or Reflective**

  Active learners are more interested working in groups because the learning process requires many activities and interactions, whereby, reflective learners prefer to work alone for the sake of better concentration on their work. Nevertheless, most students in the study utilized both aspects to a more or less equal extent. Unfortunately, most of the classes in the higher education are neither active nor reflective but passive.

- **Understanding – Sequential or Global**

  These are learners who can understand and comprehend better through sequential learning i.e. by means of a step by step learning process. Other learners, meanwhile, understand better through 'global' learning. Sequential learners are best in describing the step by step actions taken towards a solution. However, they would not be able to solve complicated problems that are not part of the sequence. Therefore, global learners can offer solutions to complicated problems but it is difficult for them to explain how they derived to the solution.

Based on the comparative study, Aravot (1998) found that architectural students have the tendencies towards the following learning preferences:

- Global understanding
- Reflective process
- Visual
- Intuitive
- Deductive

The findings from the study by Aravot (1998) also suggest that architectural students have their own particular way of thinking, knowing and doing, especially when they are learning to design within the studio-format environment. The study also found that there are some interesting differences between the designers and non-designers regarding preferences. These indicate that there are possible underlying shared commonalities among design student peers. These two studies also illustrated that architectural students are in the possession of different kinds of learning. In architectural education, learning design in the studio becomes more challenging to the students and the enhanced challenges involved in coping with these design complexities (Jones 1970) create feeling of confusion, insecure and discomfort. For that reason, there are strong tendencies for architectural students to bolster levels of learning confidence and comfort by means of sosialisation with their peers in the studio environment. Nevertheless, methods of teaching architecture are predominantly based on prior knowledge and experience because teachers do not have the time and resources necessary to obtain level of understanding of the learning styles and cultures of architectural students that would serve to support their teachings. In other words, there is lack of theory when it comes to teaching and learning in architecture (Webster 2001). Therefore, the study of such peer cultural interaction within the design studios may provide vital insights into studio peer learning to assist the teaching of design.

2.5 Designerly ways of knowing in education

Cross (1982) highlighted his main concern and interest about the need to establish a theoretical basis for treating design as a coherent discipline of study. He argued that design should be regarded as the 'third intellectual culture' of education, since it amounts to a form of intellectual culture that is just as important as the other two mainstream intellectual cultures, the sciences and the humanities. These two established culture have been dominating the social and educational systems. Furthermore, he argued that the failure of general education to recognise design as the third intellectual culture in education may prohibit the dissemination of basic knowledge realizing its real purpose and potential.

According to Cross (1982), the nature of design has four significances that ought to lead to its recognition as the third intellectual culture of education. Those significances are as follows:

- Design is mainly concerned with the conception and realisation of new things
- It involves the appreciation of material culture and the application of the arts of planning, inventing, making and doing
- Its core of language is modeling. Therefore, it is possible to develop students' aptitudes with respect to this language similar just as the aptitudes in the language of sciences (numeracy) and the language of literatures (literacy) are developed
- Design has its own distinct 'things to know, ways of knowing them, and ways of finding out about them'

In relationship to those significances, Cross (1982) introduced the notion of 'designerly ways of knowing'. This notion highlighted that there is a distinct 'designerly' form of activity that separates it from the other two cultures, namely sciences and humanities. The existence of such a distinct degree of difference is also supported by an experiment conducted by Lawson (1997). In his study, there was evidence that science and design students utilised different strategies when they are given a problem to solve. The scientists solved the problem by focusing on the problem itself, whereas, the designers were more interested in generating several solutions to the problem. In other words, the scientists were problem-focused and the designers were solution-focused. Or to put it another way, the scientists were more concerned with trying to understand a specific problem (analysis) in which the solution has already been defined (Jones 1970). On the other hand, the designers learnt about the nature of the problem as a result of trying out several solutions (synthesis). This is because design problems are ill-defined, ill-structured or unrefined. The problems do not contain all the information necessary for a solution. As a result, the designers have to come up with the extra ingredients by means of their own individual primary generators (Darke 1979), guiding principles (Lawson 1993) and personal codes in order to find several alternative solutions. By means of conjectural approaches, each designer sets his/her own manageable boundary with the aim of performing certain design tasks and generating possible solutions to the problems involved. From that notable experiment, some useful comparisons can be made between science and design education. These are as follows:

- Scientific method – problem solving behaviour in finding out the nature of what exists. Design method – converting things of value which do not yet exist
- Science is analytic, design is constructive
- Science is concerned how things are: design is concerned how things ought to be
- Science investigates extant forms, design initiates novel forms

According to Cross (1982), 'designerly ways of knowing' are not only embodied in the process but also in the products of design. Objects and products represent a form of knowledge concerned with how to satisfy requirements and how to perform certain tasks. Thus, they constitute a form of knowledge available to everyone. In this material culture, designers draw on objects around them as the primary source of their thinking and inspirations and designers have the ability to read and write in particular codes or language based upon these objects. Having done so, they are able to create new objects, after undergoing a unique process of communication with the objects concerned. Designers, therefore, seems to have their own codes and languages that translate messages in either direction between the concrete objects and abstract requirements. This is the most effective way that provides speed of thoughts (Jones 1970) when it comes to dealing with the characteristically ill-defined problems bound up with planning, designing, and inventing. Such problems would be difficult to solve by using codes familiar to numerical (science) and verbal (humanities) disciplines.

On the basis of earlier arguments and descriptions, Cross stated that there are five important aspects with regards to the intrinsic values of the 'designerly ways of knowing'. Those five aspects are as follows:

- Designers tackle ill-defined problems
- Their mode of problem solving is solution-focused
- Their mode of thinking is constructive
- They use codes that translate abstract requirement into concrete objects
- They use these codes to both 'read' and 'write' in 'object languages'

According to Cross, these aspects also justify the intellectual position of design as an essential part of general education in the following three main areas:

- Design develops innate abilities in solving real world, ill-defined problems
- Design sustain cognitive development in the concrete/iconic modes of cognition
- Design offers opportunities for the development of a wider range abilities in non-verbal thought and communication

As discussed earlier, the notion of 'designerly ways of knowing' by Cross (1982) has demonstrated that designing has its own particular intrinsic values concerning constructing and generating knowledge. According to Jones (1970), designers play different roles while they are designing due to the complexity of design. There are times when designers need to be like scientists, mathematicians, artists or a combination of all these roles. In other words, designing involves a multi-disciplinary approach to thinking and doing. Therefore, design represents a unique field of intellectual culture which is worthy of recognition at the heart of general education.

2.6 Divergent, convergent and parallel lines of thoughts in design

Design education has received primary attention in the recent decades due to the current advances of knowledge which demand a fast-paced cross disciplinary approach to knowledge. According to Lawson (1997), engineers, fashion designers, architects, physicists and the like are considered very specialized in their own field. Thus, an engineer may produce the best solution to a bridge design. However, this may not be a fine solution if the engineer fails to recognise other vital aspects involved, such as managing work forces, equipments, aesthetic qualities, time, money, security and weather. The consideration of these related aspects is essential if the successful completion of the bridge construction is to be ensured. Therefore, a question arises concerning what is the best solution in any real situation. One may say that the best solution to the design of a bridge may not be the best solution to the real situation when all other aspects as mentioned earlier are not seriously taken into consideration. This also indicates that nowadays, one should also have a considerable knowledge in other fields in order to be a successful professional within his/her own field. Indeed, perhaps, it is the case that famous designers, architects and engineers are more successful than their peers because they have an additional edge of knowledge outside their own particular specialized field. One of the reasons for this extraordinary ability is related to the way they experience and develop the state of mind known as 'parallel lines of thoughts' (Lawson 1993). This is a meta-cognitive process which basically involves free exchanges and inter-hemispheric interactions between the left and right-hand sides of the brain.

Cross (1990) points out that every person has the ability to design. As stated earlier, he described the nature of design as the particular ways of thinking and behaving. Therefore, such intrinsic design abilities are employed by people including designers to deal with certain kinds of problems in certain kinds of ways. Schon (1992) has also stated that designing in its wider sense constitutes the core of practice in all professions, occupations and everyday living. Therefore, the ability of design is considered to be part of inherent human intelligence rather than merely a skill. In other words, design ability which is strongly associated with the right-hand side of the brain is just as important as the literacy and numeracy abilities normally associated with the left-hand side of the brain. These intrinsic values are also regarded as the primary (underpinning) knowledge which needs to be taught to young learners in their early years of their education.

In relation to the previous discussions, the visual and spatial abilities acquired through design learning are also as equally important as the literacy and numeracy abilities as part of an individual's foundation of intellectual development. Almost every person uses these abilities

to communicate ideas and knowledge: historians, mathematicians, geographers and even scientists like Einstein, all need to possess visual abilities also known as 'graphicacy' (Cross 1984) to help them to work effectively, creatively and intelligently. Therefore, human beings need to possess both the capacity for imaging (visual) and communicating via language (verbal). Through the 'mind's eye', designers are able to manipulate images or systems and make judgments. Next, these design actions are transformed into 'externalised modellings' such as graphics, drawings and models. However, in the pursuit of a desirable solution, a designer needs to deal with 'puzzle-like' problems that do not provide all the necessary information required for a solution: some of the relevant information and missing ingredients can only be found by generating and testing various solutions. Thus, design is characterized by the constant generation of new task goals and redefinition of task constrains.

In many situations experienced in the designing process, designers rely highly on their visual-spatial thinking (Cross 1984; Tovey 1984). This is associated with the manual activities involved in the perception and the production of spatial relationships. According to Tovey (1984) those activities are as follows:

- Size discrimination and perception of direction
- Appreciation of spatial relationship
- Judgment of three dimensional spatial relationship from two dimensional representation
- Ability to select components to complete design
- Completion of an incomplete picture
- Recognition of objects portrayed by line drawing and incomplete contour
- Accurate perception, memory and recognition of abstract pattern to complex for verbal description
- Recognition of anomalies in painting
- Ability to recognize objects from unusual angles
- Ability to copy geometrical shapes and block design subtest

However, as mentioned earlier, the solution to the puzzling, ill-defined problems demands the constant interaction of both the left and right-hand sides of the brain and their associated special capabilities. Cross (1990) and Tovey (1984) described this process of interactions as a 'duality' that involves bilateral modes of information processing which may also be related to the ideas on 'parallel lines of thoughts' outlined by Lawson (1993). Cross (1990) briefly stated that the functions of each part of the brain are as follows:

- Left brain – 'right hand'
  It involves the visible, logical, operative modes

- Right brain – 'left hand'

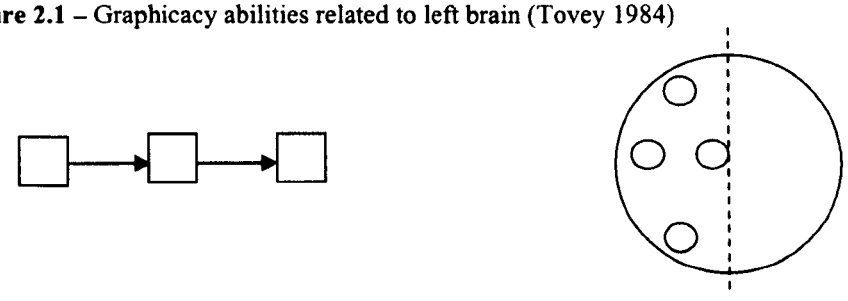
  It involves the invisible, intuitive, abstract modes

These are based on the findings from the experiments that were conducted on the 'split brain' individuals. In relation to Cross's brief descriptions, Tovey (1984) further described those functions (Figure 2.1, 2.2) in the terms of graphicacy abilities which are as follows:

- The left brain,

  It involves 'linear, serial – propositional, verbal abilities'

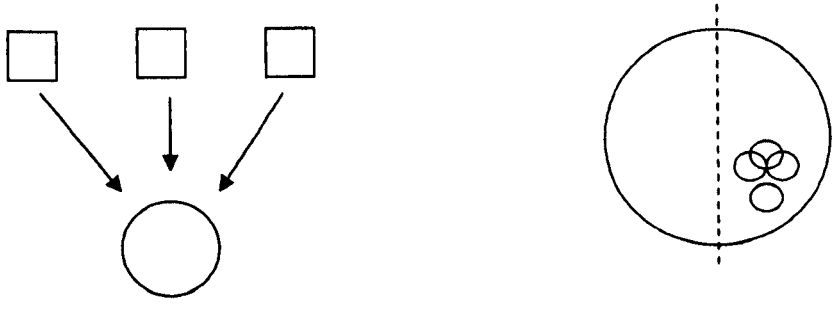
Figure 2.1 – Graphicacy abilities related to left brain (Tovey 1984)



- The right brain

  It involves 'holistic, simultaneous – appositional, visual abilities'

Figure 2.2 – Graphicacy abilities related to right brain (Tovey 1984)



As stated earlier, Lawson (1993) has provided a more appropriate description of design thinking that involves the interplay of both parts of the brain, as a single unit processor of inputs. Thus, he did not discriminate each part of the brain as a separate, specialized entity but rather was looking at both parts as a 'single unit' of the brain interacting both simultaneously and in parallel. This is because there is a risk of misinterpreting the whole nature of the designing process.

Lawson's descriptions of the active interhemispheric interplays within the brain are perhaps shared by Hudson (1966), a psychologist who for many years studied on the biases displayed in thinking attributes among English schoolboys, coining the term 'divergers' for those biased towards arts and 'convergers' for those tending towards science. However, according to Hudson (1966), the terms 'divergers' and 'convergers' do not strictly represent isolated groups of individuals. This is because they are merely intellectual qualities or traits that are used as a reference point to map the characteristics of an individual or group. In other words,

each person is potentially a 'diverger' or 'converger'. Therefore, the ideas on convergent and divergent thinking commonly associated with the left and right-hand sides of the brain, respectively, are not entirely true. For example, the right-hand side of the brain is recognized as the mute (non-verbal, language) part of the brain: nonetheless, studies have showed that it also has a certain ability to understand the 'language' of sound i.e. rhythm, pitch, melody, as well as non-verbal vocalization, like whistling (Cross 1984).

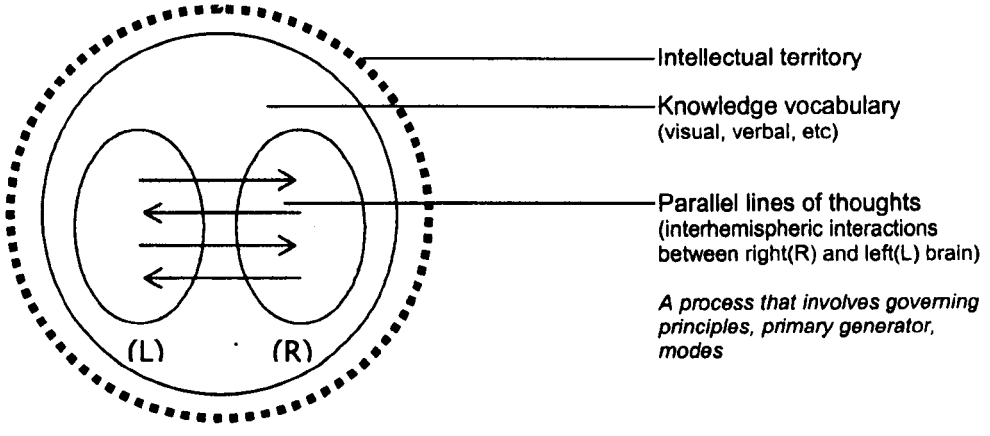
Studies conducted by Hudson (1966) indicated that IQ tests in the 1960s failed to accurately measure the intelligence of students who displayed a bias towards divergent thinking. Thus, these students could be regarded as 'culturally disadvantaged' (Cross 1984) because the kind of intelligence they displayed was less respected by others. These one-sided mind tests had failed to measure the true essence of human intelligence which includes the inherent capacities of both sides of the brain. Hudson (1966) had demonstrated that 'divergers' (artist biased) did better than 'convergers' (scientist biased) in many open-ended tests, such as those involving the use of objects, the meanings of words and drawings. In fact, many of the responses given by the divergers were rare, unconventional, original, creative and inspiring. Below are some interesting differences between the 'divergers' and 'convergers', based on the findings of the studies by Hudson (1966) as shown in Table 2.1.

Table 2.1 – Differences between divergers and convergers (Hudson 1966)

Divergers	Convergers
• Think of specific uses rather than function	• Analyse material objects in terms of their physical properties rather than function
• Broad range of interest, less control of the objects	• Narrow range of interests, more control on objects
• Tendency of being aggressive and violent	• Tendency of being non-aggressive and violent
• Humourous	• Serious
• More tolerant toward ambiguity, imaginative	• Prefer clarity and meaningfulness
• Liberal	• Authoritarian
• Opened, expressive, emotionally speaking (uninhibited)	• Closed, avoid emotional expression (inhibited) disruption
• Manipulate people, live in terms of people	• Manipulate things, lives in term of things
• Excel in unconventional, open-ended tests	• Excel in conventional intelligence tests

Lawson's ideas and descriptions of the way famous designers work creatively towards innovative and originality of design are both fascinating and helpful. Lawson suggested that at the higher level of design activity, good designers, architects and artists are able to have 'parallel lines of thoughts' that help to manipulate various modes of thinking either convergently or divergently. While in the initial stage of creative design, each expert designer is guided by his/her own unique governing principles consisting of primary generators and preferred design modes to assist and ease his/her ways of designerly thinking into a more complex design stages. These descriptions of 'parallel lines of thoughts' outlined by Lawson (1993), may perhaps explain why buildings designed by famous architects like Calatrava, Foster and Gehry have distinctive, unique architectural features and characters. Figure 2.3 is a basic illustration of the 'parallel lines of thoughts' as described by Lawson (1993), which involves governing or guiding principles, primary generators and modes that form the intellectual territory of a person.

Figure 2.3 – Illustration of parallel lines of thoughts



Notes: The size and magnitude of intellectual territory, vocabulary, state of parallel lines of thoughts may change due to the gaining of new input of information. They may vary from person to person including between the experienced and novice designer.

The ideas of Lawson (1993) with respect to the idea of 'parallel lines of thoughts' were very useful when it came to generating the framework for this research investigation into the peer socialisation and design learning activities that take place in the studio-format environment. Therefore, these ideas will be discussed further in Chapter 4 for comparison purposes while proposing the general framework of the present research study.

2.7 Reflective practice in design

'Reflective practice' is a fascinating notion introduced by (Schon 1987; Schon 1992). It is a notion that refers to the way people reacted and responded when they are dealing with both the expected and unexpected circumstances. According to Schon (1987), such practices are essential for practitioners such as architects, doctors and musicians when it comes to

developing their professional artistry. It is this ability that enables a professional to have a dimension of novelty that makes him/her outstanding in his/her particular field of expertise. Many of his ideas with regard to this notion are derived from the ideas of John Dewey who considered the human being to be an inquiring organism (Phillips and Soltis 1998).
Schon (1987) described there are two types of action regarding how a person responds and reacts in the course of certain activities for example, kicking a ball, riding a bicycle and playing a musical instrument. The first action is referred to as 'knowing in action' which he described as the spontaneous action, based on a person's inner or tacit knowledge gained through previous experiences. This is considered to be a reactive process that deals with expected circumstances. The second action, meanwhile, represents the 'reflection in action' by which a person is able to improve his/her performances or abilities with regards to certain activities through the efforts of trials and errors. Thus, each subsequent effort is guided by the newly constructed ideas and knowledge as a result of making and refining previous efforts. In short, it is a proactive process that deals with the unexpected circumstances. Generally, 'reflective practice' is comprised of both of these two modes of reactive and proactive actions.

As discussed earlier, design has its own particular ways of thinking, knowing and doing. This is mainly due to the nature of design problems which are always regarded as ill-defined. Therefore, design is characterized of having those expected and unexpected circumstances or situations. In the process of dealing with such problematic situations, a designer is expected to utilize both modes of action as part of his/her reflective practice. It is a kind of two-way conversation between a designer and design situations: a designer 'talks' to the situation and in return the situations 'talk back' to the designer. It is a generative process of constructing and reconstructing knowledge and ideas in certain situated moments. In some ways, this idea is quite similar to the perspectives of the Social Learning theorists who proposed the ideas of situated learning or situated cognition (Phillips and Soltis 1998).

In design learning situations, interactions among studio peers may also provide valuable conversation materials for reflective practices among them. In this way, they are able to exchange among one another their problem-solving experiences gained in various design situations by locating themselves in a dynamic social process. As a result, each student modifies, manipulates and constructs his/her personal design knowledge and schemata that serve as guiding principles (Lawson 2004). It is a unique process of learning experiences in which a student is 'thinking about learning' and 'learning about thinking' in order to search for design solutions by means of active participations in the multiple events of designing and socialising.

2.8 Historical Overview of Design Studio

Design studio or studio-format learning environment is always referred as the centre of every architectural education program since the existence of the early schools of architecture. Although there are diversities in school-cultures, design studios in many parts of the world shared more substantial common activities and experiences rather than those differences in content and style (Goldschmidt 1983). It is a place where students learn and practice various new skills such as visualization and representation as part of cultivating design abilities. It promotes social and intellectual interactions between the tutors and design peers by means of telling and demonstrating using those methods of visualization (Demirbas and Demirkan 2003). As a result, students are beginning to think architecturally where they learn to engage into the graphic and verbal language game in which drawing and conversation are complementary and closely connected (Ledewitz 1985). In short, design studio functions as physical and psychological entity to accommodate design activities and cognitive processes.

According to (Lackney 1999), the models of studio learning originated from the practices of the apprentice in the atelier. This apprenticeship system also has its root to the guilds of the Middle Ages which primarily centred on the arts and crafts activities. Young apprentices worked while acquiring and learning skills in the studio of their master designer or artist. During those times, they did not learn in a secluded school, however they were exposed to the adult environment by working on real products among the adults in the community.

In the late 19th century, the training of architects from apprenticeship had shifted to the training in the higher institutions. It is the beginning of the formal architectural education where young architects acquire designing abilities through project-based learning. Two of the most important historical education models are the Beaux Arts and Bauhaus (Lackney 1999; Farghaly 2006). Their influences in many architectural schools around the world are still present until today.

Beaux Arts model highly emphasised on importance of mastery ability and learning by doing. It has a very competitive and hierarchical structure of teaching and learning. Students worked in ateliers in order to prepare for the entrance examination to the schools. In the period of their study, successful students were divided and assigned several design projects under the close supervision by a prominent architect or teacher acts a patron (Crinson and Lubbock 1994; Farghaly 2006). Thus, a master's studio model was established. Therefore, each student and patron from one studio will be competing for recognition with the other studios.

The assigned projects began as an 'esquisse' which is an initial sketch problem (Lackney 1999). The projects end with a 'charrette'. It refers to the process where the finished, elaborated drawings were to be demonstrated for judging by a jury of professors and guest architects without the presence of the students. Many of these design projects are based on historical precedents mainly the neo-classical architectural styles. According Crinson and Lubbock (1994), at Beaux Arts, all other subjects are subsidiary to studio projects and taught by lectures separately from the studio. Therefore, the separation has promoted studio as the dominant learning and training environment for the young architects.

Bauhaus model of architectural education emerged after the First World War. It created several new ideas and challenges to the traditional approach of the Beaux Arts model. Their approaches are based on learning and living in a community of practices. Bauhaus encourages the interdisciplinary interactions within the design studio. This is related to the views of the social learning theorists where unskilled or unknowledgeable people become peripheral participants to learn complex bodies of knowledge through their involvement in the community of practices (Phillips and Soltis 1998). The curriculum at the Bauhaus school was structurally balanced between the 'practical instruction' and 'formal instruction' (Crinson and Lubbock 1994). This structure supported architectural students in their learning by doing with other practices particular those involve in arts and crafts. The presence of other disciplines will enhance architectural students' technical experiences as well as their creativity and learning personalities by means of self-discovery (Farghaly 2006). As a result, architectural students gained mastery in certain technical skills in several disciplines. These are hands-on learning experiences through collaborative process that prepare more employable graduates. Bauhaus has repositioned design studios into a learning community where students acquire profound design abilities through active participation rather than passive listening. Meanwhile, historical influences become less important in design learning at the Bauhaus. Major emphasis are given on self expression, abstraction and learning from nature and material.

Beaux Arts and Bauhaus models of architectural education have established and strengthened the role of design studios for teaching and learning design. Design studios foster the ways of knowing and doing needed for discovery, integration, application, and sharing of knowledge between designers especially, tutors and student peers (Lackney 1999). Beaux Arts introduced the project-based learning by doing, where students are considered as the recipient while the studio masters as the provider of knowledge in a competitive atmosphere. On the other hand, Bauhaus allows discovery, self-regulated and hands-on learning by means of collaborative

and interdisciplinary practices. Nevertheless, many current architectural schools have adopted the synthesis of these two different approaches of learning in the studio-format environment.

2.9 Critical views on Architectural education in the design studio

Previous discussions on the intrinsic values of design have suggested that each individual has the capacity and ability to design. Therefore, design intelligence and ability are not based on gender, race or status. However, recent developments of architectural education have been overwhelmed by several setbacks that have created a degree of inequality among students and educators or tutors, particularly in the design studio (Groat and Ahrentzen 1996). Such setbacks seem to degenerate the true potentials of architectural education.

In relationship to those setbacks that were mentioned in the earlier chapter, Ahrentzen and Anthony (1993); Groat and Ahrentzen (1996); Groat and Ahrentzen (1997) have further identified several key setbacks based on their studies on a number of architectural schools in the United States of America. They considered that these setbacks have strengthened the notion of 'hidden curriculum' (Dutton 1987). There have been many concerned voices that call for the positive changes with regard to the 'mastery-mystery' teaching and learning model within this curriculum. This is a model in which the tutor has mastered the craft of architecture, but the process by which the tutor arrives at this mastery remains a mystery, particularly, to the students (Groat and Ahrentzen 1996).

According to Ahrentzen and Anthony (1993), the mentality of the 'starchitects' appears to be dominant in the design studio. It is an egocentric value that primarily emphasise on the idea of 'great monuments, great men' approach in the architectural education. Such approach implies that sex and race affect the artistic creations. Therefore, the negative underlying ideas of hidden curriculum have been extended into the notion of the 'mister-master-mystery' model in teaching and learning architecture. They argued such 'favouritism' model that exclude female and a particular race from the architectural mastery has narrowed the real definition of what architecture and architectural practice is. Consequently, students and their studio peers are receiving a distorted view of the profession. According to their study, such mentality can create unhealthy differences among the students. In the design studio, the female and 'minority group' students may need to put additional design efforts due to their fears of the possible subjective and double-standard in the evaluation process. Design collaboration is also often neglected and more recognition is placed to the personal choice and individual creative freedom in this syndrome of 'starchitects'. Therefore, the design students are not

being exposed to the crucial needs to value the views and roles of others as the integral part of their design learning and thinking process.

Although, architectural education has the potentials for its interdisciplinary breadth and creative expression, a study by Groat and Ahrentzen (1997) showed that in reality such potentials have not been truly explored in design learning and teaching. Several participants stated that there seems to be a sense of anti-intellectual bias among tutors in the design studios. It seems like there is a paradox when the students are told to know some knowledge about the science or the humanities and yet, they are not given sufficient opportunity to integrate that knowledge as part of enriching their educational process. Therefore, the pursuit of interdisciplinary linkages in design learning is treated in a rather less than substantial manner. Students may become accustomed to the idea that such superficiality approach is considered the correct way to do in design. As a result, they have the tendency to develop a negative thinking that 'we do everything the best'. Such tendency leads to the lack of respect for others' expertise in other discipline of knowledge. Subsequently, this may contribute to the isolation of architectural education from the various disciplines in a particular institution. Furthermore, design studio may become a breeding ground for narrow-minded architectural graduates living in an unrealistic world of exclusivity. Such negative value may endanger the survival of architectural practices in the real world that requires the collaboration of multiple disciplines and views in many complex design projects.

From these several setbacks of architectural education, Groat and Ahrentzen (1997) have given several proposals that may transform the architectural education to ensure its relevance for a better future. At the same time, these may avoid the misdirection of the design learning potentials toward the emergence of a negative peer learning culture in the design studio. Those proposals are as follows:

- connections to other disciplines through beginning studios
- integration of different modes of thought
- reformation of pedagogical practices
- collaboration
- caring for students without any discrimination based on gender or race.

A series of design projects devised by Morrow, Parnell et al. (2004) is considered as an interesting example of design teaching initiative that responded positively to those critical views and recommendations for changes in the design studio. These projects promote the importance of creativity and reality through the process of learning by collaborating with others. The students are encouraged to construct their own views by interacting with other

learning peers. This non-traditional project approach is regarded as an 'inclusive'(Groat and Ahrentzen 1996) learning experience by the students in which they are given the opportunity to see multiple or pluralistic points of view and also to exchange roles with others. In this approach, the students are subjected to a less subjective evaluation and grading. At the same time, they are becoming more sensitive and participative to the multi-faceted issues surrounding the practice of architecture, such as, the communal and environmental issues. Therefore, they are able to establish positive cultural practices that are not influenced by the 'star mentality' syndrome among their peers. In the design studio, they may work cooperatively with their peers without having the pressure of gender, racial and status differences. Consequently, they are building a fair and conducive environment for design learning purposes with a strong sense of belonging within the design studio peer community.

2.10 Summary

The ways of learning vary from one person to the other. There are many scholars and scientists who have contributed views and theories on the learning phenomena. Amongst them are Pavlov (Behaviorist), Kohler (Cognitivist), Piaget (Constructivist) and Vygotsky (Social Theorist). Behaviorists view humans as passive learners who are the recipient of knowledge from teachers, the provider. On the other hand, Cognitivists view learners as active individuals who explore and construct knowledge under the guidance of their teachers. Constructivists view learners as active learners who are constructing and composing complex schemata through discovery as they grow in maturity. On the contrary, the social learning theorists view learning as situational events in which learners construct knowledge as a result of their social interactions within a community of practices.

Many contemporary learning theories have emerge from those earlier theories. However, there are few theories that provide significant views on design learning. Most probably, design was interpreted by many scholars as a superstructure or extrinsic knowledge that is represented by the mastery of skills. Nevertheless, Cross (1982) argued that design is an intellectual discipline that is equally important as the science and humanity or literature disciplines. Design has its own ways of thinking, knowing and doing. Such argument has been supported by several studies. A study by Lawson (1997) demonstrated that design and science students have different problem-solving strategy. Design students used solution-focused strategy while the science students used problem-focused strategy. This study further indicated that design is an intellectual culture on its own nature.

Design is a complex, active and reflective process. A designer generates ideas and solutions by the means of 'parallel line of thoughts' which include divergent and convergent modes of thinking. It also involve reflective thought processes through the conversation with materials in a dynamic multiple, interactive situations and events particularly within the studio-format environment.

Beaux Arts and Bauhaus schools are considered two of the influential models in which the studio-format environment was established as part of the formal architectural education. These models focus on the importance of designing as a process of learning by doing while dealing with various design projects. Design studios at Beaux Arts are competitive and hierarchical. Meanwhile, at the Bauhaus, design studios encourage interdisciplinary, communal learning practices. Since then, design studio has become the central of the curriculum in many architectural schools world wide.

Critical views of the design studio have indicated that the real potentials of design in the current architectural education have been misdirected. As a result, there are several dilemmas that are confronted by the students and faculties based on their gender, race and status. One of the crucial dilemmas is the inequalities to act as contributors who can bring positive change to the architectural learning and teaching. This is in order to meet with the global demands for a more interdisciplinary and collaborative discipline of knowledge and practices. Such inequalities may also have several negative impacts on the peer learning culture in the design studio. Therefore, there are several proposals that may transform the current practices of the architectural education toward an inclusive approach that emphasise the importance of the pluralistic views in teaching and learning design.

Chapter 3
Peer Group, Socialisation and Culture

3.1 Introduction

According to Dalton and Petrie (1997), peer culture is regarded as a culture that provides psychological habitat for the college students. In relationship to this description, Lindgren and Suter (1985) highlighted two basic psychological needs of a person based on Maslow's Theory. These needs are for affiliation and also, achievement. For that reason, it is assumed that students in higher institution display a tendency to form friendships by taking part in the peer related activities. Such an assumption also suggests that students may act and respond in accordance to the expectations of their peers. This exists primarily to maintain a pleasant atmosphere and respect between friends, while, at the same time, helping them to learn from their peers through meaningful reciprocal interactions. These interactive situations may shape a student's personal meaning and behaviour through the exchange of a common language, practices, norms and values with his/her peers. As a result, there are possibilities for a student and his/her learning peers to create a shared 'mental software' (Hofstede 1991; Matsumoto 1996) thus allowing them to form a more effective basis for the transaction of knowledge and learning materials.

Based on these descriptions, it seems that the studio-format environment has the appropriate social learning atmosphere for the cultivation of peer culture among the architectural students. The reason for this is mainly due to the amount of time that is spent on communication and interaction. In many learning and social situations, architectural students are more likely to spend more time interacting informally with their studio peers than with their tutors or other members of the academic faculty. Therefore, there seems to be a greater degree of possibility that a student will be exposed to the influential elements of peer culture that are evolving and operating within the design studio.

3.2 Definitions of peer

According to Lindgren and Suter (1985), peer can be defined in three basic related categories. Those defined categories are as follows:

- **Peer** is defined as the association of those of same age, who can thus be assumed to possess similar status.
- **Peer Group** is the acquaintanceship of those of a similar age who are also members of the same group.

- **Peer Society** is a general term, referring to the social environment composed of one's peers, including friends, acquaintances, the peer group to which one belongs and other peer groups as well.

From the above definitions, there are three key words that have been used to describe peer. Those key words are *association, acquaintances and similar status.* All these words represent the idea of the inter-relationship of more than one individual, sharing common interests, preferences and values with other individuals to form a group, either formally or informally. In this research, the term peer group is most appropriate when it is used as a feature of this research's main body of terminology because it reflects a smaller number of individuals, such as the number of architectural students in a classroom or studio. Furthermore, a peer society gives the impression of a larger population and within this peer society, there are several smaller groups who possess diverse characteristics

3.3 Positive functions of peer grouping

In higher education, students especially in the early years have a tendency to associate themselves in the context of a peer group. This is because a peer group has three main functions that give them the sense of confidence when it comes to facing challenges of learning in higher education. According to Wilson (1981), those three main functions are as follows:

- **It provides the means of learning.**

  The means of learning can occur in the form of planned learning, for example, peer teaching and leaderless discussions or, 'incidental learning', for example group discussion out of class. Each form of learning may be used to either focus on formal (academic) or informal (social, moral) matters. A positive means of learning is beneficial to students in helping to overcome the period of 'disjuncture' as described by Parnell (2001). This is a crucial period in education in which it can cause frustration, confusion, a loss sense of self and a desire to search for the 'right' answers. According to Parnell (2001), the mismanagement of 'disjuncture' by the students and teachers can be 'miseducative'.

- **It provides students with the psychological and emotional supports necessary for dealing with the pressures of academic work.**

  A student who is facing enormous pressure will seek his/her closer friends for comfort. Sometimes having a simple conversation with friends will reduce the burden of having such pressure. However, a student who does not have any close friend to act as 'a shoulder to cry on' will have to deal with the pressure entirely on his/her own in a state of loneliness and social isolation (Parr and Townsend 2003). If the intensity of the pressure becomes unbearable, he or she might end up losing control and performing negatively. In

a worst case scenario, he/she may attempt self-destructive acts. There were some reported cases of attempted suicides in highly competitive institutions due to the inability of some students to cope with the extreme pressure of being successful academically.

- **It provides means for the fulfillment of personal needs, social status and wellbeing.** In higher education, many students hold to the belief that academic success is not the only success they are seeking. Being successful has a broader meaning for them. Some of them are proud of being popular in their peer groups because they may be athletic, wealthy, humorous or handy to have around. Others in the peers are simply happy being around such admired, respected role models. Therefore, members of a peer group may have a lot in commons; however, at the same time each one of them may unconsciously play a different role that complements each other in order to sustain the functions of the peer group. This is related to Bandura's and Erwin's ideas of learning by imitating and approximating through role playing (Lindgren and Suter 1985; Erwin 1998).

3.4 Peer assisted learning

Peer assisted learning is a constructive platform and domain for learning (Wilson 1981). It facilitates students to externalize their inner preferences and ways of processing knowledge. This domain is beneficial because it also gives students the opportunity to reconstruct their way of learning in a positive manner and also guides them towards a better academic performance. Such assisted learning experiences help students to deal with the pressures of being evaluated and graded. According to Parr and Townsend (2003), there are basically three types of assisted learning,

- **Peer tutoring**

  This is a system of tutoring in which students teach each other. In most situations, exemplary students with greater expertise in a particular area of knowledge will act as tutors for the others and the interactions are, basically, in one direction. However, when there is little difference between the student abilities within the peer group, the students will alternate the roles of tutor and tutee. Research has shown that peer tutoring has contributed to the achievement of significant gains in reading and mathematics. However, in the design studio, more emphasis is given to tutoring between the design tutors-students.

- **Cooperative learning**

  In cooperative learning, each participant within the group has a different area of expertise which becomes vital for sharing and learning from others. Students work together in a small group and participate on a collective task. Due to the equal importance placed on

each participant, this eliminates the sense of prejudice and favoritism that is normally associated to the inconsistency of evaluation or assessment made by the teachers.

- **Collaborative learning**
  In this form of assisted learning, knowledge and information are sought and negotiated between experts and those who have less expertise. The discourse is normally bi-directional. This helps students to improve their argumentative and reasoning abilities through their interactions with experts. And at the same time, the knowledge was co-constructed in the process of the collaborative talks that took place between them.

In the past, the student population in colleges was considered to be homogeneous. In other words, students, then, were similar in many aspects of their lives because they experienced a common so-called 'campus based' life. Thus, they were dependent to a high degree of strong traditions, symbols, rituals and values set by the universities or institutions. Therefore, peer culture at that time was in line with campus identity as a whole. However, according to Dalton and Petrie (1997), students' peer culture in today's institutions has taken divergent paths. This is because the institutions have less influence on the shaping of positive peer cultures for achieving academic success. Meanwhile, a negative peer culture may restrain students in their pursuit of a meaningful intellectual life. As part of the manifestation of the negative impact of this kind of culture, students may start to perceive their teachers or tutors as outsiders in their academic life. Consequently, teachers and tutors will find it difficult to impart and share the necessary knowledge with their students. Therefore, understanding the characteristics of peer interactions will make teaching and learning more effective.

3.5 Socialisation, agents and phases

Socialisation is defined as the process by which an individual acquires and develops attitudes and values, behaviours, habits and skills (White 1977). This is normally transmitted through the family, peer group and the mass media. It is a very complex process which can take place either harmoniously or in the context of conflict. In a harmonious situation, the interacting individuals will create stronger bonds and friendships, while in a conflicting situation the result may be a rejection and the rise of non-conformist behaviour. White (1977) further clarified that there are basically two phases of socialisation which he identified as the 'primary' and 'secondary' phases. The primary phase of socialisation is concerned with the period of childhood, during which parents are the most influential agents of socialisation; this is particularly so with regard to pre-school children. Secondary socialisation deals with the phase of education at schools and higher institutions. In this phase, friends, peers and teachers are considered to be the dominant socialisation agents. Nevertheless, these stages

can co-exist at the same time. In other words, primary socialisation does not necessarily become a prerequisite for secondary socialisation. However, it is important to realize that each phase of socialisation involves different socialisation agents. Different types of agent may be stronger and more influential in one environment than the others in similar environment. Presumably, in the design studio, peers are considered to be the stronger socialisation agents when it comes to the socialisation of design students.

3.6 Sociological and psychological views of socialisation

According to White (1977), socialisation is viewed differently in sociology and psychology. In sociology, a higher emphasis is given to society *(external elements)* as the major influencing force that contributes to the development of an individual's values, behaviour, habits and skills. On the other hand, in psychology, the individual's *(internal elements)* process of interacting with his/her external world by means of internalization, reconstruction, co-construction and externationalisation are of greater importances when it comes to shaping values, behaviour, habits and skills. In this research, both the sociological and the psychological views will be given equal weight for the purposes of its investigation. This is due to the research assumption that peer culture *(external)* in the design studio and a student's design learning interest *(internal)* may appear to have meaningful relationships which are yet to be discovered. Therefore, this research will consider the social cognition events as part of its investigation. According to Erwin (1998), social cognition is concerned with the way a person conceptualises other people and how he/she comes to understand the thoughts, emotions, intentions and views of others. Social cognitive processes enable people to predict the behaviour of others, control their own behaviour and consequently make attempts to regulate their social interactions while learning from others.

3.7 Mechanisms of peer socialisation

According to Parr and Townsend (2003), there are three major mechanisms that allows for the process of peer socialisation to take place. These mechanisms provide the means of obtaining peer acceptance, social approval and group affiliation. In the setting of architectural education, a student will utilize these mechanisms to ensure that he/she can become a recognizable part or member of a chosen peer group. The mechanisms are as follows:

- **Social comparison – internal to external (psychological)**

  As stated by Wilson (1981), one of the functions of peers is to provide a way of fulfilling the desire for social status. Therefore, individuals within a peer group have a tendency to establish relationships by making social comparison. This comparison is usually based on the degree of commonality that the individual shares with a particular peer group. The

more similarities they have, the more they are positively connected and, thus, relationship between them is reinforced. In this context, it can be assumed that a higher degree of similarity creates a stronger cohesion among peers – i.e. it generates 'pulling factors'. On the other hand, if several individuals find that they have more differences in comparison with a particular peer group, they will distance themselves – i.e. 'push factors' arise. If there are enough individuals who distance themselves from the peer group then a sub-culture of different norms may be formed. This situation is normally related to a negative sub-culture for example, low achievers and trouble makers. According to Parr and Townsend (2003), the greater the heterogeneity of academic and social status in a peer group, the more likely it is that the sub-cultures will be formed within a peer group.

- **Peer feedbacks – external to internal (sociological)**

  Individuals normally receive feedbacks and response from peer members based upon the standard of performance set within the peer group. These feedbacks are normally in the form of praise that reinforces positive attitudes. This may be done through formal discussions or informal interactions. However, feedbacks provided by other peers can also be in the form of criticism. Criticism by peers may lead to a feeling of rejection in certain individuals. As a result of such rejection, these individuals may react negatively and exhibit various forms of anti-social behaviours. Consequently, this may result in a loss of motivation and interest in attaining good academic outcomes among members of a peer group.

- **Observational learning from modeling**

  Peer models whose behaviour and attitudes are exemplary can be used to motivate other individuals within a peer group towards to improve their levels of achievement and performance. Therefore, positive modeling through the observations of others can guide individuals within a peer group towards behavioural and cognitive or affective changes. Having observed that others *(peer models)* perform well in certain tasks, this will encourage those individuals *(learners)* to have a confidence that they also have the ability to be successful. It was also suggested that younger students *(novice designers)* are more likely to be dependent on peer models as motivators compared to the senior or experienced students *(expert designers)*. This is probably due to the more seasoned knowledge that has been acquired by the senior students in their efforts to cultivate interest and expertise by observing peer models over the longer periods of their education and practice (Chan 2001). Perhaps, famous architects like Foster, Calatrava and Gehry were once to have observed their peer models whereas today, they have themselves become the role models for young architects due to their specialised knowledge and expertise.

3.8 Peer group formation and processes

Ryan (2001) contends that schools, colleges and classrooms are social places that become suitable places for the formation of peer groups. In her study, she describes that peer groups are usually formed when there is a high degree of 'homophily' or similarity. 'Homophily' is a social dynamic in which characterizes the tendency of individuals who share many common attributes for the purpose of affiliation. This dynamic situation is normally created by the process of socialisation that occurs by means of peer influence. Socialisation can take place 'indirectly' by means of observation or 'directly' by way of interaction and is a form of social reinforcement that takes place within a peer group. By means of socialisation, individuals will begin to make selection of friends. This ongoing selection process of friends will eventually create a peer group with a strong sense of shared homophily or commonality among its members. Smith and Mackie (2000) also stated that there are several stages that involve group socialisation processes when members of a peer group collaborate while working on a particular group task or project. Those stages are as follows:

- *Forming* where group members exchange of information on the task process while they get to know each other. It is a process of self-disclosure that promotes interpersonal interactions.
- *Storming* where members begin to engage in criticisms and form coalitions once they have known each other for a while.
- *Norming* where members have internalized the group norms leading to the emergence of consensus, cohesion and a unified sense of group purposes. It is this stage that encourages positive group identity and a sense of belonging.
- *Performing* where members are able to cooperate and produce high quality ideas. Thus, they manage to solve problems, make decisions, generate output and resolve conflicts more efficiently. Such cooperation promotes goal-focused effort aimed at mastery and high standards of performance.
- *Adjourning* where members of a group have strong emotional experiences and reminiscence and reflect after the completion of their group effort. At this stage, members evaluate their work, give feedback and express their feelings about their group. There are times when the dissolution of such a cohesive group can cause stress to some of its members due to this strong sense of group identification.

As stated previously, one of the most important characteristics of a peer group is the sharing of certain similar traits between group members. These traits may include hobbies, music, sports, foods, perceptions, academic subjects and also designing interests. These similarities may take the form of likes and dislikes. There are several theories on the similarities that

exist between individuals and groups of people. According to Brown (1984), similarity can take two basic forms, which are as follows:

- **Attitudinal similarity**

  A similarity between the values and ideologies prevalent in a certain group

- **Status similarity**

  The proximity of groups regarding some dimensions of value or prestige

Furthermore, he stated that there are two main schools of thought concerning the nature of similarity. One school of thought sees similarity as a convergent and friendly event. The other looks at similarity as an oppositional and competitive event. From these schools of thought, three theories have been introduced. These theories are described as follows:

- **Frustration-Aggression theory**

  This is related to the event in which members of an in-group with shared similarities act aggressively to other individuals who do not share similarities with them. As a result, these disliked individuals join together to form their own group as a reaction and in order to counteract the aggression. This is normally associated with those individuals who are being bullied and treated as outcasts.

- **Similar-Attraction theory**

  The fundamental assumption underlying this theory is that people need to be alike in order to evaluate themselves, their opinions and their abilities. Without the opportunity to make self appraisals, a person's life may become miserable, punishing and even dangerous. Researches have shown that people are attracted to individuals or groups that are similar to themselves in opinions, abilities or both. This is considered as a social method of evaluating and comparing for the purposes of testing the correctness of opinions and also estimating capabilities against standards set by others within a group of people. Consequently, the group creates social perimeters or boundaries of action and judgment for its members.

- **Social Identity theory**

  This is a theory that refers to the spontaneous categorization of the social worlds into out-groups and in-groups with some experiencing high levels of self-esteem to such an extent that their in-groups have more status than the out-groups (Sears, Peplan et al. 1988). This categorization can even take place without the presence of the in-group members and with very minimal reward. This theory is applicable to the comparison between two separate but equally positive groups (intergroup comparison). In each group, the members are close enough to one another in terms of the similarities that they share. Such closeness is further enhanced by the needs to be more prominent in comparison with other groups. This is because each group is striving to be the best or most original in order to out-perform the other groups. This

may also take place in the studio-format learning environment, where, for example, a group of students who idealise Norman Foster maybe competing with another group who idealised Santiago Calatrava in order to gain enhanced group esteem and recognition. This is considered a healthy design learning situations which can make architectural education more dynamic, inspiring and challenging for architectural students.

These theories suggest that people who share higher degrees of similarity have a stronger tendency to form cohesive groups, clustering together on the basis of the various relationships and design interests that exist among them. In the context of this research study, it is suggested that there is a strong possibility that where similarities in designing interest exist among studio, peer cohesion and identity may be reinforced. Furthermore, such reinforcement will further sustain the existence of the peer culture. At the same time, the emergence of students' designing interests needs the support of the peer culture which was initially formed from the dynamic process of socialisation. In return, the emergence of further interests helps to sustain, maintain and strengthen the peer culture that is being characterized by the level of cohesion that exists among students within a peer group. From this stage onward, the coexistence of designing interest among students and peer cultures in the design studio becomes complimentary in such a manner that they reinforce one another. The diminishment of either one will weaken the other. This perhaps explains why the design studio is regarded as having had a prominent culture of its own.

3.9 Peer socialisation in design learning: A study by Wilson

As mentioned earlier, design studio environment is regarded as the central learning environment for architectural students. In addition to this intended setting for learning, the design studio has also become a place for the development of psychological and sociological states such as the emergence of peer friendships and culture among students. According to Lawson (2001), designed environments, including the design studios are supposed to accommodate three basic needs: *stimulation, identity and security*. Therefore, a design studio creates an environment *(external/sociological)* that allows students with various personality types *(internal/psychological)* to interact with their peers by means of a situation known as functional proximity (Erwin 1998). This situation is described as the degree to which the social and physical environment allows close contact between individuals or students, especially, if the learning environments take the form of an open classroom as in the case with the design studio. The higher the degree of compatibility that exists between a person and his/her environment, the more active his/her experience of learning and socialisation will be.

Therefore, this will encourage students to socialise and establish positive relationships with others. Subsequently, these students may find that they share many similarities or commonalities with their peers as far as designing are concerned.

In design studios, the interactions and socialisations that take place among the peers are also a form of informal learning that is guided towards intellectual growth and the enhancement of interpersonal skills which are the key components of Emotional Intelligence (EQ) (Johnson 2001). According to Johnson (2001), EQ is one's ability to associate, connect and work with others. This is important because it determines how well a person uses his/her abilities and intelligence. To acquire such intelligence by means of the process of socialisation, verbal skill is regarded as a powerful communication tool for establishing meaningful transactions between students. In architectural education there is a demand that a student should possess a good deal of ability in verbal communication as well as visual communication i.e. graphicacy. Studio learning activities such as tutor-student sessions and design presentations require students to communicate their design ideas and thoughts verbally so that tutors and design juries are able to make evaluations, judgments and recommendations. As such, this is a form of the heuristics model of teaching and learning (Wilson 1981). This immediate and generative process of exchanging ideas between experienced and novice designers is one of the key elements in teaching and learning architecture.

One of the outcomes of this learning experience is that an architectural student is able to improve his/her verbal communication ability. The combination of verbal and graphicacy abilities is a very useful communication tools to have in design, and becomes especially so when design ideas need to be discussed with clients and other consultants in actual architectural practice. Due to the active nature of learning verbal and visual languages, the socialisation process among architectural students in the design studios seems to be more dynamic than in the traditional classroom learning environment. From a developmental perspective, it is assumed that a further outcome of this socialisation process will be the formation of a peer culture. Therefore, this formation may contribute to the emergence and cultivation of the significant underlying standards of subjective judgments that exist among architectural students. As suggested by Wilson (1996), based on the findings of the study she conducted on architectural students, such judgments are hidden within the peer culture.

The underlying intention behind the study conducted by Wilson (1996) is to investigate the preferences or standards of judgment held by the architectural students. Such judgments may be acquired by students through a process of socialisation that takes place during their period of education. The method used in the study involved interviewing students at five different

stages of architectural education from two different schools of training, one from the north (Scotland) and the other from the south (Southern England). The interviews were assisted by 26 photographs of prominent buildings with distinct styles/identities (Modernism, Post Modernism, Neo Vernacular, High Tech). The analytical instrument used in this study is the 'Smallest Space Analysis (SSA). Intriguing findings from the study were as follows:

- First year students from both schools have similar evaluations of the building. Their evaluations are closer to the laymen opinion.
- The differences become greater after increased period of education where specific school having difference in socialisation atmosphere. The northern schools favoured Post-Modern while the southern favoured the Modern architecture.
- Students in the same school display similar changes in evaluation whereas students from the early years and late years students shared similar preferences.
- A student from a different school entering new school that has different socialisation environment will change his/her preferences in conformity with the new pattern of socialisation.
- Design concepts produced by students are driven by style rather than innovative ideas

From these findings, Wilson (1996) came to several conclusions, which are as follows:

- Architectural education systematically instills an evaluative system in students.
- Variations in the architectural evaluation system could be attributable to a specific architectural school.
- There is an underlying structure of subjective evaluative judgment due to the possible socialisation process that takes place within the design learning environment.

This study had established that there was a hidden underlying structure of evaluation at work among these groups of students. However, this study did not proceed to the further investigation of the possible influential, developmental factors that may explain the emergence of such a hidden structure. Presumably, one of those factors may involve the peer culture. Therefore, this research study will attempt to look into those various possible factors by focusing on the development and dynamics of peer culture in the design studio in which the architectural students may display a tendency to affiliate and collaborate on the basis of a degree of peer cohesion that is expressed by their shared of similarities.

3.10 Understanding the richness and complexities of culture

An elaboration on the definition of culture is considered important when it comes to providing a further understanding of its fundamental characters. This will provide additional supportive ideas to construct a framework for the investigation of peer culture in the design studio. Storey (1993) suggested there are three broad theories on culture which are as follows:

- Culture refers to a process of intellectual, spiritual and aesthetic factors – great philosophers, great artists and great poets.
- Culture also suggests a particular way of life whether of a people, a group or one existing in a certain period
- Culture refers to the works and practices of intellectual and especially artistic activity. In other words, the principle function of those texts and practices is to signify, to produce or to be an occasion for the production of meaning, signifying practices for examples, poetry, the novel, opera, fine art and even architecture.

Based on these broad theories, the term 'culture' has been defined and clarified in many different ways. Archeologists, for example, describe culture by making inferences based on the artifacts left by certain civilization, such as tools, armaments and monuments. Conversely, the Sociologists look into the pattern of interactions between the members of a society in order to learn about the culture of a society. Although these two diverse fields of scholars have different emphases and agendas, generally they are still looking for the commonality of the tangible and intangible elements shared by the members of a society when they are studying about culture as a phenomenon.

This research, therefore, is interested primarily in the commonality of tangible and intangible elements (Persell 1990; Macionis and Plummer 1998) that are generally shared among the design student peers. Tangible elements are observable cultural features that include objects such as craft utensils and behavioural norms such as greetings. The intangibles elements are non-observable features that include values and beliefs residing inside one's mind. In culture, both of these elements are closely related because they influence each other. Likewise, these individual elements evolve within the design and the social events that take place in the studio peer culture, and thus are considered as one of the primary areas for this research study.

In helping to understand the operation of these cultural elements, the followings are three useful examples that will describe such complex cultural operations. These examples are located in three different situations which indicate the richness of cultural phenomena and situations. Although, these situations seems to be familiar, they are quite strange when they are observed and studied closely, from a general view toward a particular view (Macionis and Plummer 1998).

- **Example 1**

Matsumoto (1996) stated that culture is filled with richness. However, it is also a very complex, invisible phenomena. For example, imagine an American and a Japanese meeting in a social event and introducing themselves to each another. The American will greet the

Japanese by offering his hand and expecting the Japanese to shake his hand, yet unexpectedly in return the Japanese bows his head in return. This is one example that clearly indicates the manifestation of two different operating hidden cultures in the form of behaviour and norms (tangible) in a particular social situation or context of 'situatedness' (Gero and Kannengiesser 2003). These contrasting behaviours or postures are neither wrong nor right. A greeting in the context of a social event may seem to be a simple observable situation between two different individuals. However, the possible consequence that lies beneath these contrasting behaviours can be negatively overwhelming once they surface in reality. If each individual conservatively see things through his or her cultural filters or lenses that is known as 'ethnocentrism' as opposed to 'cultural relativism' (Matsumoto 1996) which may cause cultural tensions. As a result, each person is suspicious about the other person's values (intangible) such as trust, honesty and respect. If such a cultural situation becomes more severe, it may result in serious group conflict between the members of the 'ingroup' and 'outgroup' as described by the social identity theory (Brown 1984; Tajfel 1990). In an occasion, a greeting forms a situational cue (Feather 1994) that triggers a person's reaction, consciously or unconsciously. Most likely, such a reaction is either influenced mentally or physically or shaped by the culturally-based software that has been programmed into his or her mind.

- **Example 2**

Another example that is related to the complexities and richness of culture can be described by reference to a situation in which two well-established architects *(e.g. Ken Yeang and Calatrava)* meet in an international architectural conference taking place in one of the architectural school in Australia. In an informal conversation, both of them may be easily able to discuss and understand ideas about current architectural events based on their previous experiences as students. Perhaps, the design studio of that university may act as a reference or 'holding environment' for their conversational materials. However, there is a strong possibility that a difficult conversational situation will arise when they are trying to understand and grasp ideas of the signifying practices of their individual local community such as, local customs, rites, festivities and celebrations. In the first situation, both Ken Yeang and Calatrava had similar experiences of both design and social events that took place within the architectural education and that acted as unambiguous situational cues, even though they were from different regional backgrounds. Thus, this is regarded as a 'similar-yet different' situation (Gero and Kannengiesser 2004), in which they are able to use their shared commonalities as the basis for a better degree of understanding which would compensate for their differences. However, in the latter situation Ken Yeang and Calatrava may experience difficulties in connecting their states of mind clearly, due to the ambiguous situational cues.

This is because they do not share many similar experiences of events that are specifically related to each individual regional community. This is an indication that culture manifests itself either in the form of cultural universalism or cultural specific, known as 'etic' and 'emic', respectively. According to Smith and Bond (1993) and Matsumoto (1996), 'etic' refers to the aspects of life including human behaviour that seems to be consistent, universal among people all around the world. For example we all eat, we all make friends and we all have ways to greet others. While, 'emic' refers to the different and specific ways in which these behavioral traits are practiced between different communities. Similarly, the studio peer culture may have a character that is universal among members of the wider design community regardless of race and national borders. However, at the same time it has a specific, particular ways of doing things for instance graphicacy and modelling which Cross (1982) delightfully described as the 'designerly ways of knowing' that are different from other scholarly communities such as the medical community described by Becker, Geer et al. (1961) as 'the boys in white'.

- **Example 3**

Finally, this is another unique, interesting example relating to cultural phenomena that are specifically related to the studio peer culture. This is referred to the following statements by one of the interviewed participants in the course of this research.

> *'....This year (2nd year), I worked at home. I didn't work in the studio which I think maybe that was why I was a bit stressed out. Because you know, at home, you're just alone....'*

This statement shows that although this student was working on her design outside and away from the studio social and design events, she felt quite uncomfortable with the working atmosphere at home. This indicates that she may not have felt able to share in the cultural features and perform the relevant signifying cultural practices (Storey 1993) of the studio due to individual differences and circumstances in comparison to her other studio peers. Nonetheless, she still has the sense and awareness that there is a peer culture operating within the design studio that is situated away from her home. In short, she did not have any situational cues that would make it possible for her to respond on the basis of her cultural position, yet, psychologically she still felt virtually associated with the studio culture even though it was separated from her in terms of time, space and events. According to Matsumoto (1996), many cultural features and characteristics shared across members of a cultural group are psychological in nature. Although there can be individual differences in the degree to which members of a cultural group embrace and harbour those cultural attributes due to

personality and spatial differences, the existence of those attributes is acknowledged and recognized by all members of the group. This is because the general ideas and codes attributed to a particular culture learned either consciously or unconsciously from the socialising agents within their particular environment had already resided in their mind. Based on these three examples, the following are several key points that summarise the descriptions of these rich and complex cultural phenomena:

- Culture is manifested in both the non-observable intangible and observable tangible elements.
- Culture is not only about race and nationality although both have the potentials to serve as cultural indicators and associations.
- Culture is not biologically determined or inherited but rather is learned through socialisation with primary and secondary agents *(parents, studio peers)* depending upon one's social environment including its situations and situational cues *(greetings-hand shakes)* for example, the family, neigbourhood and design studio environment.
- Culture may be formed and operated at several layers or levels for example, the national, regional, gender, generation, social class, organizational and institutional level. This is because almost everyone belongs to a number of different groups and categories of people at the same time (Hofstede 1991). They, thus, unavoidably carry about several layers of mental cultural codes representing those various layers and levels of culture. This can be seen in the example which involved the notion of 'emic' and 'etic' concerning the interactions between the two architects.
- Cultural senses can be activated by means of situational cues like, for example, responding to someone's greeting, but at other times the sense of culture takes a latent form. The cultural experience of a student who was designing alone at home without interacting with her studio peers in a culturally scripted environment is an example of this form of latency. This clearly indicates that culture is psychological in nature (Matsumoto 1996). Members of a cultural group may have varying degree to which they respond towards cultural situational cues, or may even lack the cues altogether. However, collectively they have a shared understanding that the significance of their culture manifested in the tangible and intangible cultural elements is, in fact, real.

3.11 Cultural manifestation elements

As stated earlier culture is a unique and complex phenomenon. Therefore, the study of culture is challenging because it has to deal with both implicit and explicit cultural dimensions. Consequently, it is difficult to grasp a cultural phenomenon as a whole. However, it is possible to study culture by observing and investigating the dominant elements

and their processes that manifest a particular culture such as the studio peer culture. Generally, culture is about a way of life shared between members of a community. When one is to describe a community in terms of culture, he or she is referring to its pattern of meanings, its enduringly expressive aspects and symbols contained within it that represent and guide the thoughts, feelings and behaviour of its members (Griswold 1994). The 'culture' of a community is inter-related to the 'social structure' of the community such as the pattern of relationships that exist between the members. Hence, culture and social structure influence one another.

According to Macionis and Plummer (1998), although cultures found in most communities and societies vary in many ways, they are manifested around five universal elements. These elements are *symbols, language, values, norms and material objects*. Values and norms are considered as the intangible elements whereas the others are seen as the tangible elements. These elements are described as follows:

- **Symbols** are anything that represents a particular meaning recognized by people who share a particular culture. Objects, conditions, characteristics of persons such as flashing red lights, eclipse of the moon and Winston Churchill help people to make their surrounding more meaningful and allow them to have a better sense of life.
- **Language** is a system of symbols that allows members of a society to communicate meanings with one another. It comes in the form of both the spoken and written words and these include metaphors, stories, myths and legends. A system of language is able to guide people's understanding of the world but does not limit how they do so.
- **Values** are culturally defined standards by which people appraise desirability, goodness and which serve as broad guidelines for appropriate social living. In other words, they are the broad tendencies of preferences for certain state of affairs as opposed to others (Hofstede 1991). They deal with, for example, evil vs. good, ugly vs. beautiful and irrational vs. rational. Closely related to values are beliefs which refer to the specific statements that people hold to be true. While values are abstract standards of goodness, beliefs are particular matters that individuals consider to be either true or false.
- **Norms** are the way people behave in a given community. Their behaviours are guided by the rules and expectations of a community. It is concerned with what is ethically right. Some norms are proscriptive in which they give cues as to what people should not do, while others are prescriptive telling people what they should do. Mores and folkways are also other types of norm. Mores are the society's standard of proper moral conduct and folkways are customs for routine, casual

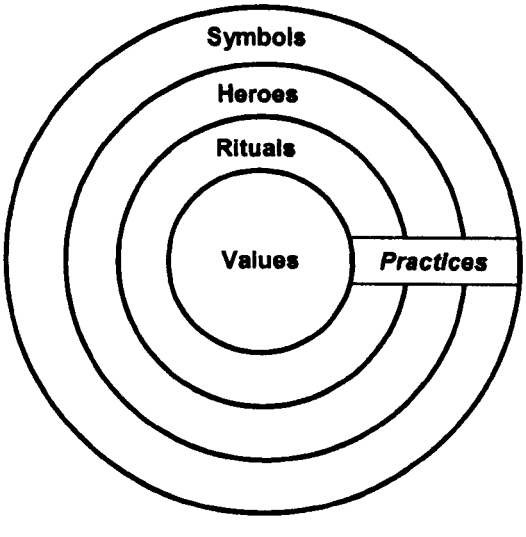
interaction. Therefore, mores distinguish between right and wrong, while, folkways draw the line between politeness and rudeness in a given society.

- **Material objects** are artifacts created by human beings that signify the particular culture of a community. These artifacts include the 'chopsticks' used by the Chinese to eat, the 'tatami' mats placed in a certain order in Japanese houses and the 'keris' used as a weapon by the Malays.

It is important for one to realize that these elements only serve as broad guidelines that may facilitate the study of cultural phenomena. Therefore, there are several approaches to how these elements can be combined and integrated to form a more useful category of elements that are dependent upon the culture to be studied. This is because, as stated earlier, a culture can be formed at various levels and on various scales i.e. at the regional, national, organization and community levels.

One of such approaches was a cross- cultural research conducted by Hofstede (1991). Most of his researches concerned the organisational culture of multinational corporations like IBM. Based on his many years of research into this culture, Hofstede defined culture as the collective programming of the mind which distinguishes the members of a group or category of people from another. He also stressed that this definition is by no means that people are programmed in a similar way to the computers because a person's behaviour is not only predetermined by his or her mental programs which he also described as the software of the mind: rather he or she has the basic ability to deviate from them and to react in ways that are new, creative or unexpected. Hofstede also realized that culture is manifested in several ways in various communities. Therefore, he used four terms that are closely related to the five manifesting elements discussed earlier. Those terms used by Hofstede are *symbols, heroes, rituals and values* as illustrated in Figure 3.1.

Figure 3.1 - Manifestations of culture from shallow to deep (Hofstede 1991)



According to Hofstede (1991) symbols are the words, gestures and pictures that carry a particular meaning which is only recognized by people who share that particular culture. Some examples are catchphrases, jargons, dress, hairstyles, flags and status symbols. Heroes are persons, alive or dead, real or imaginary, who possess characteristics highly valued and respected in a culture and who thus serve as models for behaviour. Rituals are the collective activities undertaken by people inside a culture to attain certain desired ends. Finally, values are described as the broad tendencies of preference for certain states of affairs over others.

Based on Figure 3.1, Hofstede (1991) suggested that symbols are in the outermost layer of the onion diagram representing the most superficial elements because they are most visible and susceptible to changes. Values, on the other hand, are considered to be the deepest manifestation of culture or in other words they are at the core of culture which has the most resistance to change. Heroes and ritual are both located in between the deep and shallow layers. Hofstede (1991) further integrates symbols, heroes and rituals into one category that he termed as 'practices'. He stated that although practices that involve symbols, heroes and rituals are visible to the people outside a cultural group, the cultural meanings remain invisible and only the members of such cultural groups are able to understand and interpret them accordingly.

Hofstede's model for understanding the commonalities of elements that manifest culture is a beneficial model for the general guidance of the study of the studio peer culture. Some of those elements, however, may not be appropriate for this study of peer culture in the design studio. This is because the studio peer community is different in terms of its operation, environment and social structure from the corporate business community. Nevertheless, his ideas as visualized in Figure 3.1 about the commonality of cultural elements that operate in between the shallow and the deep layers through a parallel cultural process are regarded as a useful reference point in the context of this study. Perhaps, by incorporating Hofstede's ideas of 'parallel of cultural practices' with Lawson's ideas of 'parallel lines of design thoughts', one may gain a deeper understanding of Cross's ideas of 'designerly ways of knowing' in relation to peer designing activities. Presumably, in the course of their learning processes and activities, the dynamic relationships between studio peer culture and parallel design thoughts is capable of shaping design students' 'designerly ways of knowing'.

3.12 Summary

In an active learning environment such as the studio-format environment, architectural students are exposed to interactions with their learning peers. This naturally brings about socialisation processes that allow for exchanges of ideas and knowledge. Therefore, with regard to peer groupings and collaborations that take the form of meaningful social process, there is a huge potential for positive functions and outcomes. Those positive functions include learning from others by observational modeling and co-constructing novel design ideas to deal with the ambiguities of design problems and situations. Although, there are times where students criticize and challenge one another, they are able to resolve conflicts effectively by having a common understanding of the nature of both learning and actually doing design. Thus, in the design studios, the students may start to form several smaller groups of peers within the wider peer group. However, most of them share the principal commonalities that shape their 'mental software'. Therefore, such dynamic processes of socialisation lead to the emergence of shared 'mental software', and may in the end result in the formation of a studio peer cultural phenomenon.

Culture is a rich and complex phenomenon which can be described as the 'meaningful sharing' that takes place between members of a community. This involves the sharing in common of the tangible and intangible manifesting elements such as norms and values, respectively. Therefore, the study of culture should take into consideration these two types of elements. According to Hofstede, cultural practices are determined by the close interplays of both the visible, shallow and the hidden, deep manifesting elements. In addition, Matsumoto stated that the psychological affairs related to culture are considered to have an influential role in determining the visible signifying cultural practices.

The study drawn up by Wilson demonstrates that there are interesting findings that have a bearing on the studio peer cultural phenomenon. She suggests that architectural students undergo a socialisation process that has an influence on their design learning activities. Furthermore, the design preferences and interests that exist between students in a particular architectural school tend to converge. Therefore, this represents an interesting attempt to investigate the hidden, psychological states of mind that are at work shaping the intriguing phenomenon that is the studio peer culture.

Chapter 4
Design Studio Multiple Events and Personal Constructs

4.1 Introduction

This chapter discusses the relationships between situations, design and social cognition that occur within the studio peer culture. It will also discuss the Theory of Personal Construct. The main rationale for these discussions is to draw together additional important ideas that will support the key issues related to design and cultural activities. In the earlier discussions, it emerged that there seemed to be a strong possibility of peer cultural operating within the dynamic design domain of the studio format environment. Such cultural practices may involve the existence of multiple design and social events situated in the design studio that act as the locus for architectural learning activities. Consequently, there are strong possibilities for the presence of peer cohesion and shared commonalities in designing interest among studio peers. These may be characterized as the underlying subjective standards of judgment that are at work in the peer-group environment (Schon 1988; Wilson 1996). These are the mysterious invisible parallel psychological and social forces that regulate architectural students 'designerly way of knowing'(Cross 1982) in the designing process. In addition, the studio peers may also develop their own distinct 'constructs' to create more meaningful design and social events that represent their community of practices.

This chapter is divided into several sections which are as follows:

- The discussion of the key ideas and issues raised by Gero and his research associates about design situations, construction and the interaction of design ideas as they are exchanged between designers
- Several of Gero's interesting ideas that in certain ways exist in parallel with the ideas of Schon and Lawson on design cognitive activities
- Theory of Personal Constructs which is useful in identifying the way studio peers construe their surroundings within the context of the signifying practices and multiple events
- Comparative discussions and summaries leading toward the context of the research study, particularly on peer culture and design learning

These discussions will provide a good understanding of the relationship between design learning activities and peer interactions in the studio-format learning environment. Subsequently, the researcher will be able to construct the general framework for research investigation.

4.2 Function-Behaviour-Structure (FBS)

John S. Gero is an educator and researcher who has a great interest in design cognition and process of designing which also include architectural design. In his early works, Gero focused his researches on understanding the designing process of a single individual designer whom he described as an agent. He introduced a key concept termed as 'design prototypes' which refers to a form of knowledge representation schema, rule or principle of design experience. This idea represents an initial effort to demystify the design process and it became his landmark research work later known as the Function-Behaviour-Structure or FBS (Gero 1990). However, he soon discovered that the design process is not a static, internal cognitive event. Instead, he found that it is dynamic due to the curious nature of the agent (Gero and Reffat 1997; Gero 1998; Saunders and Gero 2002) engaged in constructing the 'memory' (Gero 1999) that increases his/her ability to become an expert. This 'memory' is constructed as a result of interactions between internal and external factors in a given loci which he described as 'situatedness' (Gero 1998). This idea of dynamic, multiple designing events is basically similar to 'parallel lines of thoughts' (Lawson 1993) and the idea of 'design worlds' by Schon (1988). Gero became aware of this phenomenon largely because he began to realize that there are multiple forces created by the social environment impacting on the process of designing. Such multiple impacts condition the interactions between the various individuals or actors whom he described as multiple agents (Kannengiesser and Gero 2002; Gero and Kannengiesser 2004). This awareness is shared by Schon who views that designing is a social process (Schon 1988; Cross and Cross 1995) in which a series of dynamic constant 'feedbacks', 'talkbacks' and 'reflections' takes place between the internal and external environment of a designer and also between their peers. From the perspective of this research, Gero's works and ideas on the interactions between multiple agents in 'situatedness' may contribute some insights into understanding how architectural studio peers arrive at the stage of 'commonalities' or 'homophilies' (Ryan 2001) before they advance to a further designing stage. The following stage is a more complex form of meta-cognitive process that involves a high order design ability (Lawson 1993).

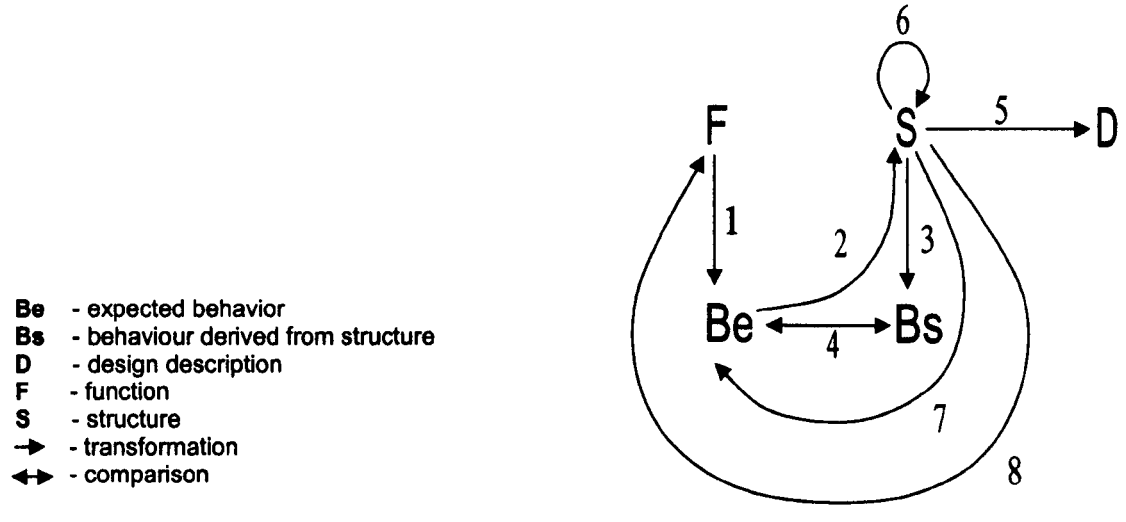
According to Gero, there are many great historic civilizations that produced artifacts (for example, poetry, drama, fine arts and architecture) by means of signifying practices (Storey 1993) in order to express the advancement of their cultural and knowledge. Physical cultural artifacts, which include landmark buildings were designed and built primarily based on the functions and needs of the progressing civilization. From this perspective, Gero therefore, suggested that design is purposeful and the activity of designing is goal-oriented: in other words, it proceeds towards its objectives through a process of exploring for appropriate

variables in order to form a coherent ideas and a unified understanding of a particular artifact. He also emphasised that an effective design activity occurs within two contexts which are known as the context within which the designer operates and the context produced by the development of the design itself. In other words, design activity largely depends on the designer's perceptions of the context in which the act of designing takes into 'place' which can also be known as 'holding environments'(Schon 1988) or 'design space'(Eckert and Stacey 2000). This process is similar to the 'situated learning' in which knowledge is actively engaged and generated by learners naturally in 'situations' (Phillips and Soltis 1998).
Based on this understanding, Gero proposed his FBS schema, later to be known as his frame work which represents design knowledge in the form of three abstract notions known as function (F), behaviour (B) and structure (S). By using a 'window' as intended the design artifact, the definitions of these notions may be characterised as follows:

- The *function* (F) of the design object is defined as its teleology – *'what it is for' (e.g. controlling noise, providing view)*
- The *behaviour* (B) of a design object is defined as the attributes that are derived or expected from its structure – *'what it does' (e.g. thermal conduction, light transmission)*
- The *structure* (S) of a design object is defined as its elements and their relationships – *'what it is' (e.g. glazing length, height, thickness, materials)*

The outcome of this schema is the design description (D) of the object in the form of graphicacy (Cross 1984) for example, drawings, sketches and notes. This schema is also diagrammatically represented by Gero, to illustrate the relationship between those notions that resulted into eight (8) processes within the schema or framework shown in Figure 4.1 (Gero 1990; Gero and Kannengiesser 2004).

Figure 4.1 – Function, Behaviour, Structure (Gero and Kannengiesser 2004)



1. Formulation (F – Be)

transforms the design requirements, expressed in function (F), into behaviour (Be) that is expected to enable this function (e.g. sound reduction, view area)

2. Synthesis (Be – S via Bs)

transforms the expected behaviour (Be) into a solution structure that is intended to exhibit this desired behaviour (e.g. glazing area, thickness, orientation)

3. Analysis (S – Bs)

derives the 'actual' behaviour (Bs) from the synthesized structure (S)
(e.g. solar absorptions, light transmittance, reflection)

4. Evaluation (Be – Bs)

compares the behaviour derived from structure (Bs) with the expected behaviour (Be) to prepare the decision if the design is to be expected

5. Documentation (D)

produces the design description (D) for constructing or manufacturing the product

6. Reformulation type 1 (S – S')

addresses changes in the design state space in terms of *structure* variables or ranges of such values for them if the actual behaviour is evaluated to be unsatisfactory

7. Reformulation type 2 (S – Be)

addresses changes in the design state space in terms of *behaviour* variables or ranges of such values if the actual behaviour is evaluated to be unsatisfactory

8. Reformulation type 3 (S – F via Be)

addresses changes in the design state space in terms of *function* variables or ranges of such values for them if the actual behaviour is evaluated to be unsatisfactory

Gero stated that his proposal on the FBS framework was his effort to further abstract Asimov's model of designing that refers to as a sequence of acts which were divided into three classes, *analysis – synthesis – evaluation*. However, he realised that such a model was too simplified and was not adequate to the task of representing the complexity of the design process. Therefore, he expanded and redefined this model by replacing the 'analysis' sequence of design process with one called 'formulation' because designers use conjecture and appositional thinking to deal with an ill-defined problem (Cross 1984). Gero's FBS framework also introduces three main processes *(reformulation 6, 7, 8)* into the final stage of

designing activity. He considered that these three reformulation processes as the 'missing links' in many of the earlier models used to represent design process. These processes deal with interactive multi-dimensional aspects of unseen design worlds where the design activity becomes intensified in the high order design thinking stage which is characterized by meta-cognitive and deep processing (Lawson 1993). These 'design worlds' were described by Gero as the *external world, interpreted world and expected world.* This is an open and dynamic setting or context for the state of 'situatedness' and constructing memory: it helps to create a design position for grounding and launching ideas in which an agent or multiple agents interact with the environment until they arrive at a common ground (Kannengiesser and Gero 2002). The determination of this position is vital before those agents embark on the next stage of design process.

4.3 'Situatedness' and constructive memory

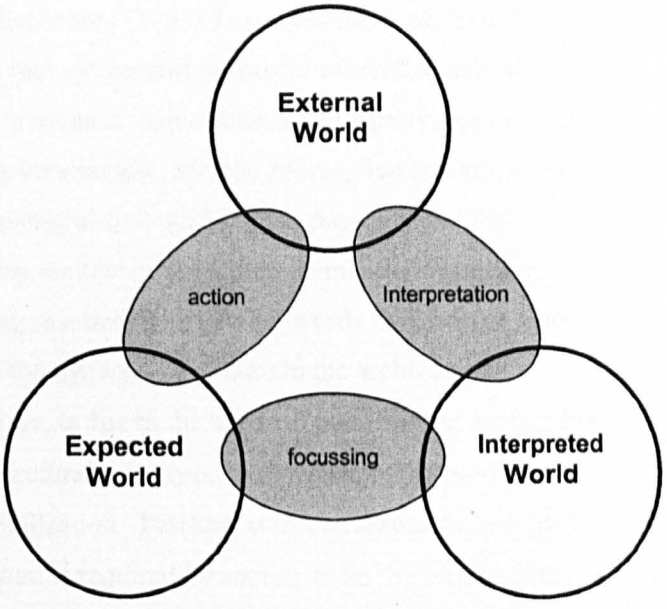
As stated earlier, Gero attempted to move away from the 'static' dimensional viewpoint of using the FBS paradigm as his 'principle idea unit' which sought to capture the process of designing an artifact. He began to explore and experiment with this 'principle unit' into a 'dynamic' dimension of design activity. Consequently, he realized that design activity does not occur in linear patterns nor it is strictly compartmentalised into a single, rigid dimension or 'universe' with confined parameters. In fact, design activity has its own 'universe' comprising a chain of multiple interactions and events without perfect ends. This is because it 'vibrates' continuously to accommodate growth and change. Due to this complex nature of design activity, Gero attempted to capture the essence of the design universe and revised his FBS framework into what is called 'situatedness'. This is a context or state that he described as a multi-interaction of three worlds: *the external world, interpreted world and expected world* (Gero and Kannengiesser 2004). Gero argued that 'situatedness' is a location that serves as an interactive design setting for agents (designers) to recall previous memories and experiences in order for them to deal with ill-defined problems. Hence, these agents or designers are able to construct new experiences and memories that enhance their design cognition and ability (Figure 4.2). In a general terms, Gero described such a construction of memory in the 'situatedness' position as *'where you are, when you do, what you do matters'*. Gero referred to a quote by John Dewey, a famous educational theorist, who inspired him into these concepts of 'situatedness' and 'constructive memory'. The quote is as follow:

'Sequences of acts are composed such that subsequent experiences categorize and hence give meaning to what was experience before'

Figure 4.2 – Multi-interactions of three worlds (Gero and Kannengiesser 2004)

WORLDS
External world:
the world that is composed of representations outside the designer or design agent
Interpreted world:
the world that is built up inside the designer in terms of sensory experiences, percepts, concepts
Expected world:
the world that the imagined actions of the designer will produce

LINK PROCESSES
Interpretation:
transforms variables which are sensed in the external world into the interpretations of sensory experiences and concepts that compose the interpreted world
Focussing:
focuses on some aspects of the interpreted world, uses them as goals in the expected world and suggest actions
Action:
brings about a change in the external world according to the goals of the expected world



Gero's notion of 'situatedness' in designing suggested that the emergence of 'novelty' or innovation in design can only occur in a situated form that allows for the more effective construction of memory as a part of augmentation of existing design experience. This is contrary to what is known as 'routine' design in which there is less creative design activity and where a designer becomes too familiar with a design situation and the types of variables of a design problem. Therefore, in 'situatedness', a designer may be able to progress further into a novel design stage through a process of constructing a different world and situation that changes the perspective of the 'familiar' design problem into 'unfamiliar' problem. Perhaps, this further exemplified Cross's argument that design intelligence or 'designerly way of knowing' is a form of scholarly intelligence where its growth is largely dependent on 'active learning' for productive reasoning (Argyris 1993) and making. This is in opposition to rote or repetitive and passive learning (Pope and Keen 1981). Although, design activities are generally appreciated through observable produced artifacts or 'object matters', the underlying processes or 'subject matters' are also considered to be critically important.
As a result of this newly discovered understanding, there was a shift of interest and attention in Gero's work which is from FBS framework on artifacts (object-static matter) to the 'situatedness' and constructing memory (subject-dynamic matter). For that reason, Gero began to focus his interest onto social cognition once he realised that a designer does not work individually, but he/she works with others within a social environment, a zone of proximal or potential development where they interact closely within dynamic domains of knowledge (Rogoff 1990; Phillips and Soltis 1998). This will be further discussed in the further section when describing Gero's ideas on agent and multi agents system.

4.4 Culture and its relationship to creative activity

In the previous chapter, it was pointed out that Storey (1993) suggested there are three broad theories concerning culture. Those theories include general processes of intellectualisation, shared ways of life amongst people and the creation of cultural texts and signifying practices as the means for the production of meanings for example, novels, operas, fine arts and even architecture. These definitions are very meaningful in describing the possibility of the existence of prominent peer culture within the context of the architectural studio learning environment. 'Cultural texts' and 'signifying practices' are two keywords that emerge from these definitions. These words suggest that the dynamic of culture in the architectural community, particularly the studio peer culture, is due to the needs to preserve and sustain the vibrancy of the signifying practices of architectural activity as the mechanism to produce the 'cultural texts' (i.e. buildings) for a given civilization. Perhaps, it can be assumed that studio culture will remain vital as long as architecture is required by society to be the source of the production of its 'cultural texts'. Some people say it is a 'myth'(Koch, Schwennsen et al. 2002), however a study by Wilson (1996) discussed in the earlier chapter revealed that there are underlying standard of subjective judgments developed and shared among students within the schools of architecture during their period of architectural education. According to Hall (1997), this is a form of tacit culture that consists of underlying assumptions and beliefs. These are the unspoken, not directly observable cognitive manifestations of culture. She stated that the tacit culture was often taken for granted and forgotten by its members, however, the impact of this culture remains the consistently hidden, influential force on their self-growth including intellectual growth. In a learning environment, the embodiment of culture can occur from the process of observational learning, a form of independence and social learning. It is a learning process that may be characterized by approximation, imitation, identification and role playing (Bandura and Walters 1963; Erwin 1998). Although, homogeneity is always associated with culture, it is considered as static or less dynamic. According to Sosa and Gero (2003), for a social change within a culture to advance into a state of novelty, it needs to confront a certain degree of heterogeneity. The diffusion produced by heterogeneity forces the reactions in a creative manner in order to secure another level of commonalities that refine the innovation of new acts, practices or artifacts as cultural text. Similar situations can also occur among the architectural students within the design studio. This is based on those descriptions that are related to the theory of intergroup comparison developed by (Brown 1984). Such comparison occupies the sense of competitiveness between two different groups of people. Competitions at the inter-group or inter-personal levels can generate new ideas and challenges that allow for the healthy competitions of the state of minds.

4.5 A curious, interested agent and multi-agents system

According to the Shorter Oxford English Dictionary (2002), an agent is a 'person' or 'thing' that takes an active role or produces a specified effect. As previously mentioned, many of Gero's works were interested in the designer's (person) cognition and thinking. He wanted to develop a thinking, learning design machine (thing) that has capabilities similar to human designers. Indeed, this might explains, his frequent used of the word 'agents' interchangeably with the word 'designers'. In a paper by Gero and his research associates, Saunders, they discussed the importance of curiosity as the driving and motivating factor that encourages an agent to be interested in a particular design situation for seeking the emergence of novelty in design (Saunders and Gero 2001). Similar principles may be applicable to design students in their heuristics, self-directed learning (Lindgren and Suter 1985) where a curiosity combined with interest may act as the intrinsic motivator and it can be a positive and rewarding learning experience. These students are able to explore and experience new knowledge to relieve the uncertainties that accompany the ambiguities of a particular design situation.

According to Vygotsky (1997), the memory of a person works best when he/she is attracted and guided by a particular interest. This is so because interest is the arousal factor that excites a person to recall all the desirable prior knowledge. Furthermore, interest may be described as a phenomenon that emerges from a person's interaction with his/her surroundings and environments (Renninger, Hidi et al. 1992). The interactions will normally lead to positive feelings such as excitement, inspirational, pleasure, exhilaration and encouragement.

Renninger, Hidi et al. (1992) stated that there are two types of interest. One is the individual interest and the other is situational interest generated by external conditions and objects. In their opinion, situational interests are likely to make contributions toward the development of individual interest. Therefore, with such development, students begin to raise their self-confidence in the later stages of advance learning. They are more prepared to seek novelty in design situations which seem 'similar-yet-different' to their prior experiences of design situations. This is due to their capacity to reemerge their personal 'design types' or design interests which they developed from learning and experiences. Such a re-emergence of 'design types' transforms the design situation and also re-transforms by the situation (Schon 1988). It is a form of constructive memory (Gero 1999), knowledge and experience that is also related to situated learning (Phillips and Soltis 1998).

In their paper Saunders and Gero (2001) described that the degree of interestingness through curiosity as the external events. In other words, this relates to how an agent perceives external events as interesting enough to merit his/her response, action and further exploration. However, based on this research proposal, a person can be interested in responding to an external event or situation once he/she has developed or embodied self-interest on the

variables of subject matter. Thus, a person is prompted into action by a situation that is also described as 'seeing-moving-seeing' (Schon and Wiggins 1992). In the studio tutor-design student relationship, occasionally there are difficulties in communication when it comes to progressing to a meaningful design situation. This is because the 'interest' behind the 'seeing' of the tutor and the student is not grounded in commonalities to move them forward to the next level of the design process.

As one way of avoiding these difficulties, Gero has proposed a situated approach by using his FBS framework to represent the multi-agents or designers' team interactions within a situated environment. This framework is described as the 'social situated design agents' (Gero and Kannengiesser 2003). Gero suggested that the success or failure of this team of agents is dependant upon the willingness of each agent to establish a ground work of commonality with other agents. This is beneficial in the pursuit of the generation of the novel designed products. However, this model is in its infancy because many of the variables with regard to the FBS of agent are only vaguely represented. Nevertheless, the general ideas behind the conceptual framework of this model can be a fairly useful as a reference in pursuing the framework in the present research.

These general ideas include the following:

- FBS as the basis unit of personal cognition of a designer is taken into the social cognition context ('situatedness' of social agents) where the FBS of others within the social cognition environment demands the interaction to establish commonalities (similar yet different) to promote a 'two way interestedness' that generates productive reasoning while enhancing the construction of memory (Figure 4.3a, 4.3b).
- The differences of magnitude in FBS commonalities between agents exist in various levels. The variation in commonalities of designing interest can fluctuate in magnitude from weak to strong. Goal and concept levels are considered to be a fertile ground of commonalities whereby commonalities at the data level are the weakest (Figure 4.3c, 4.3d, 4.3e). For example, two students sharing a similar interest in a particular architectural subject are assumed to have lower levels of common ground, whereby when they share similar interest in one architect's work, it is assumed as having a high level of common ground.
- Assuming that peer culture in design education is important, then, based on the Gero's conceptual modelling of expertise among temporary design teams (Gero and Kannengiesser 2004) it seems to validate the assumption. The negotiation of collective experiences and knowledge among experts or students into commonalities (homophilies) brings about positive outcome for example, a successful building project or a better design learning experience. Ironically, there are people who look upon the 'myth' of studio culture as having more negative influences on students'

performance than positive ones. However, Gero's model demonstrates that the sustaining of culture in the form of commonalities ('similar-yet-different') is actually a positive motivating factor toward novelty and creativity in design. According to Gero, 'similar-yet-different' refers to a situation where a designer feels contented when there are some similarities within a given ill-defined problem to ground or attach his prior experiences before he can deal with differences that emerge within that problem. In short, too much similarity is boring because there is too little to know and too much difference is less interesting because there is too much to know.

Figure 4.3a - 'A FBS view of an agent' (Gero and Kannengiesser 2004)

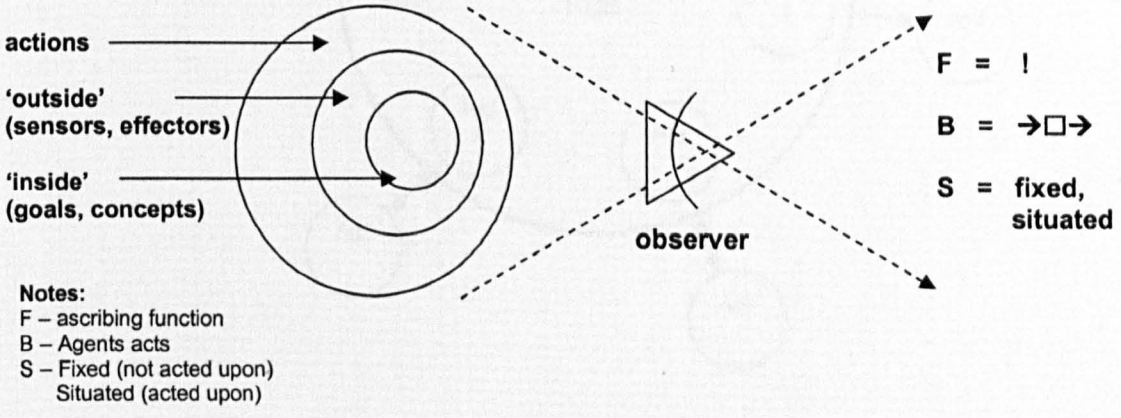


Figure 4.3b - 'A FBS view of a pair of agents' (Gero and Kannengiesser 2003)

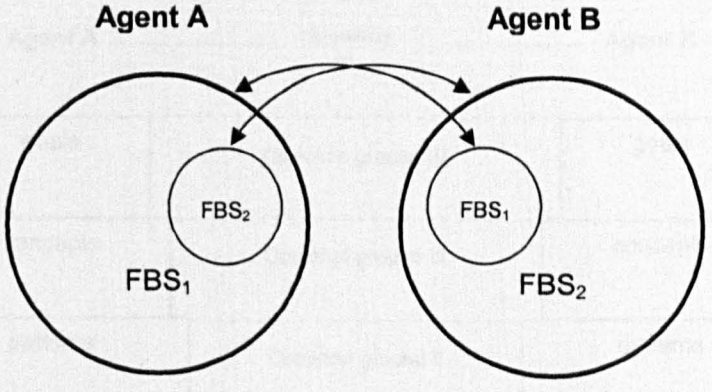


Figure 4.3c - 'A FBS model of an agent (0) constructing its FBS view in its agent society – nested stage' (Gero and Kannengiesser 2003)

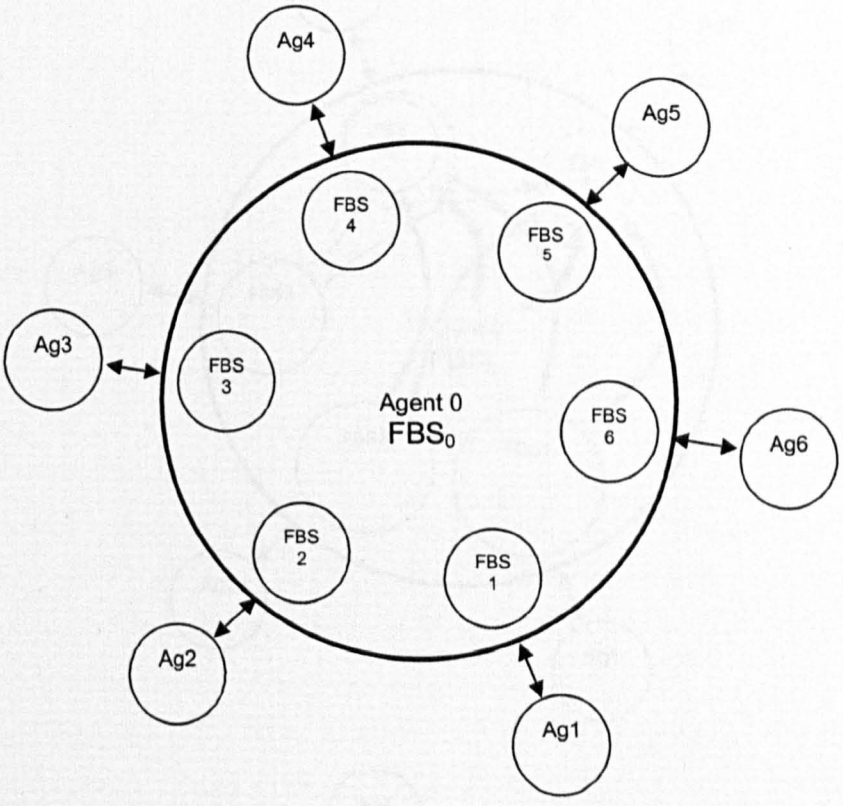


Figure 4.3d - Levels of common grounds on the stages in the construction of an agent's situation (Gero and Kannengiesser 2003)

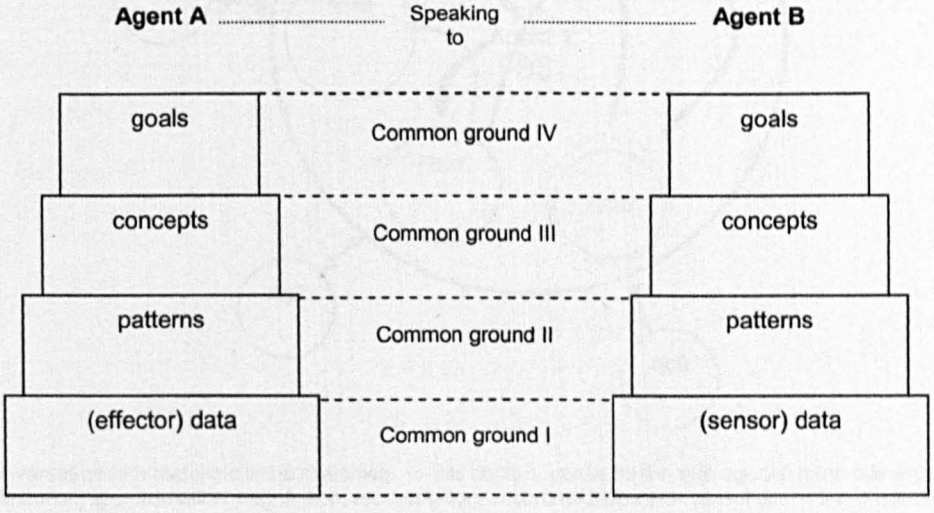
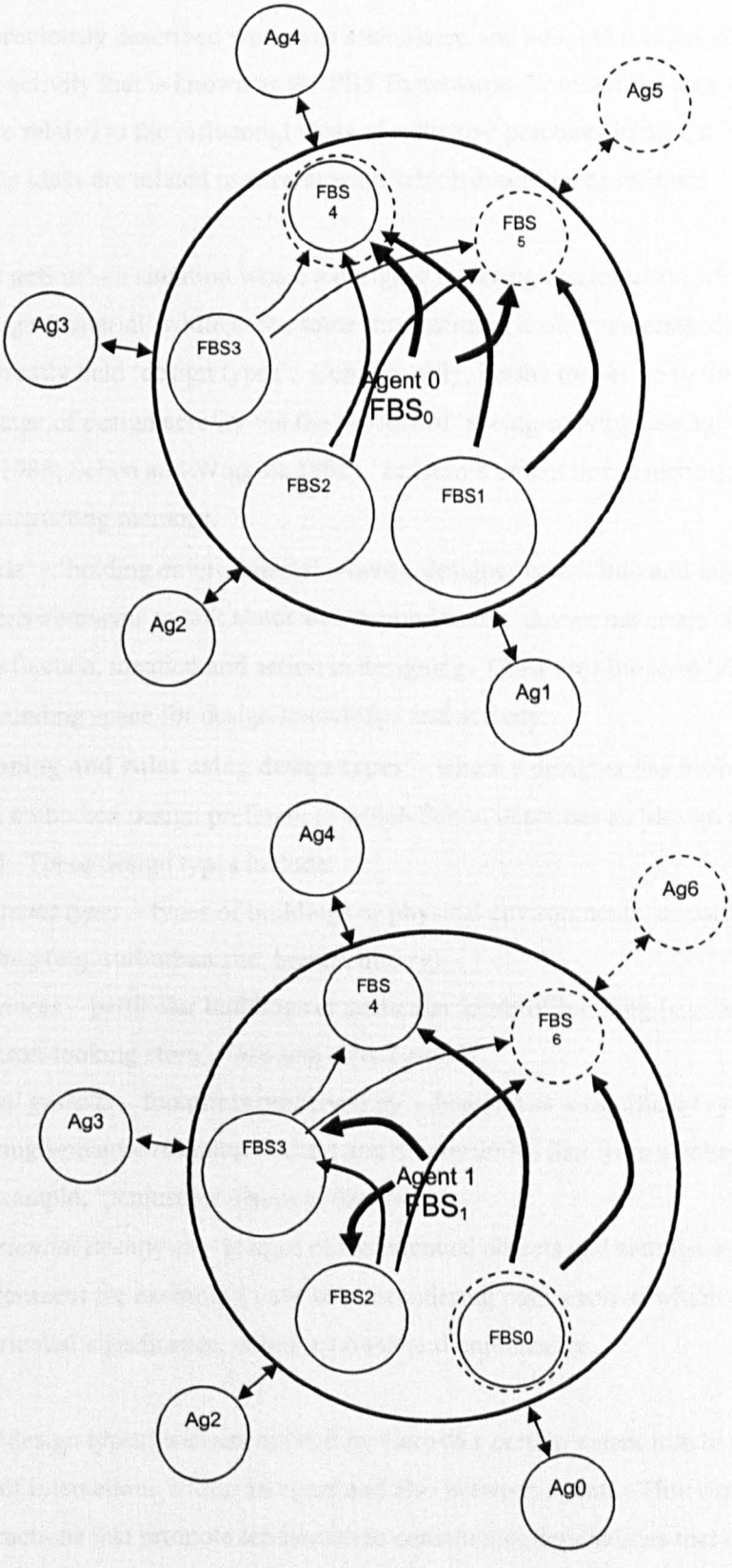


Figure 4.3e - Two examples of FBS model of two agents (0,1) constructing its FBS view in its agent society – 'interactive, dynamic state' (Gero and Kannengiesser 2003)



Notes:

'Schon's – conversation with materials while sketching. In this context, conversation with agents' materials while interacting – imitation, approximation, negotiation, reconciliation, accommodation and consolidation for productive reasoning and action' (Bandura and Walters 1963; Schon 1988; Argyris 1993)

4.6 Relationships between Schon and Gero ideas - 'design cognitive behaviour'

Much of Gero's previously described work was assimilated and adopted into his primary concept of design activity that is known as the FBS framework. Some of the core ideas of this framework are related to the influential ideas of reflective practices in design learning by (Schon 1987). The ideas are related in several ways which described as follows:

- **'reflection in action'** - a situation where a designer is having conversation with a particular design 'material' while at the same time refining his/her understanding based on his/her currently held 'design types'. Consequently, he/she moves on to the next challenging stage of design activity via the process of 'seeing-moving-seeing' (Schon 1987; Schon 1988; Schon and Wiggins 1992). In Gero's works this is identified as the process of constructing memory.
- **'design worlds'** - 'holding environments' where a designer enters into and inhabits within these environments to talk about and respond to the 'design materials' for the purposes of reflection, ideation and action in designing. Gero uses the term 'situatedness' to refer to grounding space for design knowledge and activity
- **'design reasoning and rules using design types'** - where a designer has his/her own internal built, embodied design preferences which Schon describes as 'design types' (Schon 1988). These design types include:
    - *functional types* – types of buildings or physical environments, or parts of building (e.g. surburban site, branch library)
    - *references* – particular buildings or particular kinds of building (e.g.'Morrison's Garrison-looking store', 'Miesian Arts Tower')
    - *spatial gestalts* – footprints perceived by a designer as a significant symbol carrying semantic meaning (Eckert and Stacey 2000) that form a coherent figure, for example, 'peninsular places at the end'
    - *experiential archtypes* – images of experienced objects and settings in the built environment for example a cave or a meandering path, each of which contains experiential significance, emotive power and universality.

Schon's view of 'design types' was assimilated by Gero to a certain extent into his modeling of the FBS view of interactions within an agent and also between agents. This view suggests the dynamic interactions that promote tendencies to construct commonalities that contribute towards the achievement of novelty in design based on those 'similar-yet-different' experiences.

4.7 Parallel ideas of Lawson and Gero – 'design cognitive guiding principles'

As discussed earlier in the previous chapter, Lawson (1993) introduced a fascinating notion of 'parallel lines of thoughts'. This is a creative thought process used by designers while they are pursuing for novel and original design ideas. In this process, those designers are guided by his/her own unique governing or guiding principles consisting of primary generators and preferred design modes to assist and ease the ways of their designerly thinking into a more complex design stages. Such notion of 'parallel lines of thoughts' are also related to Gero's ideas on design cognition. The brief descriptions of Lawson's key ideas of 'parallel lines of thoughts' are as follows:

- **Governing principle** - an idea about design in general which is not specifically related to the project in hand but which the designer holds to be true or worthwhile
- **Primary generator** - this is taken to represent a crucial form influencing idea about the design which is developed relatively early in the process
- **Modes** - modes of thought represent ways of describing the object being designed. Each mode has its own appropriate features.

    - *Envelope mode*: a conventional way of describing a building by its enclosing envelopes or building blocks. The features would include spaces, blocks and courtyards.
    - *Component mode*: a conventional way of describing a building by the elements from which it is constructed. These features would include walls, windows, doors, roofs, etc.
    - *System mode*: a conventional way of describing a building in terms of the functions of the systems of which it is comprised. The features would include circulation systems, cladding systems, structural systems, etc.
    - *Features*: the elements of a mode of thought which may be used to describe the object being designed. These elements, their characteristics and the rules of their behaviour effectively define the mode of thought *(envelope, component, system mode).*

These ideas by Lawson (1993) on 'parallel lines of thoughts' can also be intrepreted to have some key similarities with Gero's FBS framework in which a designer constructs a function-behaviour-structure as a form of guidance for the design process in order to produce a novel design ideas and products.

4.8 Theory of 'Personal Constructs'

The theory of 'Personal Constructs' was introduced by the psychologist George A. Kelly. Based on this theory, a construct is a form of abstraction like *happy, sad, dark or bright* that a person virtually creates from the experiences of events that shape the meaningful representation of reality about the surrounding world (Kelly 1963).

According to Kelly, a person's sense of reality about life is more meaningful when he or she is able to use his or her creative capacity to represent the environment rather than merely responding to that external world. With the ability to represent the environment, a person can place alternative constructions onto it and make changes if it does not suit him or her. Such an innate human capacity is in similar stature to the scientific impulse to predict and control. Therefore, Kelly posited that each person acts like a scientist because he or she is always building and refining theories and models about how the world works so that he or she can anticipate immediate and future events. Without such constructs, a person will be in a state of confused mind when trying to deal with the overlapping realms of the 'physical' and 'psychological' facts or experiences that constantly change the events around his or her world of realities.

A person may easily construe his or her 'world' with regard to the passage of day and night by using the movements of the sun as his or her point of reference. However, he or she may encounter difficulties in construing multiple events which involve his or her interactions with people, activities and time. For example, a design student can be certain about the time and place to attend for his or her design classes on each day because both time and place have a stable physical representation. However, within those times and places, he or she may be uncertain about the people to be met or the activities to be engaged in because most likely he or she will interact with different design peers and do different design tasks on each day at the given time and place. As a result, he or she is experiencing constant changes in multiple events which may involve peer interaction and learning activities in the studio-format environment. Therefore, there is a tendency for him or her to form transparent patterns and templates from those accumulated experiences as predictive measures to subsequent real events.

Kelly named these patterns and templates as 'constructs' which act as grounds of predictions to forecast events. Constructs make human life more meaningful because without it, the world appears to be homogeneous and human is unable to make sense of it.

Bannister and Fransella (1980) highlighted a key statement by Kelly about life and reality based on this theory. The statement is as follow:

> *'Suppose we began by assuming that the fundamental thing about life is that it goes on. It isn't that something makes you go on; the going on is the thing itself. It isn't that motives make a man come alert and do things; his alertness is an aspect of his very being.'*

Kelly has formulated a structure that further elaborated his ideas concerning this theory of personal constructs. The structure consists of a fundamental postulate or basic statement underlying the theory. The elaboration of this statement is further described by several related corollaries.
The fundamental statement regarding this is as follow:

'A person's processes are psychologically channelised by the ways in which he anticipate events'

This mainly implies on how much a person has made of the world by seeing how well that 'sense' enables the person to anticipate it (Bannister and Fransella 1980). As stated earlier that such a person is like a scientist who builds and refines theories about how the world works for the purposes of predicting and forecasting in order to deal with both the immediate and future events. In short, anticipation and prediction become the main drivers of the mental activity.
The corollaries related to the fundamental statements are as follows:

- Construction corollary: *A person anticipates events by construing their replications*
- Individuality corollary: *Persons differ from each other in their constructions of events*
- Organization corollary: *Each person characteristically evolves, for his convenience in anticipating events, a construction system embracing ordinal relationships between construct*
- Dichotomy corollary: *A person's construction system is composed of finite number of dichotomous constructs*
- Choice corollary: *A person chooses for himself that alternative in a dichotomised construct through which he anticipates the greater possibility for extension and definition of his system*

- Range corollary: *A construct is convenient for the anticipation of a finite range of events only*
- Experience corollary: *A person's construction system varies as he successively construes the replication of events*
- Modulation corollary: *The variation in a person's construction system is limited by the permeability of the constructs within those ranges of convenience the variants lie*
- Fragmentation corollary: *A person may successively employ a variety of construction subsystems which are inferentially incompatible to each other*
- Commonality corollary: *To the extent that one person employs a construction of experience which is similar to that employed by another, his psychological processes are similar to those of the other person*
- Sociality corollary: *To the extent that one person construes the construction processes of another, he may play a role in a social process involving the other person*

From these corollaries, there are several key ideas emerging from this theory and they are considered useful for the purpose of this research study. Those key ideas are summarized as follows:

- A construct becomes meaningful when it is replicable and comparable
  (e.g. today happiness and tomorrow happiness, happiness versus sadness)

- A construct can be grouped with other constructs to create a system of constructs consisting of super-ordinate and sub-ordinates. This system has its focus of convenience and range of convenience
  (e.g. happiness or sadness – winning or losing – football game – a type of sport)

- A construct has a degree of flexibility and resistance to change
  (e.g. changing from white to black dress, changing from bad to good habits)

- A person may build a construct through his or her interaction with events at the personal and also at the interpersonal level. Therefore, a person may have individual constructs and also constructs for socio-cultural process that are shared with others. In addition, it is possible that such constructs become the integral properties of the cultural manifesting elements such as language, symbol, norms and values.
  (e.g. personal: delicious/tasteless – food, interpersonal: sociable/hostile – peers)

These summaries also indicate that there are key differences between 'constructs' and 'concepts'. Construct is considered to be a more elaborate system of theoretical framework which involves wider notions of development and polarity (Bannister 1962) whereas the 'concept' is a more linear system which is concerned with the static labeling of objects that are represented by several categories of properties and characteristics (Howard 1987). Therefore, constructs are bi-polar in form which allows a person to see things in terms of how different or similar things are to each other (Phillips 1982). For example, the construct of 'attractive' becomes more meaningful when it is compared to the construct of 'ugly'. From this simple idea of a construct, a person may develop a more complex system of constructs, as he or she learns more about the surrounding and environment. Such an idea of 'attractive' may be expanded further into related constructs for example, 'friendly', 'social' and 'kind'. Therefore, constructs are related and they are organised in a hierarchical structure that provides parameters for meaningful actions and reactions.

4.8.1. The relationship between 'constructs' and designing

Kelly also shared the similar position to that of Hudson and Lawson, both of whom suggested that creativity and designing are integral parts of intelligence. He looks at the creativity process from a different perspective, one which is based on his central ideas about constructs. He suggested that creativity is a cyclical phenomenon which starts with loosened construction and terminates with tightened and validated construction. According to Kelly, a person who uses tight constructions while focusing on a single pole of a construct may be productive but he may not be creative because he cannot produce anything other than what has been blueprinted. Equally, a person who uses loose construction cannot be creative, either because he or she is unable to tighten up their ideas to a point at which it is in focus, clear and can be tested. Therefore, a creative person is the one who has the capacity to move from loosening and tightening of constructs which in turn suggests that a convergent thinker can be regarded as a person with tight constructs while a divergent thinker is someone with loose constructs. The loosening and tightening of constructs as a creative process is related to parallel lines of thoughts (Lawson 1993) in design thinking that operate divergently and convergently within the design process.

4.8.2 The relationship of 'constructs' to social and cultural practices

As mentioned in the earlier section, a person builds and develops constructs at the personal and also at the interpersonal levels. This commonality in constructs encourages social interactions among people within a particular group. This is because they develop a shared model of reality (Hatchuel, Masson et al. 2002) or collective 'mental software' (Hofstede 1991) for the ease of knowledge transaction. Sharing models of reality may also include

sharing cultures and their manifesting elements i.e. language, symbols, norms and values. According to Cross and Cross (1995), design is a social process because through this process new design knowledge emerges from the interactions between designers in respect to the current design knowledge.

Hatchuel, Masson et al. (2002) are fascinated with the existence of such qualities within the design process and they considered designers as community of practices that promote collective learning and which deal with multiple domains in the pursuit of intensive innovation. Therefore, they suggest that organizations and industries such as auto industries need to shift from a knowledge management paradigm towards a design paradigm. This is due to the fact that many organizations are experiencing difficulties in breaking new boundaries of innovation within the constraints of the existing body of knowledge. Furthermore, knowledge is managed by the erection of barriers between 'concept-process' and 'technical-product'. Therefore, by shifting to a design paradigm the gap between the 'space of concept' and the 'space of technical' can be bridged closer. This is also related to the idea of co-evolution of 'problem space' and 'solution space' for a more creative process (Dorst and Cross 2001). Within such paradigms, unconventional concept like *'flying boat'* is more inspiring than the existing ideas epitomized by such notion as *'boats have no wings'* (Hatchuel and Weil 1999). Hatchuel and Weil (2003) stated that design is a process by which something unknown can intentionally emerge from what is known and that furthermore it is also a human collective process that is partly shaped by culture.

From these descriptions, sharing a commonality of constructs that are within the cultural properties is beneficial in terms of bringing about better social interactions particularly among design peers. This is because such interactions promote innovative ideas through collective learning which also include peer assisted learning.

4.9 Summary and discussions

From the earlier descriptions of Gero's ideas and work, it is quite fascinating that before generating his initial ideas of FBS, he began to search for the 'FBS context' by observing the influence of cultural phenomena on intellectual design activities which produce cultural text and artifacts. This is done by looking at the signifying practices of scholars from the great civilizations of the past. It seems that the value of studying a particular aspect of a culture contributes towards the generation of a specific understanding of human cognition and action

which includes design cognition, social process and 'making' (Schon 1988) meaningful products.

Several potential key issues were identified from the studies on agents or designers by Gero and his research associates for the purpose of this research investigation. These key issues were classified into three main areas related to design activity which are as follows:

- design cognition
- social cognition
- design situation

The issues that have arisen from these three main areas are as follows:

- **Relationship between curiosity, the construction of memory and novelty in design**

Curiosity is regarded as the driving and motivating factor that encourages an agent or student to be interested in a particular design situation by constructing and enhancing his/her memory (Saunders and Gero 2001). Hence, an agent or student is able to explore and experience new knowledge and utilize it to relieve and fix the uncertainties that occur within an ill-defined design problem toward seeking the emergence of novelty in design solution.

- **Commonalities among social situated agents or designers**

Gero and Kannengiesser (2003) stated that socially situated design agents represent the interactions of multi-agents, students within a situated environment. They suggested that the success and failure of a team of various agents are largely depended upon the willingness of each agent to establish grounds of commonality in the form that is 'similar-yet-different' with other agents. The negotiation of collective experiences and knowledge based on commonalities is beneficial if both the individual agent and the team are to pursue better design performance and outcomes. As mentioned previously, 'similar yet different' refers to a situation where a designer feels more contented when there are some similarities within a given ill-defined problem to ground or attach his prior experiences before he can deal with differences within that problem.

- **'Situatedness' and design activities**

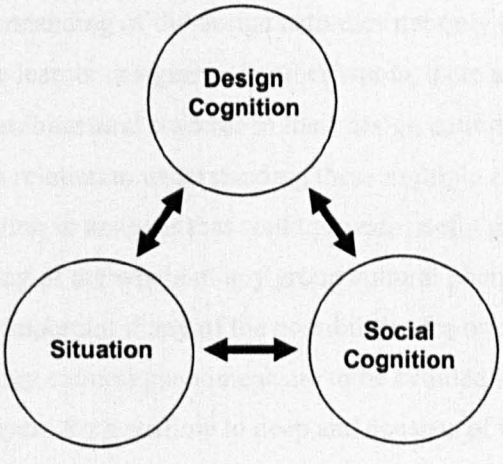
Gero (Situatedness), Schon (Reflection) and Lawson (Parallelism) are among the few researchers and educators who share the fundamental yet critical views that designers are experiencing design activity in a context of 'stateness' in order to form a solid ground from

which to intensify their design cognitive ability that pursues a solution to an ill-defined problem. The following are comparisons that summarize the importance of design 'stateness' in the design cognitive process:

- Gero
  State of Designing 'Context' – Situatedness
  Design Cognitive Process - Construction of Memory using 'FBS'
- Lawson
  State of Designing 'Context' – Parallelism
  Design Cognitive - Parallel lines of thoughts using 'Guiding Principles'
- Schon
  State of Designing 'Context' – Holding environments
  Design Cognitive Process - Conversation with Materials using 'Design Rules'

From those main areas and the related issues that have been described, there are multiple events that are at work and interacting within the peer group. This is characterized as a group phenomenon which involves design cognition, social cognition and the situational context of activity. A peer culture in certain ways is not only a product of the individual members, but also of the social and situational context (Penland and Fine 1974). Hence, it is important to consider the functioning of the whole phenomenon in a way that encompasses personal, group, situational design activities in order to investigate the shared commonalities that exist among architectural students and help shape the studio peer cultural phenomena. In other words, designing activities that involve thinking, interacting and making within the architectural community have multiple events that shape one another. Therefore, there are three fundamental inter-connected events shaping the functioning of the whole that characterized the cultural phenomenon. This is illustrated as Figure 4.4 below.

Figure 4.4 - Studio multiple events



The keywords that described each event are tabulated in the following Table 4.1. These keywords are also related to the discussions of the main issues in the previous sections and chapters. However, it is important to stress that these descriptive keywords are only supposed to serve as supportive theoretical backgrounds and also to be used as guidelines for conducting the initial, exploratory study of this research.

Table 4.1 – Descriptive keywords related to events

Events	Descriptive Keywords
Situation	• 'Situatedness' – Gero • 'Parallelism' - Lawson • 'Holding Environments' – Schon
Design Cognition	• 'Construction of memory' - FBS • 'Parallel lines of thought' – Guiding Principles • 'Conversation with Materials' – Design Types
Social Cognition	• Social identity theory, Peer Group Processes • 'Similar yet Different', Commonalities • Solidarity and Personalisation

In the context of design learning, the combination of internal and external designing interests by students through peer culture in the design studio is one research study that would help to expand the concept of design thinking suggested by Schon, Lawson and Gero. This would provide a deeper understanding of the design activities not only by the expert designers but also the young, novice learner designers. In other words, there are internal and external events that influence architectural students in their design activities which involve multi-directional events. In relation to understanding these multiple events, Hogg (1992) suggested four levels of observation or analysis that could provide useful guidelines to study and examine the functioning of the whole of any group cultural phenomenon such as the studio peer culture. This is important if any of the possibilities for oversimplification in observing and understanding group cultural phenomena are to be avoided because it is manifested through the various layers from shallow to deep and consists of both tangible and intangible elements (Hofstede 1991). Those suggested levels are as follows:

- **Intrapersonal**

The observation or analysis of the general psychological and sociological processes among individuals or groups within the larger context of a community for example the signifying practices of the architectural community

- **Interpersonal and situational**

The observation or analysis of the inter-personal interactions in the loci of situations for example the studio format environment as a zone of proximal or potential development

- **Positional**

The observation or analysis of the inter-personals interaction in terms of a confined activity, for example, the situatedness in design activity that involves both design and social cognition

- **Ideological**

The observation or analysis of the inter-personal interactions in a confined activity that displays an apparent representation of shared commonalities in terms of activity interests

Therefore, the central aim of this research is to discover and reveal the underlying subjective standards of judgment by investigating the shared commonalities among design students within the studio peer culture. Figure 4.4, Table 4.1 and the four levels of observation, as discussed earlier will become the general guideline to establish the perspective of the research process and its focus of inquiry. The general view of the 'functioning of the whole' that consists of multi-directional, inter-related events within the architectural peer learning community is considered essential in attempts to investigate and unveil those shared commonalities and hidden, underlying judgments.

- **The use of 'constructs' as tools to observe and assess signifying cultural practices and differences**

According to Bannister and Fransella (1980), the theory of personal construct has been widely used to study various fields including architecture, literature, religion, language and teaching techniques. It provides imaginative ways of exploring the process of construing by developing a view of our constructs as hierarchical and patterned into sub-systems. In the context of this research, constructs can provide a more insightful view of the relationship between cultural manifesting elements and multiple designing events. This theory also provides an alternative means of investigation in which a researcher acts as a facilitator for research subjects to express their constructs as they are related to their own learning experiences. These identified constructs are considered very useful for the purposes of comparative investigation between different groups of learning peers.

Chapter 5
Research Methodology

5.1 Introduction

The practice of research is sometimes messy and rarely conforms to the specific models as described in text books. Many research processes begin with a phase of divergence which is followed by a phase of convergence. During the phase of divergence, a researcher attempts to explore deeper into the various issues surrounding the topic of study in order to establish several theoretical assumptions. Those assumptions serve as the basic foundation upon which an investigation may be built and progress into the convergent phase of further clarifications.

'Culture' regarded as the collective programming of mind between members of a group (Hofstede 1991) is manifested by layers of tangible and intangible elements (Persell 1990; Hofstede 1991). In the studio-format environment, peer culture is characterised and shaped by the multiple events that take place within the dynamic of peer interactions. Therefore, it is of crucial importance to consider both cultural layers and meaningful events as part of this research investigation in order to capture a picture of this interesting phenomenon in all its richness and establish its relationship with design learning.

There are two major challenges in this research investigation. Firstly, to uncover the notable issues that surround the phenomenon under discussion (e.g. cultural elements, multiple events); and secondly, to determine the significance of studio peer culture as part of design learning experience.

Therefore, the aims of this research investigation are as follows:

- To explore and gain more insights on the areas and also levels of shared commonalities in design interest according to the subjective standard of judgments that exist among architectural students.
- To clarify the interconnected events of social cognition, design cognition and 'situatedness' within the studio peer culture
- To examine the significance of studio peer culture by means of comparison with other fields of study

This chapter begins with discussions of several methods and strategies for conducting an investigation. These involve inquiry, exploration, fact gathering and analysis. These

discussions will be followed by the description of the general framework of this research investigation.

5.2 Qualitative and quantitative research

Research methods can be either qualitative and quantitative (Bryman 2004; Moore 2006). Each method has its advantages and disadvantages. According to Bryman (2004), qualitative research basically focuses on words in the collection and analysis of data. It is a very useful way of gathering data on an area or subject that is not readily understood by means of numerical term (Moore 2006). In contrast, quantitative research mainly involves the collection of numerical data. For example, in this research, it would address itself to such matters as the proportion of design students who feel strongly about a particular design activity in the studio learning environment.

In qualitative research, an investigator looks through a wide lens searching for potential patterns of interrelationships between a previously unspecified set of ideas or inquiries. Furthermore, the researcher also acts as part of the research instrument in order to acquire good and imaginative insights into the respondents' worlds and experiences (Brannen 1992). In another words, the researcher are gathering rich and deep data by seeing through the eyes of the people being studied (Bryman 2004). Therefore, it may be regarded as an 'inductive' way of investigation where a theory emerges from the research observations and findings. This orientation of research is commonly associated with those techniques using participant observation, interview and focus groups (Bryman 1992).

There are several criticisms leveled at this kind of research orientation (Bryman 2004). Firstly, it may be considered too subjective because the findings rely heavily on the unsystematic and open-ended views of the researcher. Secondly, replication is difficult due to the lack of a standard set of procedures and the unstructured nature of such research. Finally, there is a lack of transparency, particularly with regard to the selection of participants and process of data analysis.

Conversely, in quantitative method, a researcher is more likely to investigate through a specified set of variables through narrowly focused lens (Brannen 1992). It is therefore, a 'deductive' research process where an investigator isolates and defines variables based on the domain of theories that have been constructed. Those variables are linked together to frame key hypotheses that will guide the empirical inquiry (Brannen 1992; Bryman 2004).

Therefore, following this process is the operation of gathering data relevant to the hypotheses. In this research, the instrument for collecting data is pre-determined and finely tuned where clearly defined and unambiguous set of research issues are presented to the respondents or participants (Brannen 1992). The data are processed into a useable form and later analysed to produce results which will be utilised for drawing conclusions and making recommendations (Moore 2006). Due to the highly explicit nature of its procedures, such investigation is capable of being replicated by others.

This method is closely related to natural science approach which is systematic and explicit in conducting investigation. It usually involves survey, experiment, structured observation and content analysis (Bryman 1992).

There are several weaknesses in this method. Firstly, it sometimes fails to recognize the differences between social *(e.g. students, parents, teachers)* and natural *(e.g. atoms, molecules)* realities. This is because people are active social beings that are exposed to internal (intra-personal) and external (inter-personal) events that pattern their world of realities. Secondly, over reliance on static instruments and procedures may produce artificial outcomes or results that are not applicable to people's everyday lives *(e.g. peer learning experiences in design studio)*. As a result, it presents a restricted view of the complexity of human behaviour and also of the situations where human beings interact with others (Cohen, Manion et al. 2000).

This section has described the strengths and weaknesses of qualitative and quantitative research methods. Therefore, it is important to consider the 'fitness for purpose' before adopting qualitative, quantitative or combined methods. In this study, both methods were combined as a multi-strategy approach for gathering meaningful data for exploratory, comparative and explanatory purposes. Such an approach also allows for better description, greater precision and gives additional dimensions (Hammersley 1992; Moore 2006) to this investigation of studio peer culture. According to Blaxter, Hughes et al. (2001), such a combined approach can take several various forms which are as follows:

- **Qualitative research facilitates quantitative research**

  Data and findings from qualitative research can provide background information on a particular research area or interest to establish hypotheses which is useful to devise a survey for further study

- **Quantitative research facilitates qualitative research**

  This usually refers to quantitative research helping with the choice of subjects for qualitative investigation

- **Qualitative and quantitative are combined to provide a general picture**

  Data and findings from quantitative research can be utilized to fill the gaps in a qualitative study because not all pertinent issues are addressed by either the qualitative or the quantitative investigation.

5.3 Comparative research

As part of combining both qualitative and quantitative methods, this research also employed a comparative approach. This is an approach that uses identical methods and variables on different sets of peoples, contexts or situations. According to Bryman (2004), such study can be regarded as a comparative study. It is a useful way of investigating in order to seek explanations for similarities and differences to gain greater awareness and deeper understanding of people's realities in different contexts i.e. in different learning environments.

Such research is commonly used in cross-cultural studies of peoples, organizations, nationalities or races (Bryman 2004). In this study, a particular phenomenon may be examined by comparing different groups of people based on their surroundings and socio-cultural practices as manifested in the form of customs, traditions, values, thought patterns and language.

One of the key challenges in comparative research particularly in cross-cultural study is to devise an appropriate methodology and instrument for gathering data. This is to ensure that data collected from different groups of people are comparable or equivalent for the purposes of comparative examination.

5.4 Multi-strategy and triangulation in research

'Multi-strategy' is defined as the use of two or more research approaches and methods of data collection within a single study (Bryman 2004). It is also known as the mixed-method strategy (Blaxter, Hughes et al. 2001; Creswell 2003; Moore 2006). The main advantage of multi-strategy is that it provides both breadth and depth for a particular study especially when it comes to investigating a complex group phenomenon (Hammersley 1992; Moore 2006). For example, in-depth interviews may provide a detailed picture of human behaviour and attitudes, however, the results maybe superficial due to subjectivity and biased interpretations.

Therefore, those limitations can be overcome by using survey questionnaires on larger samples or populations to give broader picture thereby adding considerable value to the research results (Moore 2006).

Multi-strategy methods also serve as a technique of triangulation by using data from various types of investigation (Blaxter, Hughes et al. 2001; Creswell 2003; Moore 2006). This is a useful way of cross-examining and validating findings within a study. According to Cohen, Manion et al. (2000), triangulation originates from a technique of physical measurement employed by marine navigators, military strategists and surveyors to pinpoint a single spot or objective by using several location markers. Cohen, Manion et al. (2000) stated that triangular techniques attempt to map out, or explain more fully, the richness and complexity of a situations and behaviours by studying them from more than one standpoint and making use of both the quantitative and qualitative data.

From those discussions, the use of multiple-strategy is considered appropriate in this research investigation. It allows methods to be combined in order to gather qualitative and quantitative data for the purposes of cross-examination. Consequently, the findings will present a deeper, broader and richer picture of the studio peer culture.

5.5 Brief definitions of research design and methods

A proper research design and technique ensure the effectiveness of a particular research investigation. According to Oppenheim (1992), research design and techniques are closely related and they influences one another throughout the process of investigation.

Research design is considered as the basic framework or plan of a research that makes the research possible and also reliable for generating good investigation conclusions (Oppenheim 1992). It provides strategies and choices for making decision on the priorities, processes and methods of investigation (Bryman 2004). Oppenheim (1992) has stated that a research design should be able to inform a researcher on several key questions:

- What are the possible samples?
- What comparisons are to be made?
- What are the variables that need to be measured?
- How these measures will be related to external events such as social, cultural?

Research techniques are described as the methods employed to generate, gather and collect data which are important to research study (Oppenheim 1992; Bryman 2004). The main concerns of research technique are measurement, quantification and instrument building. This is to ensure that methods and instruments are appropriate, sufficient, valid and reliable. Self-completed questionnaire, interviews, participant observation are several examples of instruments that can be used as the methods of research investigation. According to Oppenheim (1992), some key questions that are considered important that need to be addressed in developing the research techniques are as follows:

- How should a researcher gather the data?
- Should he/she gather the data by interview, observation or postal/web based questionnaire?
- How should he/she measure attributes or dimensions on attitudes, personalities, social integration, cognitive styles or friendship patterns?
- How should he/she analyse the contents of feedback to the given questionnaire and other forms of test?

With such questions in mind, a researcher should be able to look for relevant information, resources, and references that will facilitate the drawing up of his/her research plan or framework with the appropriate methods and tools for conducting the investigation.

5.6 Framework, phases and stages of research

In this research, there are two main phases in conducting the investigation. The first phase is regarded as the exploratory, qualitative investigation. It is followed by the explanatory, quantitative investigation in the second phase. The main purpose for this approach to the investigation is testing elements from the theory emerging from the initial phase by constructing a survey tools that can be utilized on different samples or people in the later phase. The results and findings from the later phase of investigation offer means of cross-examination. This will further reinforce and support the theoretical assumptions established in the initial findings. According to Creswell (2003) such a strategy is useful to a researcher who wants to explore a group phenomenon and expand the understanding of its characteristics.

- **Phase one –Exploratory**

In this phase, there are three stages of investigation. The descriptions of those stages are as follows:

1st stage - This begins with reviewing the literatures that are related to the area of interest to this investigation. This is followed by the identification of prominent sets of issues that are regarded as influential within the domain of the studio peer culture. There are three main categories of issues and these are design cognition, social cognition and situations. These issues, with the relevant keywords have been tabulated in Table 4.1 from previous chapter.

2nd stage - An exploratory investigation is formulated. A semi-structured interview is used as the method of investigation. In this interview, a series of questions was prepared based on the categories of inquiry in order to gather qualitative data.

3rd stage - The gathered qualitative data are analysed looking for emergent themes particularly with regard to the shared commonalities in the cultural manifesting elements. These are elements that evolve in the form of situated design and social activities among the studio peers.

- **Phase two - Explanatory**

In this phase, there are four stages of investigation. The descriptions of those stages are as follows:

1st stage – A qualitative investigation based on the interview findings is formulated in order to conduct a comparative study. The participants in this study are a group of dual-study students. This is an interesting group of students because they have peer learning experiences in both the studio-format and also engineering-lab environments. Here, focus group method is adapted to gather the data.

2nd stage – Several examples of literature on the Theory of Personal Constructs (Kelly 1963) are reviewed here. The main purpose of these reviews is to elicit meaningful 'constructs' from the qualitative data gathered in the focus group sessions. The use of constructs is beneficial because it provides a comparative structure for the investigation of the deeper aspects of peer culture between larger samples of various peer groups.

3rd stage – A survey questionnaires using 'constructs' was transposed into a semantic differentials format. This tool of investigation is comprised of key bi-polar 'constructs' identified from the qualitative findings of the focus group study.

4th stage – A quantitative data analysis is conducted based on hypotheses which are generated from the findings in the previous stages of investigation. The data are analysed by using several statistical tests. The quantitative results and findings are illustrated in the forms of tables, bar charts and semantic differential charts that serve as visual representations of the findings.

The descriptions within this framework of research study provide general explanations of the methodology adopted in the various stages of the investigation. Further discussions of the selection of participants, data collecting methods, analysis and statistical tests employed within those stages of investigation will be undertaken in the following chapters. Chapter 6 deals with qualitative study and discussions of its findings based on the interview and focus group data analysis. Chapter 7 presents quantitative study and discussions of its findings based on comparative data analysis using statistical analysis.

5.7 Summary

In research, there are two major approaches to investigation. The qualitative approach focuses on words as its primary source of investigation. On the other hand, the quantitative approach is predominantly concerned with numerical aspects. Each approach has its potentials and weaknesses. Therefore, it is important to consider the 'fitness for purpose' (Cohen, Manion et al. 2000) before deciding on approaches and methods of investigation in a particular area of research study.

This study of the studio peer culture adopted a multiple-strategy approach which combines several research methods for comparative purposes. Such a strategy is considered appropriate because it allows the collection and use of qualitative and quantitative data for triangulation measures. Therefore, data and findings can be cross-examined in order to provide deeper, broader and richer picture of the phenomena being studied.

There are two main phases in this research study. The early phase is regarded as an exploratory study to uncover those shared commonalities that take the form of manifesting elements within the studio peer culture. The analysis and findings are based on qualitative data from the interview sessions conducted with the architectural students. This is followed by an explanatory phase that involves comparative study between groups of students from different fields of study. In the final stage of this phase, 'constructs' are used for comparative quantitative data analysis so as to provide harder and more objective findings.

Chapter 6
Qualitative Study and Findings

6.1 Introduction

As discussed in the earlier chapter, culture is about the meaningful sharing between members of a community. It involves sharing the elements that manifest a culture in common. If there is a studio peer culture, the researcher should be able to discover commonalities in the form of cultural elements among the design peers. However, if there are such commonalities among studio peers, there are still uncertainties concerning the significance of studio peer culture.

Therefore, individual interviews were conducted to gather meaningful insights into the shared commonalities among architectural students in order to reveal the underlying studio peer culture. On the other hand, the focus group sessions were used for gathering comparative insights regarding the fundamental differences between studio peer culture and other peer cultures based on different kinds of peer learning experiences such as those familiar to the Dual-study students.

This chapter begins with the discussions on the method of gathering and analysis individual interview data. These are followed with the discussions on the findings from individual interviews. The method of using and analyzing focus group data will also be discussed. Subsequently, there will be discussions on the findings of meaningful constructs based on the focus group data.

6.2 Collecting qualitative data - Individual interview

As discussed in the previous chapter, several methods were utilized through the various stages of this multi-strategy investigation to gather qualitative and quantitative data. Those methods adopted on the basis of the aims of this research: to seek answers to the key questions stated in the first chapter. Semi-structured interview method was used to gather data from individual interview sessions.

- **Semi-structured interview**

In the initial stage of investigation, the main purpose is to explore and identify commonalities of signifying practices among the architectural students based on the design and social events experienced by the peer group.

In this method, the interviewer has a list of questions based on relevant topics to be addressed and covered often referred as an interview guide (Maykut and Morehouse 1994; Bryman 2004; Guillaume and Bath 2004). This allows for the flexibility in both the questions posed by the interviewer and the responses given by the interviewee. In addition, these guided yet flexible interview sessions made it possible to consider any additional issues that came up that might prove complimentary to the research.

This method of investigation generated rich information on the respondents' experiences in design learning and social interactions within the studio-format environment. Interviewing people individually offered the advantage that their ideas and responses were not influenced and pressured by others. This is important because the researcher was not looking for correct responses but meaningful responses to gain vital insights on studio peer culture for further investigation.

6.3 Preparing questions for individual interview

According to Maykut and Morehouse (1994), developing a focus of inquiry is helpful to guide the interview purposes of what is to be found out about the signifying practices and multiple events within the peer group phenomenon. There are two main focuses of inquiry which are related to the aims of research stated earlier in this chapter.

The focus of inquiry is used to guide the individual interviews with the Architectural students. The inquiry is as follow:

- the commonalities in designing interest among architectural students

Maykut and Morehouse (1994) also stated that a focus of inquiry can be refined into several categories of inquiry. These categories serve a beneficial role as guidelines for constructing and developing more specific questions. Therefore, the categories of inquiry used in the interview are as follows:

- signifying cultural practices that involve symbols, words, norms and values
- level of commonalities about those practices among peers
- benefits of such practices in peer interactions within the multiple events *(situatedness, learning and social)*

Based on Krueger's (1988) suggestions, the researcher prepared questions which were clear, brief, reasonable, and one-dimensional. Lengthy and multi-dimensional questions were also avoided. Such questions may result in confusions and make it difficult for the participants to distinguish the core intent of the questions. The numbers of question were limited for

approximately one hour period of session. The questions were also arranged in a sequential manner moving from general to a specific topic in the form of introductory, transitional, key and ending questions.

A description of intentions was attached to each question for the guidance of the interviewer while conducting the sessions. The underlying intentions behind each question were based on the research focus and categories of inquiry outlined earlier in this section. There were also several probing questions following each question to gather further information and response from the interviewees. The formulated and probing questions are shown along with the intentions behind them in *Appendix A*.

6.4 Individual interview participants

In the interview sessions, the participants were 7 architectural students (K100) from the University of Sheffield. The course descriptions are shown in *Appendix F*. The selection of participants was considered to be a purposeful sampling strategy on the basis that the participants were relevant to the research areas of interest (Maykut and Morehouse 1994; Bryman 2004; Guillaume and Bath 2004).

Of the 7 architectural students who participated, 5 were males and 2 were female international students. Two each were from the 1st and 3rd year of study. One each was from the 2nd, 5th and 6th year of study. The small number of participants was due to the fact that many other students were too pre-occupied with their preparations for design submissions and final exams during the planned period for interview sessions. However, there were enough participants to conduct an exploratory study because they represented various years of study. Therefore, this allowed for the gathering of a wider range of information from different years of studio peer experiences.

6.5 Interviewing

Prior to the scheduled interview sessions, several correspondences were made between the researcher and participants for reconfirmation and rescheduling of time as requested by the participants. The correspondences took place mainly through the use of email and several telephone calls. One of the advantages of such communication was that it gave the researcher a glimpse of the character and personality of the participants. Some participants were casual in their responses, while others were quite formal. This was quite useful as it helped the researcher to gather several conversation materials that would serve to prompt the interview

session with each participant. These materials were also used as part of the preparation of the opening script at the beginning of every interview and focus group session.

As an early preparation, the researcher made proper room arrangements for the seating of the participants and also the location of the audio recording devices. Signing-in sheet, batteries, extension cords, note pad and pen were also prepared to avoid any unforeseen problems during the sessions. Before each session begins, the interviewer explained the main purpose of the interview and also the assurance of confidentiality regarding all information given in the session. Each participant was also consulted about his/her consent to the recording of interview sessions.

The venues for all sessions are located at the Department of Architectural Studies, University of Sheffield. Some of the interview sessions took place in the meeting room while others were conducted in the researcher's room. The meeting room was considered more suitable however it was reserved for academic events on the day of the scheduled session.

In the interview sessions, the participants were quite enthusiastic when responding to the questions. Some of them found that several questions were quite interesting and exciting, particularly, the questions with regard to the analogy of a 'zoo' or 'animal kingdom' and the studio as a 'karaoke lounge'. Occasionally, the researcher had to make some minor clarifications on certain questions with the assistance of probing questions and information collected from previous sessions. The researcher also had to prepare a typed written quote by the British comedian, Stephen Fry. This was to ensure that the interviewees could capture the message behind the quote by reading. Additional questions were also included as concluding questions that gave interviewees the opportunity to finalise their thoughts on the overall issues discussed throughout the session. The interview sessions took between 40 and 45 minutes.

6.6 Transcribing interviews

Transcribing interviews is a demanding task and time consuming (Maykut and Morehouse 1994; Bryman 2004). This is because the utterances are important data for the research. A researcher is not only interested in what the participants say but also the way they say and respond. The failure to transcribe interview data carefully in its entirety may distort the interview content and the reliability of the research data. Although a researcher may seek assistance from others or pay a professional transcriber to save time on transcribing, preparing one's own transcripts gives a valuable opportunity to relive the interview and become significantly more familiar with the data (Maykut and Morehouse 1994).

Prior to the transcribing process, the researcher listened to the audio-taped interview at least once, in order to re-familiarized with the content. In addition, it helped to search for any keywords that could not be clearly heard. Due to lack of experience, the researcher transcribed each interview in two stages. In the first stage, the interview data was transcribed into a handwritten transcript. This was followed by typing the handwritten transcript into a computerised word processing program. Therefore, each transcription took between 3 to 4 days to complete. The data transcript was then converted into a computerised word processing program before it was prepared for analysis. Each page of the interview transcript is coded accordingly for future reference. The transcripts are shown in *Appendix B.*

6.7 Analysing individual interview data

Although analysing substantial amounts of the interview data can be very challenging, it can also be illuminating. The approach and strategy to analysing such data is considered critical. Therefore, this research adopted an inductive approach to the analysis of data. Such approach involves the seeking of themes in the content of the participants' responses and expressions in the medium of the language expressed by the participants. It is a process of discovering by moving from thoughts through to language and then to themes. This also involves note writing and grounding ideas (Charmaz 2002) based on key research questions and literature reviews. The researcher searches for emerging themes by chunking, categorizing, moving around and rearranging the interview data into different formations in order to investigate the 'interiors'(state of mind) and the 'exteriors' (descriptions of events and social settings) through a representational view of language (Miles and Huberman 1994; Baker 1997).

As suggested by Ritchie and Spencer (1994), there are five key stages within a framework for analyzing the qualitative data of this study. Those stages are as follows:

- *Familiarisation* - This requires the researcher to get familiarize with a wide range and diversity of data while gaining a feel for the data or material as a whole. During this stage, the researcher listens to and read through material, listing key ideas and recurrent themes.
- *Identifying a thematic framework* - This is the attempt by the researcher to identify key issues, concepts and themes in which the data can be examined and referenced.
- *Indexing* - This refers to the process in which the thematic frame work or index is systematically applied to the data in its textual form.

- *Charting* - This is the stage where the researcher builds up a complete picture of the data as whole as means of unitizing the data.
- *Mapping and Interpretation* – This refers to researcher pulling together the key characteristics of data that have been filtered and sorted then, continuing with the mapping and interpreting the data set as a whole.

This framework was utilised as a general guide to the analysis of the qualitative data gathered from the individual interviews and focus group sessions. Atlas.ti, computer software was used to facilitate the processing of data, specifically for coding, indexing, recalling and reducing. Subsequently, those processed data were assembled into several key themes represented by relevant utterances.

6.8 Findings from individual interviews

From the utterances of the design students who participated in the interviews, there are four shared commonalities of significant elements that emerge as the manifestations of studio peer culture. Some of these elements are similar to those cultural manifestation elements as described earlier while the others are closely associated. This is because the design community does share several common social structure and function with other communities. However, it also has its own particular signifying practices in thinking and doing such as graphicacy and modeling (Cross 1984; Cross 1990). Other communities may not employ such practices extensively within their social environments. Therefore, the emerging shared commonalities among the studio peers are as follows:

- shared commonalities of meaningful words
- shared commonalities of symbols
- shared commonalities of norms
- shared commonalities of values

- **Shared commonalities of meaningful words**

Words and phrases are considered to be meaningful symbols such as those words used by the prominent architects discussed in the book, Design in Mind by Lawson (1994). The words that they used like 'thinking pencil', 'parrots of art and technology' and 'jugglers' became semantic language (Eckert and Stacey 2000) among members of the architectural community. By sharing the basic meaning, they can easily communicate and understand each others' design thoughts. This suggested that each community has its own shared semantics for effective representational communication (Fraser 1990) signifying their particular culture and

differentiating it from other communities. The socialisation among the peers in the studio is considered influential in their process of developing meaningful words or phrases that yield different meanings from their literal meaning in the 'normal' language.

> *'....photoshop rash and that's the thing that you say when you're commenting on somebody's work. Photoshop rash is designing something when you've got far too many effects with photoshop on the page and you ended...'*

> *'CAD monkeys is one of the big, almost fear for the year out that the employer would simply put us behind the computer and makes us do all their drawing for them'*

> *'.....it also offer a bit of humour as well, because you can attach appropriate different words to different things....when our year tutor gives talk, his name is Sat, so we have Sat Chat...'*

From the above utterances, these words or phrases may evolve through the process of convergence and condensation of ideas while students exchanged their intellectual territories intrinsically and extrinsically. They communicate by using those words to represent particular social and design events. The words or phrases become contextualised as soon as students are engaged in communications that act as situational cues within those events. Some of these words and phrases take the form of metaphors. According to Alvesson (1993), a metaphor is an illustrative device and created when a term is transferred from one level of meaning to another, therefore, illuminating central aspects of the latter and shadowing the others. From the perspective of 'natural' or 'normal' language, a metaphor allows an object to be perceived and understood in term of another object.

These evocative words may also serve as hidden design guidelines and prescriptive measures to deal with the design uncertainties. According to Cross (1986), such words may carry underlying non-verbal cultural codes that involve meaning making, problem solving and problem finding.

> *'So, if I was talking to my friend downstairs, they obviously know what it is. So, I can just refer to that without having to explain it'*

> *'... you know, going with architecture students, you can say things vaguely that people know what you trying to put across ....'*

These words are helping students to communicate, express, translate and frame a set of design ideas faster and effectively. In other words, they are using simplified, recognizable codes to improve their speed of thoughts while designing. This is considered as a part of constructive

thinking. By using meaningful and evocative words, the design students are able to send and receive a set of design ideas more effectively to allow for the better flow of design ideas among their peers. Kashima (1997) suggested that such words may form into narrative conversations that also facilitate the planning of ideas and problem solving.

- **Shared commonalities of symbols**

There are many symbols that help people to make their surrounding more meaningful within their community. Persons, alive or dead, real or imaginary can become meaningful symbols for a particular community such as that of the studio peers. They may also be known as 'heroes' (Hofstede 1991), since they possess characteristics highly valued and respected in a culture and serve as models of reference. In architecture, prominent, and successful architects are considered as heroes who can be regarded as realistic models of reference for the students.

> *'...Calatrava would be, because I think you will agree with me, his work is quite engineering and architectural...'*
>
> *'David Chipperfield, I am very impressed with the way that he takes potentially what a very difficult and dangerous form, way of making building and he handles them safely...'*
>
> *'I really like the works of Steven Hull and Alvar Aalto... I'm very interested in phenomenology...well especially natural phenomena and how they (architects) interpreted it into architecture...'*
>
> *'I like Richard Murphy....the materiality ... I love architect that really knows how to use material, touch and experience going through building, actually'.*

These utterances illustrates that design students do have signature architects as their model of reference. Although, they may not share a similar architect as models of reference, they have shared sense of the importance of having architects as their models. These architects do not merely serve for imaginary end; they are also regarded as active and realistic models for purposes of design learning.

> *'....And people like Murphy and Mockbee, you can see it's by truthful of materials and truthful to nature. And using material the way they meant to be...'*

As indicated by the above utterances, there are several benefits that students may gain by having architects as their models or heroes. Real architects can provide ideas in the form of design precedents about solutions to a particular problem, for example, the knowledge of the

proper use of timber construction in design. According to Lawson (2004), design precedents may consist of a substantial body of experiential or episodic knowledge gathered by the expert architects. Therefore, those precedents are considered to be more useful than theoretical or semantic knowledge when it comes to design.

Successful architects are also capable of offering inspirational guiding principles to students. These principles are sets of ideas, beliefs and values that operate in a coherent manner and which architects are able to generate novel decisions in designing (Lawson 2004). Therefore, students may refer to these guiding principles to develop their own coherent sets of design solutions, for example, coherent solutions between materiality, circulation, structure and lighting.

Architects may also serve as 'short-hand' to the students for generating set of design ideas to formulate innovative design solutions. For example, the name of 'Calatrava' exemplifies set of ideas about structure, material and form in architectural design.

By having architects as their model of references, design students are provided with more effective means to build their own model of problem-solution by creating a pool of precedents. In addition, students as novice designers are able to expand their design schemata or concept formations (Lawson 2004). This is because there is lack of reliable models to deal with complexities and ambiguities in architectural design.

- **Shared commonalities of norms**

Norms are the way people behave in a given community. Some norms are proscriptive in which they give cues on what people should not do, while others are prescriptive which refers to what people should do. In the studio-format environment, there are several notable norms among the design students. Those studio related norms are demonstrated by the following utterances:

> *'I can see people jumping on the table'*
>
> *'...we've sort of arrange the sofa in this particular way, so that there is a space that you can go....'*

In the design studios, students demonstrate a degree of playfulness with objects and materials in unusual ways within their learning environment.

'You're definitely got your packed of monkeys ... you probably got you fair share of parakeets who are very colourful and would show off quite a lot in the studio, by the work that was sort of pinned around them....'

'The gazelle or monkeys, like we all kind of get along like we're herd, we're like little tribe...'

Design students have a tendency to form smaller groups within the wider group for the purposes of group intimacy and the practice of their special interests. They also practice informal design collaborations while designing among themselves.

'We were just debating on the theory of evolution versus creation...'

'I think it's very important that you kind of feel that you can criticized one another and also you can receive criticism without being personal...'

They challenge and criticise ideas among their peers. Perhaps, this is because design solutions are approximate and indefinite.

'You can spend 10 hours in the studio sometimes and get no way and sometimes you can sit down in an hour and do more than somebody else...'

They tend to spend longer or extra hours in the design studio because they are formulating the methods and solutions to the ill-defined design problems which are both time demanding and challenging.

'...that's a bit like a parrot, I guess, because it's like you kind of hearing things and you're copying them in some ways or maybe....at least they're shaping the way you think...'

'....others always like to hang around and you bounce off other people and you get ideas...'

In respect to their learning, design students are gaining several learning benefits from their norms as indicated by the above utterances. These norms are related to objects and multiple

non-stationary activities found within the studio-format environment. Such signifying norm behaviours assist the students by enhancing their design learning through 'affordances' (Lawson 2004). This notion is usually refers to the manipulations of object beyond their basic properties for other functions and behaviours. For example, a low window sill as an 'object' affords a design student with the possibility of sitting or perhaps even climbing on it to hang another design object. Therefore, such observable norms help students to reshape and rethink their design ideas. In doing so, they are seeking for better design solutions and alternatives.

A norm associated with spending longer hours in the design studio is also beneficial to the students. According to Dorst and Cross (2001), the more time a designer spends on defining and understanding problem, the better he/she will achieve a creative result. This is because he/she has an enhanced opportunity to use personal frame of reference in forming a conceptual structure during that time.

> *'...It takes somebody else to say, 'Why have you done that?'. And I said, 'I don't know'....I have no idea and he said, 'What you might be doing is just turn this bit of the building around, and suddenly everything works.....'*

The norms related to the interaction with other members of the peer group such as collaboration, group intimacy and debating ideas assist design learning through 'social' affordances. The above utterances suggest that the students measure and evaluate the potential of their design ideas against other peers by playing and informally exchanging roles. The practice of exchanging roles helps them to consult, praise, recommend and criticize each other. For example, a design peer who has good structural knowledge affords the role as a 'consultant' to assist his/her other peers in a structural problem. He/she acts like 'a parrot' providing multiple input (Pereira 2000) which also functions as an 'editing facility' for friend who is searching possible solutions that integrate aesthetic needs and structural stability. This is considered as a form of peer assisted learning that is taking place in design studio.

In design studios, many of the observable norms are important kinds of 'informed behaviours' as part of the reflective thinking activity that involves 'reflection in action' and 'reflection on action' (Schon 1987). Those interactions between 'person' and 'object', 'person' and 'person', or both simultaneously, can be regarded as the actions and reactions related to the 'multiple affordances' situation (Atmodiwirjo 2005) in which both the object and the social

affordances are interwoven in 'situatedness', thus providing a wide range of possibilities for sourcing and generating design ideas.

- **Shared commonalities of values**

Values are culturally defined standards by which people appraise the desirable and the goodness which serve as broad guidelines for appropriate social living. In another words, they are the broad tendencies that provide the basis for a person's preference for certain states of affairs above others (Hofstede 1991). The following groups of utterances represent the related values commonly shared among the design students in the studio:

> *'Ah ...hardworking, definitely. If you can imagine what an architect does...'*
>
> *'Success is 1% inspiration and 99% perspiration...'*
>
> *'Fortunes favour the Brave'.*

The students are relying on courage and hardship to confront the uncertainties and complexities that arise while designing.

> *'Your time, your priorities and you start to learn what you should be doing. Instead of wasting time on a certain drawing or model, you should be doing this rather than...'*

They have to be efficient in managing their design works if they are to be prepared for unforeseen design problems and opportunities.

> *'...I think that's sort of honesty in material and also helps to form the agenda and type of building to get, so that, you can show where the materials, think about the materials and how is that work as material...'*
>
> *'....I love architect that really knows how to use material, touch and experience going through building....'*

The students value the need to have a sense of purpose (Lawson 1994) in design when looking for meaningful and practical design solutions to problems.

> *'...listening to other people have to say. And, listening to their ideas, that sort you have to do...'*

'....to have an understanding the way people think, the way people operate understanding people probably the best skill you could have as an architect... '

'...almost like a partnership system, you do like to help each other out... '

They consider openness in peer interactions as an important part of their design learning experiences. It allows them to easily replicate and abduct design ideas from one another. This is a process that involves 'solidarity toward personalization' that may contribute to the similar-yet-different design outcomes.

There are learning benefits that design students can gain from the values that exists within the studio environment. Values provide a strong sense of purpose (Lawson 1994) and these help the students to sustain their levels of motivation and their particular design interests: the students need to strike a balance between the time they have available and their design tasks to do in order to make progress.

Values generate a higher awareness of beauty in design and issues of practicality, such as materiality and functionality. This is related to the notion of the 'place of values in the world of facts' (Potter 1989). With regard to the common benefits of peer values, these promote an openness that allows design students the freedom to discuss, challenge and debate, thus facilitating the expression of ideas.

'...one of the first year lecturers said to us, 'Remember how you look at a building now, because the way that you look at it when you finished your course, it will be completely different ....I didn't quite believe it. But, two years later, you start to realize, it's true.... '

These utterances suggest that this student was describing his experience of the transformation of his values into the direction of a 'material view' which is central to the design culture. Such a change is essential because design requires a particularly knowledgeable appreciation of 'material culture' because the practice of design has its own distinctive set of 'things to know, ways of knowing them, and ways of finding about them' (Cross 1982).

In relation to those previously mentioned peer cultural values, Cross (1982) stated that there are several intrinsic key values in design as well as architecture. Those intrinsic values are as follows:

- Practicality
- Ingenuity
- Empathy and,
- Concern for appropriateness

In adopting and adapting such 'designerly values', a young student most likely needs to undergo a process of 'suspension of disbelief'(Schon 1984) that creates a 'perspective transformation'.

According to Imel (1998), perspective transformation is the process of becoming critically aware of how and why our assumptions constrain the way we both perceive the world, and understand and feel about it. Therefore, changing these structures of habitual expectation will promote an integrating perspective. Hence, a person is able to make better choices and decisions to act upon and accommodate those new understandings that he/she has acquired. It is essential for novice students to alter their frames of reference and values in order to construct new ways of defining worlds by accumulating the relevant design knowledge and competencies.

6.9 Summary of interview findings

In the exploratory interview study, the qualitative findings indicate that there are four main shared commonalities that emerge as the peer cultural manifesting elements. Those shared commonalities are in the following areas:

- The architectural students are using meaningful words in verbal interaction among their peers in the design studio.

- They are relying on prominent architects as their learning heroes that served as realistic model of references for designing purposes.

- They are displaying a particular way of non-verbal behaviours that are directed towards exploring and pushing for innovative ideas by means of multiple affordances.

- They are embracing intrinsic values that provide them with the strong senses of purpose required to deal with the ill-defined and challenging design problems.

The summaries of those findings with regard to the shared commonalities are tabulated in the following Table 6.1 below:

Table 6.1 – Summaries of Interview Findings

Cultural elements	Type of element commonly shared by design peers	Examples	Learning benefits
Language	Meaningful words in verbal interaction	• 'photoshop rash' • 'CAD Monkeys'	• Simplified, condensed codes • Speed of thoughts • Guidelines
Symbols	Architects as model of reference in learning	• 'Calatrava' • 'Chipperfield' • 'Aalto' • 'Murphy'	• Source of precedents • Source of guiding principles • 'Short hands' to the solution and understanding of problem
Norms	Participative and informative behaviours	• 'unconventional' • 'non-stationary' • 'group intimacy' • 'spending long hours' • 'debating and challenging'	• Reshaping ideas through affordances • Peer assisted learning • Personalization through solidarity 'similar-yet-different'
Values	Intrinsic and design related	• 'courage and hardship' • 'efficiency' • 'practicality' • 'openness'	• Better sense of purpose • Building design confidence • Awareness of practicality and reality • Freedom of ideas' expression

These initial findings suggest that studio peer culture is operating parallel to the design activity and processes in many ways. It can also be suggested that design students and their peers are gaining various learning benefits from this parallel operation. In other words, these individual and peer learning benefits transpire through the combination of 'design in mind' and 'culture in mind' within the situated design and social interactions.

Therefore, there are possibilities in the studio-format environment in which the design students are developing their design cognitive and expertise while they are also subconsciously developing their particular peer culture.

6.10 Collecting qualitative data – Focus group

A comparative investigation of two groups of students from different backgrounds of study is one method of research that is useful to identifying support for the initial findings about the studio peer culture. Smith and Bond (1993) have stated that it is quite appropriate to study cultures by assessing the values of representative samples of members from different group. This gives us a better general frame work for classifying the differences and drawing boundaries between cultural signifying practices. However, Smith and Bond (1993) caution that such investigation should be treated with care to avoid 'ecological fallacy'. This is the mistaken belief that, because two cultures are different, then any two members of those separate cultures must also necessarily differ in the same way.

- **Focus Groups**

The use of focus group is considered an appropriate way of collecting data for comparative purposes. Krueger (1988) stated a focus group is consisted of people who possess certain characteristics in common who via their discussions provide useful data of qualitative in nature. It is compatible and flexible in which it can be used as a self-contained research method or it can also be used in conjunction with other methods, qualitative and quantitative (Morgan 1988).

In this study, this approach can be useful in three ways. Firstly, it provides a better means of searching for signifying differences between two peer cultures, those of designers and non-designers. Secondly, it can minimize the 'ecological fallacy' factors because it is more concerned with the collective responses of participants rather than with individual responses. Thirdly, it is helpful to a researcher who has initial knowledge about an issue and is interested in developing a more in-depth understanding or clarifying certain patterns, trends and issues about group processes (Vaughn, Schumm et al. 1996).

This focus group method has the combined elements of individual interview and participant observation as a means of collecting data (Morgan 1988). Participants were given the opportunity to share their experiences, attitudes, opinions and cognitions on a main topic while the researcher takes less directive and dominant role as observer and moderator.

This comparative investigation undertaking the method just described, will be focusing on gathering information with regard to the participants' experiences in the design studio and engineering laboratory. This is mainly because both environments have the basic equivalent quality as a learning work space allowing students to perform the following activities:

- practical tasks that involve learning by doing and making
- group works that involve communications and interactions between peers

Those qualities allow identical structure for the creation of an identical structure for observation of the fundamental differences between peer activities that occur within the contexts of the multiple events *(e.g. situations, learning, and socialising)* between both environments.

6.11 Preparing questions for focus group

The focus of inquiry that is used to guide the focus group sessions with the participants is as follow:

- the fundamental differences between design and non-design students

The categories of inquiry used in the focus group are similar to those used in the individual interview. This is to ensure that the gathered data from the interview and focus group can be used for further comparative investigations. As mentioned earlier, those categories are as follows:

- signifying cultural practices that involve symbols, words, norms and values
- level of commonalities about those practices among peers
- benefits of such practices in peer interactions within the multiple events *(situatedness, learning and social)*

A description of intentions was also attached to each question for the guidance of the interviewer while conducting the focus group sessions. The underlying intentions behind each question were based on the research focus and categories of inquiry outlined earlier in this section. There were also several probing questions following each question to gather further information and response from the interviewees. The formulated and probing questions are shown along with the intentions behind them in *Appendix A*.

6.12 Focus group participants

In this part of investigation, the participants for the focus group sessions were also based on a purposive sampling strategy. They are the 'Dual-study' students who are studying at the University of Sheffield. The main reason for their selection was due to their multi-disciplinary background as students who had learning experiences in both the studio-format and engineering lab environments. They were in a better position to discuss the differences in

peer culture between the two learning environments. Their information on those differences could provide useful, supportive data for further comparative investigation.

Four students participated in each of the two focus group sessions. These numbers of participant fulfilled the requirements for the minimum numbers of participant for a focus group session as suggested by Morgan (1988). In the first session, three students were from the 2nd year (Structural Engineering and Architecture (HK21)) and 1 student was from the 2nd year (Structural Engineering and Architectural Studies (H2KC)) took part as the participants. The main difference between these courses or codes is that HK21 is a dual-course recognized by the RIBA, ISE and ICE. While H2KC is an engineering course with a substantial architectural content which also includes some design studio work. The course descriptions for these selected 'Dual-study' students are shown in *Appendix F*.
Ideally, it was better to have participants from a similar code of study. However, due to time constraint, the researcher decided to continue with the session because these participants were peers in the same year of design studio and they knew each other quite well. These students are doing their first year in design studio and second year in engineering. In the second session, all four students were from the 3rd year HK21 (Structural Engineering and Architecture) and they were doing their second year in design studio and their third year in engineering.

6.13 Conducting focus group sessions

All the focus group sessions were conducted in a meeting room that is located at the Department of Architectural Studies, University of Sheffield. Before each session begins, the interviewer explained the main purpose of the session and also the assurance of confidentiality regarding all information given in the session. Each participant was also consulted about his/her consent to the recording of interview and group sessions. The interviewer also made several requests to the focus group participants before the session began. First, the participants were requested to allow one person speaks at a time. Secondly, the participants were encouraged to speak out and exchange their opinions without being worried about what others may think. Therefore, the moderator also needed to be flexible, objective, empathetic, persuasive and a good listener during the discussions in order to encourage the participants.

In the focus group sessions, the Dual-study participants also responded well to the questions directed at them. They were able to discuss openly their different experiences between the design studio and laboratory. There were no sudden interruptions between the discussions

from one participant to another during the sessions. The Dual-study students also found the sessions were meaningful to them as they help them to express their views and underlying thoughts. This was because they had rare opportunities to do so in the past. Furthermore, these students also felt that they had their own group culture due to their unique exposures to two different learning environments.

At the end of each session, the moderator summarized the discussions based on the main topics and asked participants for additional thoughts and comments. Each participant was given a souvenir as appreciation of his/her participation and cooperation in the session.

The process of recording the sessions was similar to the interview sessions. The digital voice recorder and the manual tape recorder were used for recording and also transferring data into written format for analysis purposes.

6.14 Analysing focus group data

Initial findings from the interviews indicate that the cultural phenomenon is shaping and being shaped by the interrelated events of the design situation, cognition and social cognition. For example, the word 'photoshop rash' is a meaningful word as part of the language used by the design students that is the manifestation of their studio peer culture. This word carries multiple meanings in which it inter-relates the three events of design situation, design cognition and also social cognition. These relationships between manifesting elements and multiple events can be illustrated as follows:

- Grounding design situation that concern with 'making' presentation – design situation
- Speed of thoughts that assist the 'quality' of presentation – design cognition
- Simplified codes and guidelines for efficient 'sharing' purposes – social cognition

This general understanding of the relationship between studio peer culture manifesting elements and those events provides guidelines for gathering deeper insights through comparative investigation. Those guidelines also help the researcher to generate a framework of comparative data analysis based on themes related to those underlying events of design *situation, design cognition and social cognition.*

Therefore, the data which were gathered from the focus groups will be analysed in several stages. This is to give a more organized sequence of analysis while at the same time, it allows for a better and deeper familiarization with the contents of data. Those stages are as follows:

- Familiarisation with the 'dual-study' students' utterances
- Identifying key emergent themes on the areas of differences
- Relating cultural elements to those emergent themes

This further investigation is used to support the initial findings on studio peer culture and the significance of its influences on design students by looking into the possible differences between the two learning environments experienced by the Dual-study students.

6.15 Findings from focus groups

From the analysis of the utterances of the Dual-study students, there are 4 main emergent themes representing key differences of peer cultural events between the studio and lab environment. Those themes are as follows:

- Learning settings and situations
- Learning process
- Verbal and Non- verbal behaviours
- Peer Relationship

- **Learning settings and situations**

Utterances about the studio

'in architecture, gives you freedom, gives you opportunity to develop yourself..'.

'...unlike the architecture which is much more free'

'...the studio which inherently more kind of cosy as the lounge. It is sort of got more room for social'

'...and its sort of mix with other student'

'...its not just a place where you work its also a place where you live and to be interactive...'

Utterances about the lab

'I think engineering is a bit more restrictive....'

'... engineering gives you good structure as to have to do things but with much less freedom..'

'It doesn't have social atmosphere and you just do your work'

'It is set up like quite similar to a school like with groups of table....'

'Its very bland, its soulless almost its very utilitarian its like got no disperse of different years..'

From those utterances, there differences in the learning settings and situations between the design studio and the engineering lab are made apparent.

In the design studio, learning activities are mainly led by the students. They have more freedom to organized their own work and explore ideas. The studio atmosphere is casual and sociable providing the students with the opportunity for diverse personal and interpersonal activities while designing.

In the engineering lab, learning activities are predominantly led by the tutors to assist students on the given tasks and problems. Those activities are structured to make learning purposes more explicit. The learning atmosphere also seems formal where students spend more time focusing on their learning tasks and less time on socializing with their learning peers.

- **Learning process**

Utterances about the studio

'...in architecture, we're playing around the basic first which feels like nursery isn't it...'

'...there is no real right way everybody does something different you know...'

'This is what I want and the best way to do that is to model it, to draw it, to get renderings of it put it on back to work...'

Utterances about the lab

'...it is not about expressing yourself as such and its much about doing exercise...'

'I think its more sort of to do with finding efficient cost effective ways...'

'When you start doing, they just throw you straight to hardcore theories...'

The learning processes of the learning peers also differ in various ways between the two environments.

In the design studio, students are exploring for different ideas. Each student is focusing and trying to find personal solutions to design problems. They are more likely to rely on episodic thinking while working on design solutions.

In the lab, students are more likely to be performing the given tasks rather than exploring personal ideas. They are focusing on the problems at hand because there is only one solution to a particular problem. Therefore, they are employing semantic thinking which relies on theories, and formulae.

Utterances about the studio

'..you'd got your conceptual design from looking at the works of Norman Foster, Frank Lloyd Wright ...'

'...in architecture there's a hundred and one million ways of doing stuff...'.

'...the students, they are encouraged to push boundaries.'

'...architecture is much more personal and it's your own work which you put on us perhaps like, showing you personality there...'

Utterances about the lab

'...it's more book based ... there is only two ways of doing it one of them is British Standards the other is Europe code...'

'...rationalise it up get a bending moment diagrams going.... At the end of it I had like a little truss thing'.

'...you're being given knowledge to use how you want to use.'

'...you know, there's only one answer, you can't debate who is right, who is wrong.'

Design students are likely to use real architects as their models of reference for learning. In a given learning situations, they are dealing with wide domain of knowledge. In doing so, they have the tendency to alter existing knowledge to accommodate personal learning needs. Design students are more interested in original and distinct qualities of ideas and products. Therefore, they have a tendency to challenge and debate ideas among themselves.

Engineering students are more dependable on abstract model of knowledge *(i.e. theories, formulae)*. When they are working on a particular learning task, they deal with specific kinds of knowledge and information that are provided for them as well as having in common a concern for precision and accuracy in tackling problems. Therefore, engineering student share similar goals regarding what they are supposed to achieve in their learning activities without the need for issues to be debated and challenged.

- **Verbal and Non- Verbal behaviours**

Utterances about the studio

'...it's much more fun to talk about architecture in architecture...'

'...in architecture they talk in riddle.'

'...in the studio, you probably won't go and say, 'I don't understand how'. It will be more like asking for advice and explanation.'

'...when you going to go to see someone else to talk about, its going to be to talk about your own project or their own..'

'...then you figured out the riddling thing, 'Ok, maybe I need to do some work that's what the riddle said...'

Utterances about the lab

'..a lot more formal the way they speak'.

'...if you're talking to an engineer I think you're talking about numbers ...and all they'll understand exactly what you're on..'

'Conversations tend to be shortened to a point in engineering....'

'...we don't tend to talk to the engineers about what we're doing.'

'Your imagination doesn't cope by...you're not trying to get your idea across and discussing things...'.

There are signifying differences between those two learning environments in the way students communicate with their peers.

In the design studio, students are fascinated with having meaningful conversations with their peers. These exchanges are more likely to be expressed using evocative and metaphoric words. They are using these words to express and describe sets of coherent design ideas in a narrative manner. This is considered an effective way for them to exchange ideas. Therefore, this naturally encourages closer and more active conversations between studio peers

In the engineering lab, by contrast, students prefer to have short conversations with peers when they are discussing their learning activities. They use simpler words which are clear and directed towards specific ideas. This allows them more time to concentrate on working on a particular task without any additional needs to expand existing ideas or pools of information.

Utterances about the studio

'...people making stupid stuff like stools and stuff ....someone thought maybe it is a great idea to make a coat hanger out of some stools...'

'...with the architects you just get lots of head butting because people want to do their idea, people want to do this way'.

'You get a lot of inspiration in the studio though sometimes just looking around what other people are doing.'

'...you spend loads of your time, you spend twelve hours you can fill a full day in the studio...'

Utterances about the lab

'...you're watching somebody else do something else and you repeat it and that sort of thing'.

'...you don't really have those disputes and you have to learn how to deal with people on a more technical level...'

'...they clearly do know and they're just can't be bother to help you, basically.'

'....you tend to segregate and go away to do separate bits and come back together in later project..'

There are also several notable differences in non-verbal behaviours between students in the design studio and the engineering lab.

In the design studio, students have a tendency to perform unconventional acts during their learning activities. They play around with objects by changing their properties for different purposes. The students are keen to challenge and debate on various design ideas among themselves, whilst simultaneously exchanging ideas with others through active social interactions. They also have a tendency to spend longer hours in the design studio integrating diverse design activities.

In the lab, students are learning in the context of common knowledge and interests. They are doing their learning tasks that based on procedures and the times arranged for them. One consequence of this is that they are likely to discuss on similar ideas among themselves without much disagreement. They work independently when they are doing tasks that are different from other peers. They are also able to organize their time and learning activities accordingly.

- **Peer Relationships**

Utterances about the studio

'...architecture is lot easier to get to know people because everyone is 1st year right now and we were all making new friends..'

'I am learning to work with different people very quickly...'

'...it has the strength of being able to communicate your ideas to other people and the mutual support.'

'...you need more social support in the studio, probably because you're there much longer...'

Utterances about the lab

'...if you come out to someone and you ask them something like look, 'I don't know what to do this, can you just help me'. And then, they just give me a weird look like you are bothering me.'

'...when I am in engineering and keeps my head down,...we don't stand around talking to everyone as we would do in architecture.'

'I am doing Euro codes and you are doing British standards, and I am really sorry but I don't know what is going on'.

Sosialising is just slowing you down and it interferes your work.'

There are differences in peer relationships and interactions between the two learning environments.

In the design studio, students are learning while they are socializing with their peers. This helps them to maintain openness in their relationships that facilitates the meaningful exchanges of design ideas. Such informal and supportive relationships are regarded as an effective way of peer assisted learning when it comes to dealing with design uncertainties that every peer experiences.

In the lab, students spend more time in their learning activities acting on an individual basis. They consider learning to be more effective when it is separated from socializing with peers. This is because each of them is working and concentrating on learning task within the specified domain of a problem. Therefore, among the students, peer relationships tend to be reserved and formal.

6.16 Identifying 'constructs' from focus group data

A number of reviews dealing with the 'Theory of Personal Constructs' have suggested that underlying constructs can be elicited from those earlier focus group findings. The key ideas of using constructs for construing events (Kelly 1955; Kelly 1963) for the prediction purposes may provide deeper insights into the fundamental differences between peer cultural groups.

Therefore, it is appropriate to elicit bi-polar constructs from Dual-study utterances based on early findings on peer cultural differences. These constructs are useful for the further validation and assessment of the studio peer culture by enabling different learning environments to be compared using quantitative study.

Several procedures need to be followed before these bi-polar constructs can be extracted from the utterances. Firstly, the utterances were organized according to the common descriptive themes. Secondly, the utterances were analysed and categorized in relationship to the cultural elements and multiple events. Consequently, the constructs were generated in order to represent the underlying meanings of the categorized utterances that had been analysed.

For example, a common theme of verbal acts illustrates the interrelated events of design and social cognitions. At the same time, it also indicates the properties of language, as one of the cultural manifesting element for a peer community. Therefore, a construct can be generated from utterances under the heading of a particular theme so as to provide a meaningful and objective reflection of the multiple events and cultural properties.

Table 6.2 shows an example of how the underlying bi-polar constructs from the dual-study students' utterances were elicited. The constructs in the column on the far left, represent utterances that refer to the studio-format environment, while, the constructs in the column on the far right, reflect the utterances that refer to engineering lab environment.

Table 6.2 – Example of Eliciting Bi-Polar Constructs

	Utterances of the dual-study students		
'constructs'	About the design studio	About the engineering lab	'constructs'
Social	'the studio which inherently more kind of cosy as the lounge. It is sort of got more room for social..'	'It doesn't have social atmosphere and you just do your work...'	Individual

A series of discussions and revisions took place in order to identify and finalise the key bi-polar constructs elicited from the utterances. This was necessary to avoid confusion of meanings between constructs. The bi-polar constructs underlying those related utterances are divided into three categories of events namely; 'situations', 'learning' and 'socializing'. Table 6.3a, 6.3b and 6.3c illustrate those related bi-polar constructs identified within each category of event.

Table 6.3a – 'Situations'

	Utterances of the Dual-study students		
'constructs'	About the design studio	About the engineering lab	'constructs'
Student-led	'..in architecture, gives you freedom, gives you opportunity to develop yourself'.	'I think engineering is a bit more restrictive'.	Tutor-led
Freedom	'...unlike the architecture which is much more free.'	'...lab it's far more ordered'.	Ordered
Casual	'...the studio which inherently more kind of cosy as the lounge. It is sort of got more room for social.'	'Its very bland, its soulless almost its very utilitarian...its like got no disperse of different years.'	Formal
Social	'...thing.is and its sort of mix with other students.'	'It doesn't have social atmosphere and you just do your work.'	Individual

Table 6.3b – 'Learning'

	Utterances of the Dual-study students		
'constructs'	About the design studio	About the engineering lab	'constructs'
Aim at Exploring	'...in architecture, we're playing around the basic first which feels like nursery isn't it.'	'...it is not about expressing yourself as such and its much about doing exercise.'	Aim at achieving
Solution-based	'....there is no real right way everybody does something different you know.'	'...you know, there's only one answer, you can't debate who is right, who is wrong.'	Problem-based
Episodic	'...concept in architecture can be much wide.'	'When you start doing, they just throw you straight to hardcore theories.'	Semantic
Realistic	'....you're doing certain building and look at the work of this architect.'	'...it's more book based ... there is only two ways of doing it one of them is British Standards the other is Europe code.'	Abstract

Table 6.3b – 'Learning' (continued)

	Utterances of the Dual-study students		
'constructs'	About the design studio	About the engineering lab	'constructs'
Tacit	'I have to do is to constantly think as to how you are thinking and try to change that as much as possible.'	'It's just a straightforward process which you picked up from the book.'	Explicit
Broad	'...in architecture there's a hundred and one million ways of doing stuff.'	'...you're being given knowledge to use how you want to use it.'	Focused
Original	'...the students, they are encouraged to push boundaries.'	'....we make them structurally to test them for loads or bending moment.'	Accurate
Integrative	'...ideas about to arrange your space or whatever it is that you're trying to think about materials or others.'	'It's just like do this now and gets your result in five minutes time and it's done.'	Discrete

Table 6.3c – 'Socialising'

	Utterances of the Dual-study students		
'constructs'	About the design studio	About the engineering lab	'constructs'
Evocative	'...it's much more fun to talk about architecture.'	'...if you're talking to an engineer I think you're talking about numbers.'	Direct
Metaphorical	'...in architecture they talk in riddles.'	'Conversations tend to be shortened to a point.'	Literal
Extrovert	'....architecture people are kind of more open to new people.'	'...they clearly do know and they're just can't be bother to help you, basically.'	Introvert

6.17 Summary

Qualitative findings from interviews indicate that Architectural students have shared commonalities among them. There are various benefits that they are gaining from the experience of these commonalities in learning and socialization events.

The findings from the focus group study also seem to support the signifying peer cultural practices by scrutinizing the Dual-study students' different experiences of the design studio and engineering lab environments.

Underlying those signifying differences, there are key bi-polar constructs identified within the 'situations', 'learning' and 'socialising' events. Such an identification of constructs was able to provide a deeper insight in the studio peer culture taking place that exist within those interrelated events.

These elicited constructs are useful for further quantitative investigation by the devising of a survey using semantic differential technique that provides an improved means of objective assessment and validation. Subsequently, findings from quantitative investigation will be able to determine the possible significance of studio peer culture.

Chapter 7
Quantitative Study and Findings

7.1 Introduction

In the previous chapter, qualitative findings have provided meaningful insights on the shared commonalities among architectural students with regard to signifying cultural manifesting elements. The findings also illustrated that there are key differences on the underlying multiple events between those peer cultural practices that took place in the studio-format and engineering lab environments.

The next challenge of this research investigation is to test and verify those findings by using a quantitative investigation based on previous identified constructs. The main purposes of this investigation are as follows:

- To verify if those elicited constructs are meaningful and appropriate representations of peer cultural practices and events.
- To determine the level of significance on the degree of agreements in each group of students.
- To determine the level of significance with regard to differences and correlations of agreement between groups of students.

Therefore, the main hypothesis *(H_1)* and null hypothesis *(H_0)* in this quantitative investigation are as follows:

***(H_1)* – 'There are <u>differences</u> between the peer culture in the studio format environment and peer culture in a learning environment from other field of study'**

***(H_0)* - 'There are <u>no differences</u> between the peer culture in the studio format environment and peer culture in a learning environment from other field of study'**

This chapter begins with discussions concerning the formulation of survey, collecting data, selection of participants and appropriate statistical tests. These are followed by some general observations regarding the responses given by the participants and also discussions of the descriptive findings based on Architectural students' responses to the gathering of initial views on their commonalities. The statistical findings on each group of participants will also be discussed. Next, there will be discussions on findings from the comparative analysis between groups. Finally, visual representations that illustrate and support the qualitative and quantitative findings are presented.

7.2 Survey using 'Constructs'

As discussed previously, findings from qualitative investigation tend to be subjective and biased on the interpretations of data. This is due to a possible lack of transparency in selection of participants and data analysis. Furthermore, the interview data represented only those participants who have studio peer cultural experiences. Although, the Dual-study participants had provided information on their different peer cultural experiences in the focus group sessions, their numbers were relatively small. For that reason, there are still uncertainties on the significance of studio peer culture and the influences it had on the Architectural students.

Therefore, there are two ways to verify and support the initial findings. Firstly, to gather quantitative data from larger representative samples of Architectural and Dual-study students and secondly, to gather comparative data from a group of Non-architectural students who have no studio learning experiences; however they have similar context of peer learning experiences in a different environment.

A survey is considered appropriate for the purpose of this further investigation. It helps to compare, contrast, classify, analyse and interpret events within a cultural phenomenon. It can also be utilized to discover more about the wide range of signifying practices of a large number of people within a group or between groups. Conducting a survey requires careful consideration to ensure the responses of participants can be elicited efficiently and accurately (Moore 2006). Those considerations were carefully thought about in term of the specific purpose of the research inquiry (Cohen, Manion et al. 2000).

Therefore, using personal constructs in this survey is a useful way of gathering data relevant to the study. On the basis of the Theory of Personal Constructs (Kelly 1963), Diamond (1982) stated that members of a cultural group shared similar super-ordinate and sub-ordinate constructs that they use to predict and order the events that take place around them. As a result, they are able to have meaningful communications and interactions with other members by using those shared constructs. In Kelly's terms, these members have established a particular focus and range of convenience and this aids their predictions in order to deal with learning and socio-cultural events. Hence, constructs translated into the form of bi-polar words *(i.e. social-individual, realistic-abstract)* are beneficial to the identification of the similarities between members of a cultural group, while at the same time, drawing attention to the differences between members of various cultural groups.

Furthermore, the use of constructs allows the researcher to formulate a survey using standardized information and formats to gather quantitative data. These data can be further examined using statistical tests to reveal and compare meaningful patterns of constructs representing cultural properties and the multiple events of various peer groups.

7.3 Designing and conducting survey using 'Constructs'

In the previous chapter, underlying constructs *('design' and 'non-design' related)* were elicited from utterances of the Dual-study students who took part in the focus group sessions. These constructs were divided into three interrelated categories of events namely: 'situations', 'learning' and 'sosialising'. Table 7.1 shows the constructs within each of the interrelated events.

Table 7.1 – Bi-Polar Constructs and Categories

About situations	About learning	About socialising
student led-tutor led	aim at exploring-aim at achieving	evocative-direct
free-ordered	solution based-problem based	metaphorical-literal
casual-formal	episodic-semantic	extrovert-introvert
social-individual	realistic-abstract	
	tacit-explicit	
	broad-focused	
	original-accurate	
	integrative-discrete	

By using these categories of constructs and events, a survey form using a semantic differentials technique was formulated. According to Heise (1970), semantic differential is a useful technique for measuring people's reactions to stimulus words by establishing a rating on a scale defined by contrasting adjectives at each end. It is a simple and economical way of obtaining data from different people of various groups and cultures. Therefore, this survey technique can be utilised as an observational tool to investigate the cultural commonalities and differences among the student peers.

This technique used a scale of seven points long. This figure was chosen because it would help the respondents to make consistent judgments (Lawson 2001). 4 was labeled 'neither', 3, 5 were labeled 'slightly', 2, 6 were labeled 'quite' and 1, 7 were labeled 'very'. Such scales measure the directionality *(e.g. good vs bad)* and also intensity *(slightly through very)* of a person's underlying thoughts or experiences. In addition, most of the constructs were

supported by amplifying sentences that would assist the participants to make better judgments with their rating choices. Aside from this choice of ratings, a participant was given alternative choices to rate 'do not understand', 'unsure' and 'not relevant'. This was to see if those constructs addressed to him/her were meaningful or otherwise.

Table 7.2 shows part of the survey format illustrating the composition of ratings, amplifying sentences and alternative choices. The full format of the semantic differential survey is shown in *Appendix C*.

Table 7.2 – Part of survey format

	very	quite	slightly	neither	slightly	quite	very		
'Constructs'	1	2	3	4	5	6	7	'Constructs'	
Social 'Learning activities are done through social interactions'								**Individual** 'Learning activities are done through individual study'	☐ Do not understand ☐ Unsure ☐ Not relevant

In conducting the study, a survey form was prepared for distribution purposes. The survey form consists of the followings:

- The introduction and the purpose of study
- A brief description of the definition of 'Personal Constructs'
- Instructions to participants on the positions of scale and how to rate them
- The semantic differential chart that contains the constructs for rating purposes. As a precaution against the 'positioning' tendency of ratings by the participants, the polar positions of the assumed design-related and non-design related constructs are randomly alternated (*e.g., happy-sad, dark-bright*) (Good, Suci et al. 1967).
- The participant's educational background and feedback
- Statement of appreciation and assurance of confidentiality

The survey was conducted on groups of students in their respected classes or studios with the kind permissions from their respective tutors, except in the case of one group of students. However, these students had agreed to participate in the survey when they were approached and explained to them about the study and its confidentiality by the researcher. Before the questionnaires were answered, the researcher gave the participants a brief introduction to the survey and instructions regarding its completion.

7.4 Survey participants

A total number of 167 students participated in this research survey as is shown in Table 7.3. They were from three groups of students with different experiences of learning environment. The first group consists of 113 Architectural students from 1st to the 6th year of study. The second group consists of 42 students from the 3rd year of the Mechanical Engineering study. Finally, the third group consists of 12 Dual-study students who have experiences in both the architecture and engineering learning environment. The small number of Dual-study students was related to their being a smaller segment of the general 'population' in comparison to the students from other groups in the survey. The main purpose for these group selections was to cross-examine and support previous findings with hard quantitative data using statistical tests. Subsequently, this may provide explicit and objective results regarding studio peer culture.

Table 7.3 – Number of survey participants
(the course descriptions of the participants are as shown in *Appendix F*)

Area of study	No. of Participants	Notes
Architecture	113	(1st – *n=48*, 2nd – *n=28*, 3rd – *n=22*, 5th & 6th – *n=15*)
Mechanical	42	3rd year
Dual-study	12	(2nd - *n=5*, 3rd – *n=5*, 4th – *n=2*)
Total *(n)*	**167**	

The total number of student participants from Architectural studies is considered appropriate to be a representative sample (Heyes, Hardy et al. 1986) for the purposes of this investigation. This is because the participants were basically similar to the general population of architectural students in the University of Sheffield in terms of educational characteristics and peer experiences.

The Mechanical engineering students were purposely selected to investigate their learning experiences specifically within the engineering laboratory environment. As stated earlier, the laboratory has the basic equivalent to the design studio in the sense that both learning environments allow students to perform practical tasks and interact with their peers while learning. Both environments are also different from the lecture class environment where students have limited opportunities to perform practical tasks and interact with their peers. Therefore, the investigation of the peer cultural phenomenon by comparing the students' experiences in the design studio and engineering laboratory is considered appropriate and

reasonable. Furthermore, the interplay of events between learning situations, processes and socializing within peer cultural practices seems to be more dynamic in design studio and laboratory.

The Dual-study students were also purposely selected because they had experiences of both design studio and laboratory learning environments. The investigation into their dual learning experiences is regarded as a sensible way of supporting comparative investigation into the peer cultural differences between the design studio and laboratory learning environment. Hence, this will facilitate further study to determine if there is such an influential studio peer culture at work among the design students.

Architectural and Mechanical students were requested to rate bi-polar constructs based on peer experiences in their particular learning environments i.e. the design studio or engineering lab. However, the Dual-study students were requested to rate bi-polar constructs for each of their experiences in the design studio and engineering lab. Therefore, they were given one set of questionnaires for each environment.

7.5 Analysing quantitative data

According to Siegel (1956), the first step to be taken in analyzing data for decision-making is to state the null hypothesis *(H_0)*. A hypothesis is a researcher's informed speculation regarding the possible relationship between variables. The null hypothesis is a hypothesis that no differences will be found and it is specifically formulated for the purpose of being rejected. If it is rejected, the alternative or research hypothesis *(H_1)* may be accepted. The research hypothesis is the prediction based on the research theory under examination. The standard test of hypotheses is a technique known as statistical inference. It is a technique that uses an appropriate statistical test to draw conclusions about a large number of events or populations based on the basis of the observations of only a portion of these.

In this research study, the main hypothesis is related to the theoretical assumption that studio peers have their particular cultural signifying practices within the studio-format environment. This assumption is based on the initial findings in the exploratory stage of the research investigation which indicated studio peers have shared commonalities in the way they learn and socialise.

As discussed earlier, a comparative investigation is necessary to reinforce the research theoretical assumptions of the research by looking for the possible differences between two

peer learning groups from different field of study. Furthermore, it will reveal whether there is a relationship between the variables of 'peer culture' and 'degree of agreement' by using constructs.

There are several considerations that need to be taken into account before a researcher decides on the appropriate statistical test (Siegel 1956; Cohen and Holliday 1996). In this investigation, those considerations were types of analysis *(i.e. one-way, two-way, correlation)*, sample *(i.e. related, unrelated sample)* and measurement *(i.e. nominal, ratio, interval)*. Based on those considerations, the appropriate statistical tests used in this research investigation are as follows:

- *Chi-Squared 'goodness of fit'* test was for one-way analysis to observe the distribution of ratings by members in a particular group (Architecture, Mechanical, Dual-study).
- *Chi-Squared* test was for two-way analysis to observe the differences in degree of agreement between two unrelated samples or groups (Architecture – Mechanical).
- *T test* was for two-way analysis to observe the differences in degree of agreement between related samples or similar group (Dual-study 'studio' – Dual-study 'lab').
- *Spearman's rank order correlation coefficient* test was used to observe on the degree of association on rating judgments between different participants who have experiences in similar learning environment. (Architecture – Dual-study 'studio', Mechanical – Dual-study 'lab').

These selected tests will be used to determine the level of significance on findings. The level of significance is the level of probability *(p)* that the relationship between variables was due to chance factors (Heyes, Hardy et al. 1986). If a statistical test specified a probability $(p) < 5\%$ *or 0.05*, this means that the result of finding is significant. In other words, the results *(i.e. rating choices)* have up to a 5 probabilities in 100 likely to occur due to chance.

According to Heyes, Hardy et al. (1986), the common level of significance is $(p) \leq 0.05$ which suggests the result is significant. If $(p) > 0.05$, the result is likely to occur due to chance and is, therefore, considered as not significant. Therefore, if the result *(p)* is significant, a researcher can reject the null hypothesis (H_0) and accept the research hypothesis (H_1).

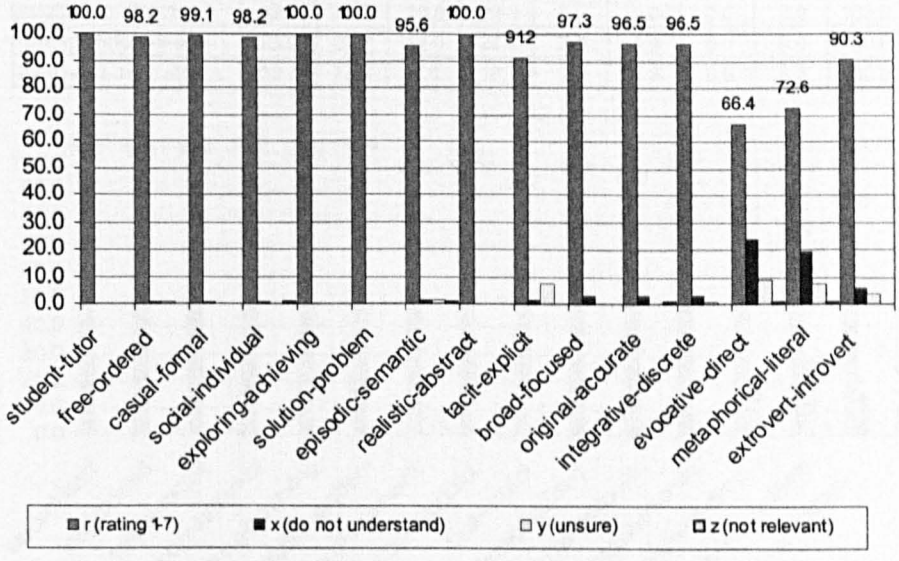
The level of significance regarding degree of association *(r)* is determined between values 0.00 to 1.00. There is a very high correlation between two variables if *(r)* is between 0.90 to 1.00 and a very low correlation if *(r)* is between 0.00 to 0.19.

7.6 General responses of survey participants

This section will discuss the number and percentage of responses by participants in each group of students *(e.g. Architecture, Mechanical, Dual-study)* on the bi-polar constructs before findings from statistical analysis of the gathered data are further discussed. The main reason for these discussions is to observe participants' ability to understand and rate the given constructs. This is to ensure the use of such constructs in this survey is relevant to participants with regard to their peer cultural experiences in a particular learning environment. The following Table and Figure 7.4, 7.5, 7.6 and 7.7 show the numbers and percentages of responses to the series of bi-polar constructs given by each group of participants.

Table and Figure 7.4 – General responses on constructs by Architectural students (n=113)

Constructs	*Total r*	%	*Total x*	%	*Total y*	%	*Total z*	%	TTL
student-tutor	113.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
free-ordered	111.0	98.2	1.0	0.9	1.0	0.9	0.0	0.0	100.0
casual-formal	112.0	99.1	1.0	0.9	0.0	0.0	0.0	0.0	100.0
social-individual	111.0	98.2	1.0	0.9	0.0	0.0	1.0	0.9	100.0
exploring-achieving	113.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
solution-problem	113.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
episodic-semantic	108.0	95.6	2.0	1.8	2.0	1.8	1.0	0.9	100.0
realistic-abstract	113.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
tacit-explicit	103.0	91.2	2.0	1.8	8.0	7.1	0.0	0.0	100.0
broad-focused	110.0	97.3	3.0	2.7	0.0	0.0	0.0	0.0	100.0
original-accurate	109.0	96.5	3.0	2.7	0.0	0.0	1.0	0.9	100.0
integrative-discrete	109.0	96.5	3.0	2.7	1.0	0.9	0.0	0.0	100.0
evocative-direct	75.0	66.4	27.0	23.9	10.0	8.8	1.0	0.9	100.0
metaphorical-literal	82.0	72.6	22.0	19.5	8.0	7.1	1.0	0.9	100.0
extrovert-introvert	102.0	90.3	7.0	6.2	4.0	3.5	0.0	0.0	100.0



Notes:

r - number and percentage of responses that rate constructs between 1-7
x - number and percentage of responses that rate constructs as 'do not understand'
y - number and percentage of responses that rate constructs as 'unsure'
z - number and percentage of responses that rate constructs as 'not relevant'

Table and Figure 7.4 illustrate that a majority of the architectural student participants were able to make rating *(r)* choices between numbers 1 and 7 *(r > 90%)* on the bi-polar constructs related to 'situations' and 'learning' events. This indicates that those rated constructs were considered meaningful and related to their peer cultural experiences within the studio format environment.

There are fewer participants who rated *(r)* between number 1 and 7 *(r < 75%)* on two of the bi-polar constructs namely *'Evocative-Direct'* and *'Metaphorical-Literal'* which are related to the 'socialising' events. This indicates that more participants *did not understand (x)* or were *unsure (y)* about these constructs in relation to their peer cultural experiences. Nevertheless, the percentage of participants who chose to rate between 1 and 7 is higher *(r > 65%)* than those who chose to rate *x, y* or *z.*

Table and Figure 7.5 – General responses on constructs by Mechanical students (n=42)

Constructs	no. of *r*	%	no. of x	%	no. of *y*	%	no. of *z*	%	TTL
student-tutor	41.0	97.6	0.0	0.0	1.0	2.4	0.0	0.0	100.0
free-ordered	41.0	97.6	0.0	0.0	0.0	0.0	1.0	2.4	100.0
casual-formal	41.0	97.6	0.0	0.0	0.0	0.0	1.0	2.4	100.0
social-individual	42.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
exploring-achieving	40.0	95.2	0.0	0.0	2.0	4.8	0.0	0.0	100.0
solution-problem	42.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
episodic-semantic	38.0	90.5	0.0	0.0	3.0	7.1	1.0	2.4	100.0
realistic-abstract	40.0	95.2	1.0	2.4	1.0	2.4	0.0	0.0	100.0
tacit-explicit	36.0	85.7	1.0	2.4	5.0	11.9	0.0	0.0	100.0
broad-focused	38.0	90.5	0.0	0.0	4.0	9.5	0.0	0.0	100.0
original-accurate	37.0	88.1	2.0	4.8	3.0	7.1	0.0	0.0	100.0
integrative-discrete	40.0	95.2	1.0	2.4	0.0	0.0	1.0	2.4	100.0
evocative-direct	32.0	76.2	10.0	23.8	0.0	0.0	0.0	0.0	100.0
metaphorical-literal	28.0	66.7	12.0	28.6	2.0	4.8	0.0	0.0	100.0
extrovert-introvert	33.0	78.6	7.0	16.7	2.0	4.8	0.0	0.0	100.0

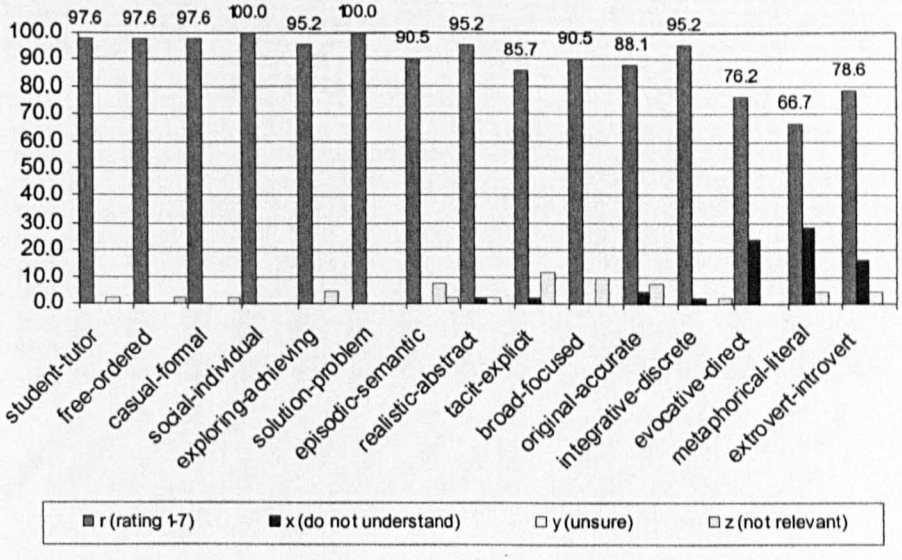


Table and Figure 7.5 also illustrate that a majority of the Mechanical student participants were able to make rating *(r)* choices between numbers 1 and 7 *(r > 90.0%)* on most of the bi-polar constructs related to 'situations' and 'learning' events. Bi-polar constructs of *'Tacit-Explicit'* and *'Original-Accurate'* have slightly lower percentages, *(r=85.7%)* and *(r=88.1%)* respectively. However, these percentages are regarded as high. These also indicate that those constructs that were rated are to be considered meaningful and related to their peer cultural experiences within the laboratory environment.

There are less number of participants who rated *(r)* between 1 and 7 *(r < 80%)* on all of the bi-polar constructs in the 'socialising' events. The bi-polar constructs of *'Metaphorical-Literal'* has the lowest percentage *(r=66.7%)*. This indicates that more participants *did not understand (x)* or were *unsure (y)* about these constructs in relation to their peer cultural experiences. Nevertheless, the percentage for participants who chose to rate between 1 and 7 is higher *(r > 65%)* than for those who chose to rate *(x), (y)* or *(z)*.

Table and Figure 7.6 – General responses on constructs by Dual-study (n=12) based on experiences in the design studio

Constructs	*no. of* r	%	*no. of* x	%	*no. of* y	%	*no. of* z	%	TTL
student-tutor	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
free-ordered	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
casual-formal	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
social-individual	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
exploring-achieving	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
solution-problem	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
episodic-semantic	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
realistic-abstract	11.0	91.7	0.0	0.0	1.0	8.3	0.0	0.0	100.0
tacit-explicit	11.0	91.7	0.0	0.0	1.0	8.3	0.0	0.0	100.0
broad-focused	11.0	91.7	0.0	0.0	0.0	0.0	1.0	8.3	100.0
original-accurate	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
integrative-discrete	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
evocative-direct	9.0	75.0	2.0	16.7	1.0	8.3	0.0	0.0	100.0
metaphorical-literal	6.0	50.0	5.0	41.7	1.0	8.3	0.0	0.0	100.0
extrovert-introvert	11.0	91.7	1.0	8.3	0.0	0.0	0.0	0.0	100.0

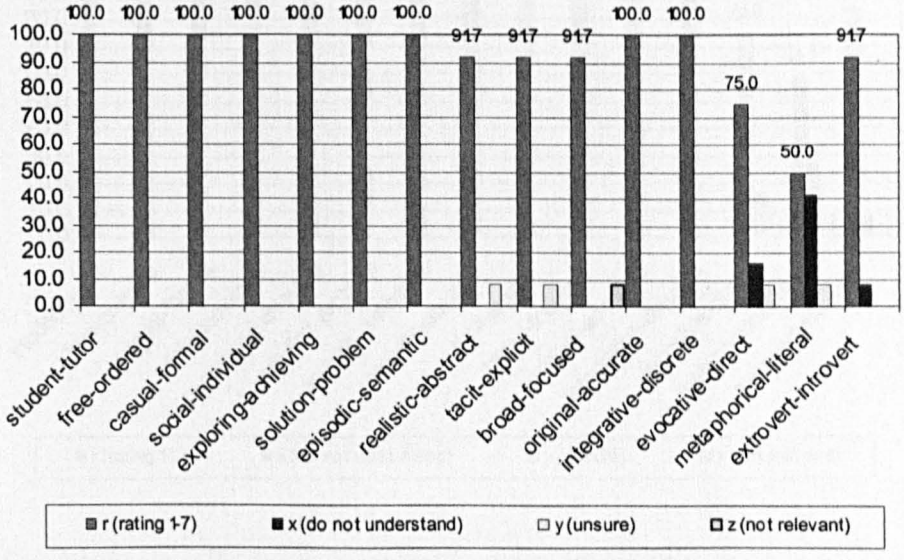
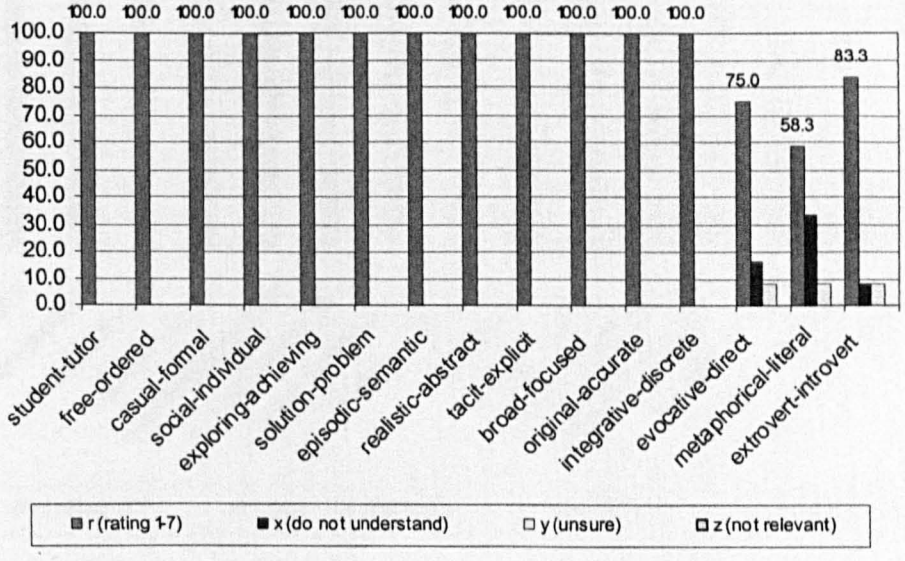


Table and Figure 7.6 show that the majority of the Dual-study students were able to make rating *(r)* choices between numbers 1 and 7 *(r > 90.0%)* on the bi-polar constructs related to 'situations' and 'learning' events. These indicate that those constructs that were rated are also to be considered meaningful and related to their peer cultural experiences within the studio format environment.

There is a lower number of participants who rated between 1 and 7 *(r ≤75%)* on two of the bi-polar constructs namely *'Evocative-Direct'* and *'Metaphorical-Literal'* which are related to the 'socialising' events. The bi-polar constructs of *'Metaphorical-Literal'* has the lowest percentage *(r=50%)*. These indicate that more participants *did not understand (x)* or were *unsure (y)* about these constructs in relation to their peer cultural experiences.

Table and Figure 7.7 – General responses on constructs by Dual-study (n=12) based on experiences in the engineering laboratory

Constructs	*no. of* ***r***	%	*no. of* **x**	%	*no. of* ***y***	%	*no. of* ***z***	%	TTL
student-tutor	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
free-ordered	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
casual-formal	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
social-individual	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
exploring-achieving	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
solution-problem	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
episodic-semantic	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
realistic-abstract	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
tacit-explicit	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
broad-focused	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
original-accurate	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
integrative-discrete	12.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
evocative-direct	9.0	75.0	2.0	16.7	1.0	8.3	0.0	0.0	100.0
metaphorical-literal	7.0	58.3	4.0	33.3	1.0	8.3	0.0	0.0	100.0
extrovert-introvert	10.0	83.3	1.0	8.3	1.0	8.3	0.0	0.0	100.0



Similarly, Table and Figure 7.7 illustrate that all of the Dual-study students were able to make their choices of rating *(r)* between numbers 1 and 7 *(r=100%)* with regard to the bi-polar constructs related to 'situations' and 'learning' events. This indicates that those constructs that were rated are considered very meaningful and related to their peer cultural experiences within the engineering lab environment.

There are fewer participants who made their choices of rating *(r)* between numbers 1 and 7 *(r ≤75%)* on two of the bi-polar constructs namely *'Evocative-Direct'* and *'Metaphorical-Literal'* both of which are related to the 'socialising' events. The bi-polar constructs of *'Metaphorical-Literal'* had the lowest percentage *(r=58.3%)*. These indicate that more participants *did not understand (x)* or were *unsure (y)* about these constructs in relation to their peer culture experiences.

7.6.1 Summary of overall survey responses

As discussed earlier, Table and Figure 7.4, 7.5, 7.6 and 7.7 illustrate that the majority of the participants from each group were able to make their choices of rating *(r)* between numbers 1 and 7 with regard to bi-polar constructs related to 'situations' and 'learning' events. Based on the overall responses shown in Figure 7.5, the participants were able to rate *(r)* between 1 and 7 *(r>90%)* on these constructs. This indicates that those constructs are to be considered meaningful and related to their peer cultural experiences within their particular learning environment.

Figure 7.8 – Overall responses on constructs by the survey participants

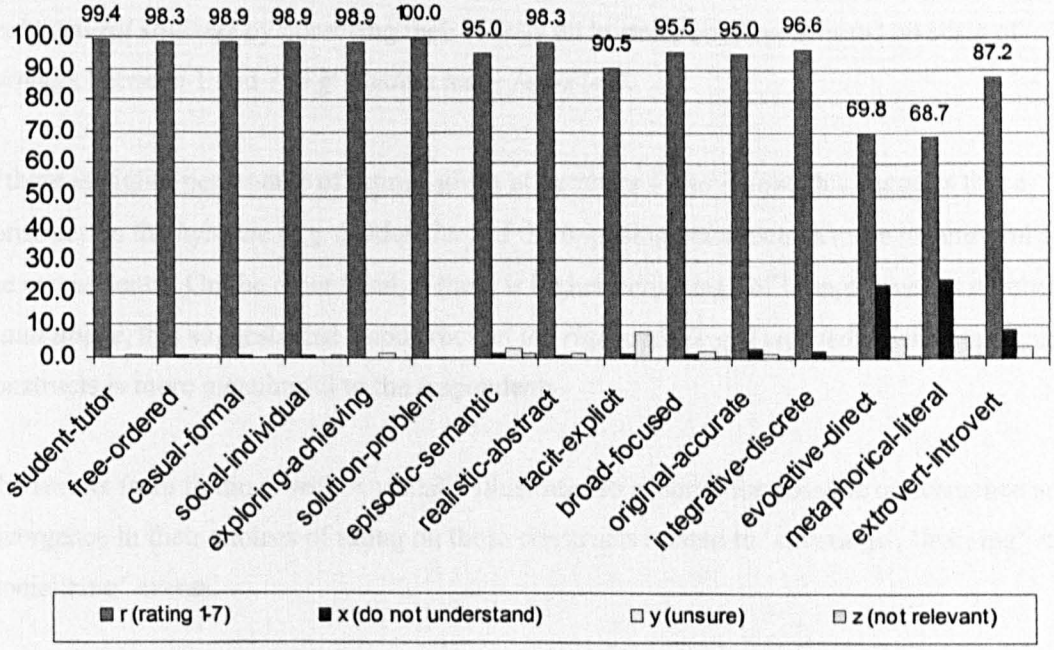


Table and Figure 7.4, 7.5, 7.6, 7.7 also illustrate that there is lower number of participants who made their choices of rating *(r)* between numbers 1 and 7 on two of the bi-polar constructs namely *'Evocative-Direct'* and *'Metaphorical-Literal'* both of which are related to the 'socialising' events. Based on several feedbacks given by few participants, they may be able to rate *(r)* these constructs if supportive amplifying sentences describing the constructs are given. Therefore, for future research purposes, these constructs will be refined with the support of descriptive amplifying sentences.

Nevertheless, as indicated in Figure 7.8, the overall percentage of all participants who chose to rate *(r)* these constructs between number 1 and 7 is higher *($r > 65\%$)* than those who chose to rate *x, y* or *z*.

Finally, the higher overall responses on the series of bi-polar constructs by all participants indicate that these constructs are meaningful in relationship to the interrelated events of 'situations', 'learning' and 'socialising' within their particular learning environment. Therefore, the use of constructs does fulfill the purpose of this research to investigate further the studio peer culture among architectural students by means of comparative study.

7.7 Descriptive findings - Architectural students

The main purpose of this section is *to identify the key commonalities of constructs among architectural students* by observing their ratings on bi-polar constructs based on scale of numbers between 1 and 7 *(e.g. Student led – Tutor led)*.

If there is higher percentage of ratings given at numbers *4 and below*, this suggests that a construct on the *left-side (e.g. Student led)* of the opposing constructs is more meaningful to the respondents. On the other hand, if there is higher percentage of ratings given at numbers *4 and above*, this suggests that a construct on the *right-side (e.g. Tutor led)* of the opposing constructs is more meaningful to the respondents.

The results from findings will be visually illustrated to observe for possible convergence and divergence in their choices of rating on those constructs related to 'situations', 'learning' and 'socializing' events.

7.7.1 Constructs related to 'Situations' events within studio environment

- Student led – Tutor led

Table and Figure 7.9 – Ratings on 'Student led – Tutor led'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	2	0	1	0	3.0	2.7
2	11	2	5	2	20.0	17.7
3	9	3	5	3	20.0	17.7
4	7	3	1	1	12.0	10.6
5	10	9	4	5	28.0	24.8
6	9	10	6	3	28.0	24.8
7	0	1	0	1	2.0	1.8
ttl	48	28	22	15	113.0	100.0

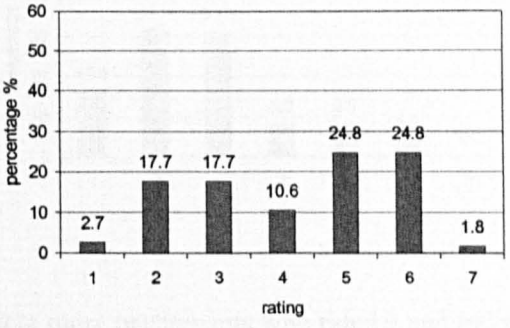
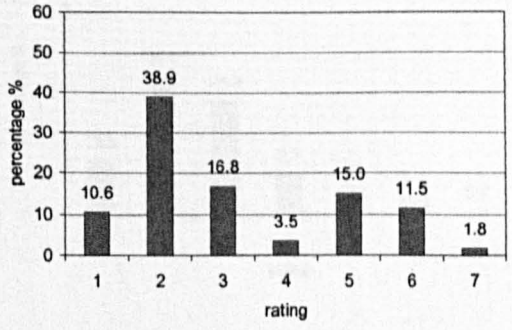


Table and Figure 7.9 show that there were more participants who rated 5 and above *(24.8%, 24.8%, 1.8%)*. These indicate that the *Tutor-led* construct is preferred by more of the respondents and suggests that more respondents considered situations within the studio are being led by the tutors as opposed to the students.

- Free – Ordered

Table and Figure 7.10 – Ratings on 'Free - Ordered'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	4	3	3	2	12.0	10.6
2	24	8	6	6	44.0	38.9
3	5	4	4	6	19.0	16.8
4	3	0	1	0	4.0	3.5
5	8	3	6	0	17.0	15.0
6	2	8	2	1	13.0	11.5
7	1	1	0	0	2.0	1.8
ttl	48	28	22	15	111.0	98.2

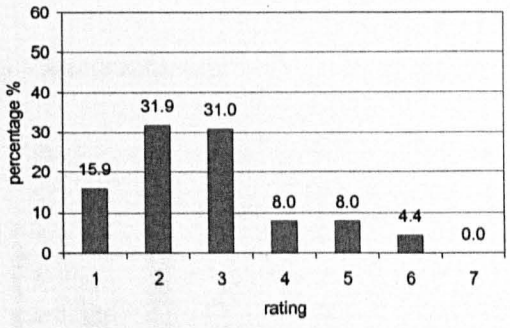


Based on the Table and Figure 7.10, it can be seen that there were more participants who rated 3 and below *(16.8%, 38.9%, 10.6%)*. These figures show that more than half of the participants chose *Free* as a more meaningful construct and it reveals that more respondents felt that the situations within design studio afforded them with more freedom in their learning activities.

- Casual - Formal

Table and Figure 7.11 – Ratings on 'Casual - Formal'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	8	4	3	3	18.0	15.9
2	19	5	8	4	36.0	31.9
3	11	12	6	6	35.0	31.0
4	2	1	5	1	9.0	8.0
5	3	5	0	1	9.0	8.0
6	4	1	0	0	5.0	4.4
7	0	0	0	0	0.0	0.0
ttl	48	28	22	15	112.0	99.1

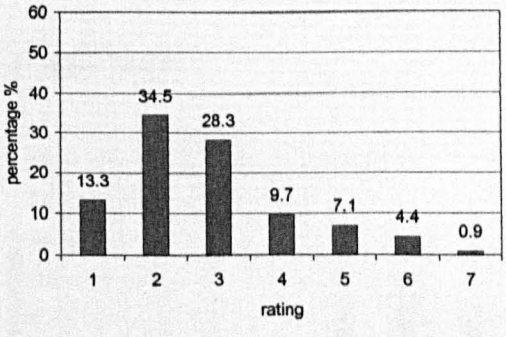


The Table and Figure 7.11 also show that there were more participants who rated 3 and below *(31.0%, 31.9%, 15.9%)*. These indicate more than two-thirds of the participants saw *casual* as a more meaningful construct than *Formal*. This suggests that more respondents looked at the learning situations in design studio as casual.

- Social - Individual

Table and Figure 7.12 – Ratings on 'Social - Individual'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	8	3	3	1	15.0	13.3
2	17	9	6	7	39.0	34.5
3	13	9	6	4	32.0	28.3
4	3	2	4	2	11.0	9.7
5	2	4	1	1	8.0	7.1
6	3	0	2	0	5.0	4.4
7	1	0	0	0	1.0	0.9
ttl	48	28	22	15	111.0	98.2



Similarly, the rating results illustrate that more than two-thirds of the participants rated 3 or lower *(28.3%, 34.5%, 13.3%)*. This demonstrates that more participants preferred *Social* as a more meaningful construct because they felt that interactions with studio peers gave them a number of learning benefits.

7.7.2 Constructs related to 'Learning' events within studio environment

- Aim at exploring – Aim at achieving

Table and Figure 7.13 – Ratings on 'Aim at exploring – Aim at achieving'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	14	3	5	4	**26.0**	**23.0**
2	22	11	7	3	**43.0**	**38.1**
3	7	7	1	6	**21.0**	**18.6**
4	2	2	4	1	**9.0**	**8.0**
5	2	4	4	0	**10.0**	**8.8**
6	1	1	1	1	**4.0**	**3.5**
7	0	0	0	0	**0.0**	**0.0**
ttl	**48**	**28**	**22**	**15**	**113.0**	**100.0**

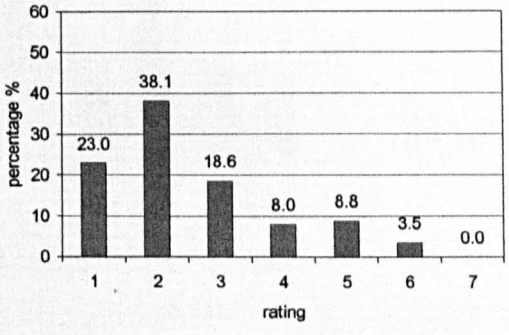


Table and Figure 7.13 illustrate that there were more participants who rated 3 or lower *(18.6%, 38.1%, 23.0%)*. This shows that more than half of the participants chose *Aim at Exploring* as the more meaningful construct. These figures reveal that more respondents are interested in exploring various ideas while doing their learning activities.

- Solution based – Problem based

Table and Figure 7.14 – Ratings on 'Solution based – Problem based'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	1	1	0	0	**2.0**	**1.8**
2	0	4	3	2	**9.0**	**8.0**
3	3	2	1	1	**7.0**	**6.2**
4	2	5	2	0	**9.0**	**8.0**
5	14	6	8	1	**29.0**	**25.7**
6	17	8	5	6	**36.0**	**31.9**
7	11	2	3	5	**21.0**	**18.6**
ttl	48	28	22	15	**113.0**	**100.0**

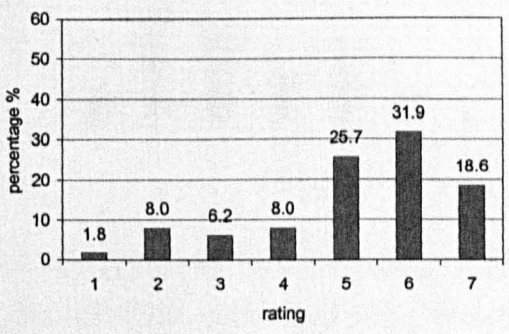


Table and Figure 7.14 show that there are more participants who rated 5 and above *(25.7%, 31.9%, 18.6%)*. More than two-thirds of the participants preferred to regard *Problem-based* as the more meaningful construct. This suggests that more respondents regard themselves as mainly dealing with problem-based learning activities.

- Episodic - Semantic

Table and Figure 7.15 – Ratings on 'Episodic – Semantic'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	7	4	5	5	**21.0**	**18.6**
2	23	10	11	4	**48.0**	**42.5**
3	9	7	3	3	**22.0**	**19.5**
4	4	4	1	3	**12.0**	**10.6**
5	0	1	0	0	**1.0**	**0.9**
6	2	1	1	0	**4.0**	**3.5**
7	0	0	0	0	**0.0**	**0.0**
ttl	48	28	22	15	**113.0**	**100.0**

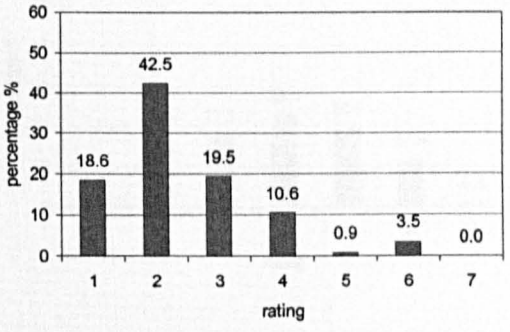
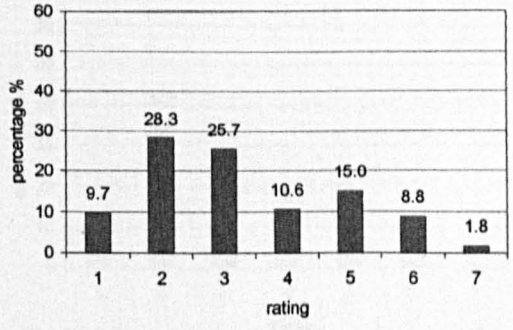


Table and Figure 7.15 illustrate that more than two-thirds of the participants rated 3 or lower *(19.5%, 42.5%, 18.6%)*. The results also indicate that more participants preferred *Episodic* as the more meaningful construct. This suggests that they are relying on episodic thinking based on meaningful precedent events while designing.

- Realistic – Abstract

Table and Figure 7.16 – Ratings on 'Realistic – Abstract'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	6	2	0	3	**11.0**	**9.7**
2	15	5	8	4	**32.0**	**28.3**
3	15	9	2	3	**29.0**	**25.7**
4	3	3	4	2	**12.0**	**10.6**
5	5	8	4	0	**17.0**	**15.0**
6	4	1	3	2	**10.0**	**8.8**
7	0	0	1	1	**2.0**	**1.8**
ttl	48	28	22	15	**113.0**	**100.0**

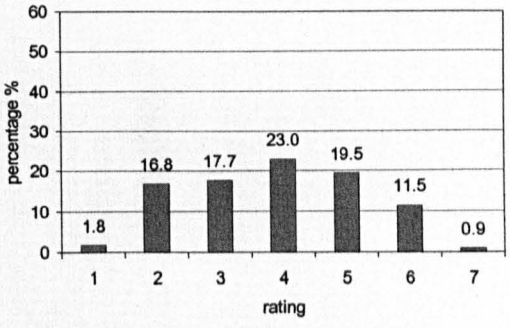


Similarly, these results illustrate that there are more participants who rated 3 or lower *(25.7%, 28.3%, 9.7%)*. These show that more than half of the participants chose *Realistic* as the more meaningful construct. This indicates that their learning process is guided by real situations which also include the design works of well known architects.

- Tacit – Explicit

Table and Figure 7.17 – Ratings on 'Tacit – Explicit'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	2	0	0	0	2.0	1.8
2	10	5	3	1	19.0	16.8
3	9	7	3	1	20.0	17.7
4	11	3	9	3	26.0	23.0
5	8	6	4	4	22.0	19.5
6	1	5	3	4	13.0	11.5
7	0	1	0	0	1.0	0.9
ttl	48	28	22	15	113.0	100.0



The results show that there are almost an equal numbers of participants who rated each construct. There is also a high percentage of participants who chose neither the constructs, *Tacit nor Explicit* as the more meaningful construct. These are suggesting that both constructs are considerable meaningful to them as part of their learning process in the design studio.

- Broad - Focused

Table and Figure 7.18 – Ratings on 'Broad – Focused'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	2	2	4	2	10.0	8.8
2	22	7	6	6	41.0	36.3
3	12	9	9	2	32.0	28.3
4	6	3	3	3	15.0	13.3
5	2	4	0	1	7.0	6.2
6	1	2	0	1	4.0	3.5
7	1	0	0	0	1.0	0.9
ttl	48	28	22	15	113.0	100.0

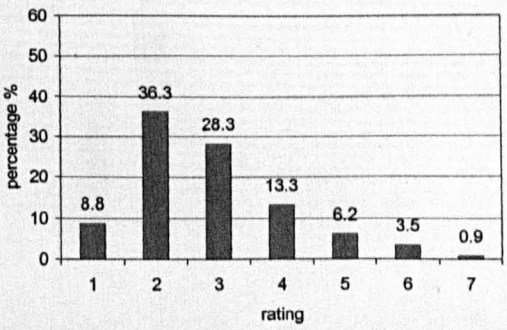


Table and Figure 7.18 illustrate that more than two-thirds of the participants rated 3 or lower *(28.3%, 36.3%, 8.8%)*. These indicate that more participants preferred *Broad* as the more meaningful construct because they considered themselves to be dealing with a wide domain of ideas while searching for coherent solutions to ill-defined design problems.

- Original - Accurate

Table and Figure 7.19 – Ratings on 'Original - Accurate'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	5	0	2	3	10.0	8.8
2	21	7	7	8	43.0	38.1
3	11	8	7	2	28.0	24.8
4	7	5	4	2	18.0	15.9
5	2	3	2	0	7.0	6.2
6	0	3	0	0	3.0	2.7
7	0	0	0	0	0.0	0.0
ttl	48	28	22	15	113.0	100.0

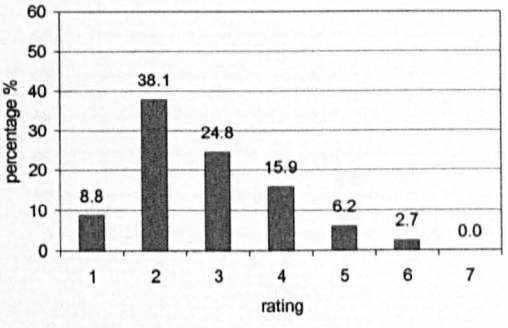
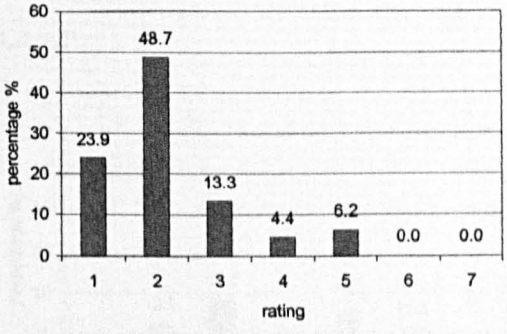


Table and Figure 7.19 illustrate that there are more participants who rated 3 or lower *(24.8%, 38.1%, 8.8%)*. These show more than half of the participants chose *Original* as a more meaningful construct. This reveals that more respondents placed a higher value on quality and distinctiveness rather than accuracy and precision in their work and learning process.

- Integrative – Discrete

Table and Figure 7.20 – Ratings on 'Integrative – Discrete'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	12	5	5	5	27.0	23.9
2	21	17	10	7	55.0	48.7
3	9	1	2	3	15.0	13.3
4	3	0	2	0	5.0	4.4
5	0	4	3	0	7.0	6.2
6	0	0	0	0	0.0	0.0
7	0	0	0	0	0.0	0.0
ttl	48	28	22	15	113.0	100.0



The rating results also show that there are more participants who rated 3 and below *(13.3%, 48.7%, 23.9%)*. Interestingly, these indicate that almost two-thirds of the participants displayed a marked preference for *Integrative* as the more meaningful construct. This suggests that majority of the respondents find learning in the design studio to be an integrative process: it requires them to bring many ideas together while working on design solutions.

7.7.3 Constructs related to 'Socialising' events within studio environment

- Evocative – Direct

Table and Figure 7.21 – Ratings on 'Evocative – Direct'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	0	0	0	1	1.0	0.9
2	6	7	5	1	19.0	16.8
3	8	6	6	1	21.0	18.6
4	4	6	1	4	15.0	13.3
5	9	0	0	1	10.0	8.8
6	4	1	3	0	8.0	7.1
7	1	0	0	0	1.0	0.9
ttl	48	28	22	15	113.0	100.0

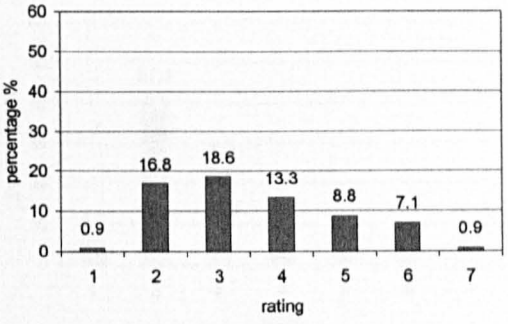
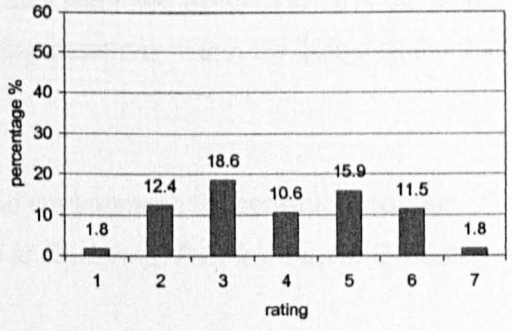


Table and Figure 7.21 illustrate that there were more participants rated 3 or below *(18.6%, 16.8%, 0.9%)*. However, there is a high percentage of the participants who *do not understand (23.9%)* or were *unsure* (8.8%) on these two constructs. This suggests that more participants chose *Evocative* as the meaningful construct in their socializing events with regard to their socialising within the studio environment. Nevertheless, there is also a considerable number of participants who were unable to select a preference. Much feedback from the participants indicated that these constructs needed amplifying sentences in order to make the descriptions clearer.

- Metaphorical – Literal

Table and Figure 7.22 – Ratings on 'Metaphorical – Literal'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	1	0	1	0	2.0	1.8
2	6	4	2	2	14.0	12.4
3	7	8	2	4	21.0	18.6
4	5	1	5	1	12.0	10.6
5	10	5	2	1	18.0	15.9
6	4	4	4	1	13.0	11.5
7	0	0	1	1	2.0	1.8
ttl	48	28	22	15	113.0	100.0

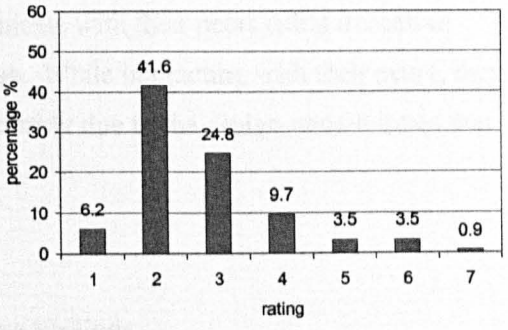


Similarly, those results also show that there were more participants who rated 3 or below *(18.6%, 12.4%, 1.8%)* while at the same time there is a considerable number of the participants who do not understand *(19.5%)* or are unsure *(7.1%)* on these two constructs. This indicates that more participants chose *Metaphorical* as the more meaningful construct. This percentage is, however, lower.

- Extrovert – Introvert

Table and Figure 7.23 – Ratings on 'Extrovert – Introvert'

Rate	Frequency				TTL	%
	1st	2nd	3rd	5 & 6th		
1	3	2	1	1	**7.0**	**6.2**
2	21	11	8	7	**47.0**	**41.6**
3	10	10	6	2	**28.0**	**24.8**
4	5	2	2	2	**11.0**	**9.7**
5	0	1	3	0	**4.0**	**3.5**
6	2	1	0	1	**4.0**	**3.5**
7	0	0	1	0	**1.0**	**0.9**
ttl	48	28	22	15	**113.0**	**100.0**



Finally, Table and Figure 7.23 illustrate almost two-thirds of the participants who rated 3 or below *(24.8%, 41.6%, 6.2%)*. Interestingly, these results also indicate that more participants showed a marked preference for *Extrovert* as the meaningful construct. This reveals that majority of the respondents considered themselves as open, friendly and outgoing while socializing in the studio environment.

7.7.4 Summary of descriptive findings

In the events related to 'situations' within the studio environment, the constructs *Tutor-led, Free, Casual* and *Social* were considered more meaningful by the Architectural students. They considered that many of learning activities taking place in the design studio are being mainly led by tutors. Nevertheless, they felt that they had more freedom to carry out their activities. Therefore, they are experiencing learning situations within the design studio that are more casual and social.

In the events related to 'learning' within the studio environment, the constructs that the participants considered more meaningful are *Aim at Exploring, Problem-based, Episodic, Realistic, Tacit, Explicit, Broad* and *Original.*
In the design studio, students emphasize exploring various possibilities for solutions. However, they regarded themselves as dealing with problem-based learning process. When attending to the design challenges, they are relying more on episodic memory and realistic models of reference. They are using both their tacit and explicit knowledge to deal with those

challenges. They are working integratively while dealing with wide domains of knowledge and information in the pursuit for design originality.

In the events related to 'socialising' within the studio environment, the constructs that participants considered to be more meaningful are *Evocative* and *Extrovert.*
Architectural students have a tendency to communicate with their peers using evocative words which exemplify several sets of design ideas. While interacting with their peers, they are open, friendly and also supportive. This is probably due to the design uncertainties that each one of them confronts while learning.

7.7.5 Semantic differential charts of descriptive findings

In this section, semantic differential charts are constructed to illustrate the mean of ratings on constructs by the Architectural students. The main purpose of these charts is to observe convergence and divergence of those mean ratings on constructs.

Table 7.24 shows the mean of ratings for each constructs by students from each year of architectural study. It also presents the overall mean ratings for each construct.

Figure 7.24a illustrates the semantic differential chart that consists of mean of ratings of each construct by students from each year. While Figure 7.24b demonstrates the overall mean of ratings for each construct.

Table 7.24 – Mean of Ratings of Construct - Architecture (1^{st} – 6^{th} year)

Constructs	1st year		2nd year		3rd year		5th, 6th year		Overall	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
student-tutor	3.8	1.6	4.9	1.3	3.9	1.7	4.5	1.6	4.2	1.6
free-ordered	3.0	1.6	3.7	2.0	3.3	1.7	2.5	1.2	3.2	1.7
casual-formal	2.7	1.4	3.0	1.4	2.6	1.0	2.5	1.1	2.7	1.3
social-individual	2.6	1.4	2.8	1.2	3.0	1.4	2.7	1.0	2.8	1.3
exploring-achieving	2.1	1.1	2.9	1.4	2.9	1.6	2.5	1.4	2.5	1.4
solution-problem	5.6	1.3	4.5	1.7	4.9	1.5	5.5	1.8	5.2	1.5
episodic-semantic	2.4	1.1	2.7	1.2	2.2	1.2	2.3	1.2	2.4	1.2
realistic-abstract	3.0	1.4	3.5	1.4	3.8	1.7	3.1	1.9	3.3	1.6
tacit-explicit	3.4	1.3	4.1	1.5	4.0	1.2	4.7	1.3	3.9	1.4
broad-focused	2.8	1.2	3.2	1.4	2.5	1.0	2.9	1.5	2.9	1.3
original-accurate	2.6	1.0	3.5	1.3	2.7	1.0	2.2	0.9	2.8	1.2
integrative-discrete	2.1	0.9	2.3	1.2	2.5	1.3	1.9	0.7	2.2	1.1
evocative-direct	4.0	1.5	3.1	1.1	3.3	1.5	3.4	1.3	3.6	1.4
metaphorical-literal	3.9	1.4	3.9	1.5	4.2	1.7	3.8	1.7	3.9	1.5
extrovert-introvert	2.6	1.1	2.7	1.1	3.1	1.4	2.7	1.3	2.7	1.2

Figure 7.24a – Semantic differential chart of mean of ratings - Architecture (1st – 6th year)

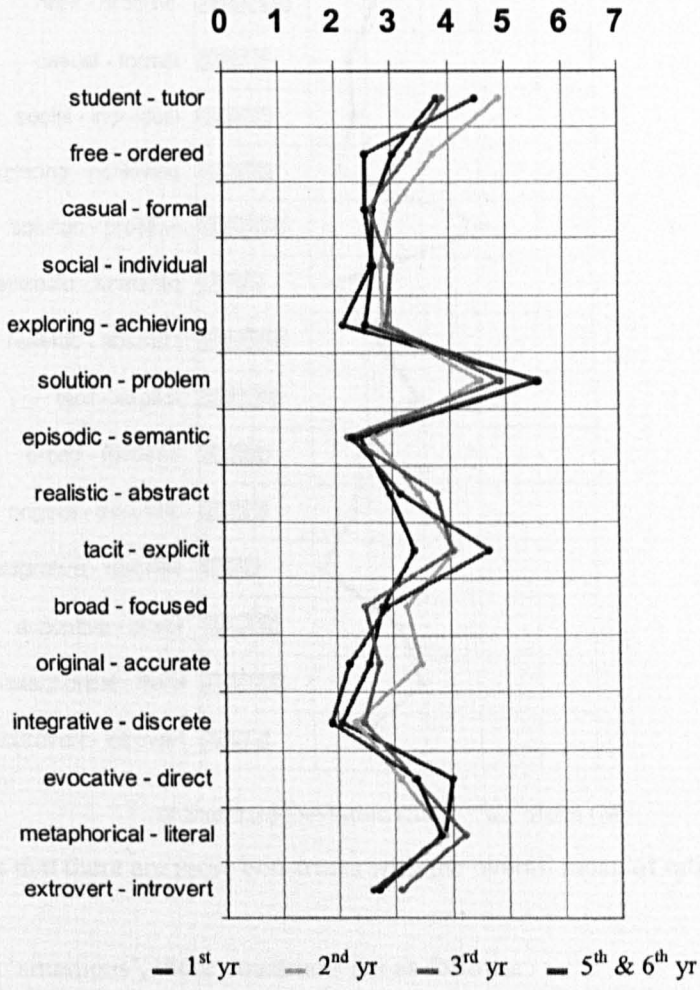


Figure 7.24a illustrates that there are several notable convergences on mean of ratings for constructs among the Architectural students *(1st, 2nd, 3rd, 5th & 6th year)*.

In events related to 'situations', there are convergences of ratings for the following constructs:

- *Casual (M=2.7, 3.0, 2.6, 2.5) , Social (M=2.6, 2.8, 3.0, 2.7)*

In events related to 'learning', there are convergences of ratings for the following constructs:

- *Episodic (M=2.4, 2.7, 2.2, 2.3), Integrative (M=2.1, 2.3, 2.5, 1.9)*

In events related to 'socialising', there are convergences of ratings for the following construct:

- *Extrovert (M=2.6, 2.7, 3.1, 2.7)*

In general, this chart also reveals that design studio peers are sharing many similarities of signifying practices within those multiple events.

Figure 7.24b – Semantic differential chart of overall mean of ratings - Architecture (1st – 6th year)

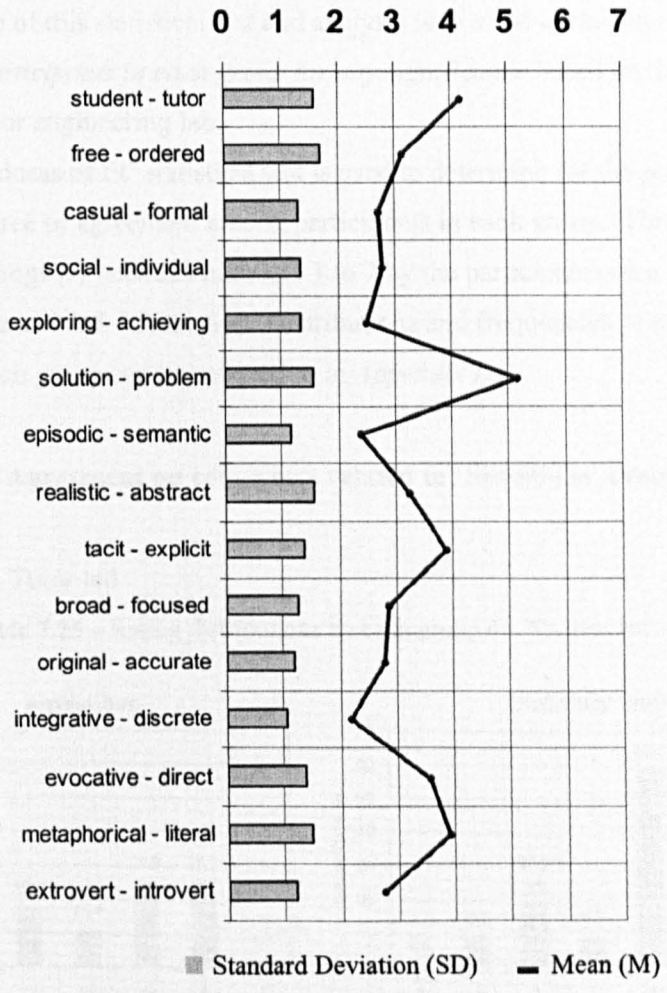


Figure 7.24b shows that there are more constructs with the overall mean of rating of less than 4.

In events related to 'situations', those constructs are as follows:

- Free *(M=3.2, SD=1.7)*, Casual *(M=2.7, SD=1.3)*, Social *(M=2.8, SD=1.3)*

In events related to 'learning', those constructs are as follows:

- Aim at Exploring *(M=2.5, SD=1.7)*, Episodic *(M=2.4, SD=1.2)*, Realistic *(M=3.3, SD=1.6)*, Tacit *(M=3.9, SD=1.4)*, Broad *(M=2.9, SD=1.3)*, Original *(M=2.8, SD=1.2)*, Integrative *(M=2.2, SD=1.1)*

In events related to 'socialising', those constructs are as follow:

- Evocative *(M=3.6, SD=1.4)*, Metaphorical *(Mean-3.9, SD=1.5)*, Extrovert *(M=2.7, SD=1.2)*

This chart illustrates that many constructs on the *left-hand* side are meaningful to the students. It also provides initial descriptive supports for the previous qualitative findings.

7.8 Statistical findings – One way test

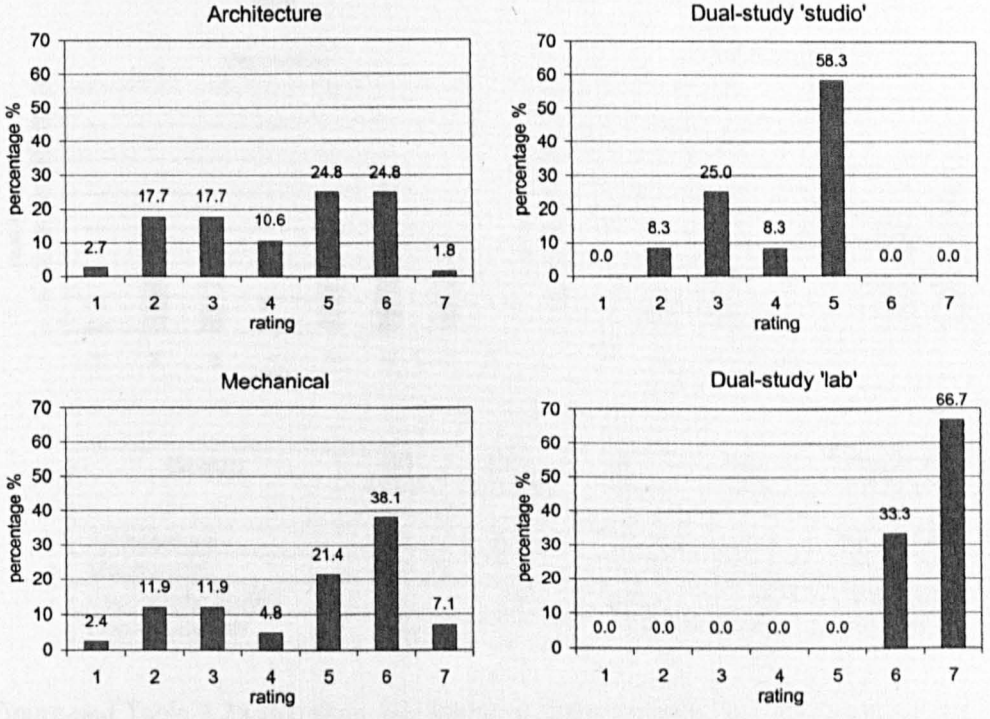
The main purpose of this statistical test and analysis is *to observe the degree of agreement among student participants in each group for any significance* based on their experiences in the design studio or engineering lab.

Chi-Square 'Goodness of fit' statistical test is used to determine for the possible significance regarding the degree of agreement among participants in each group. This is based on the distribution of ratings *(r)* between numbers 1 to 7 by the participants on a particular bi-polar construct *(e.g. Student led – Tutor led)*. Distributions and frequencies of ratings by participants of each group can be referred to in *Appendix D.*

7.8.1 Degree of Agreement on constructs related to 'Situations' events

- Student led – Tutor led

Figure and Table 7.25 – Rating distributions by each group on 'Student led – Tutor led'



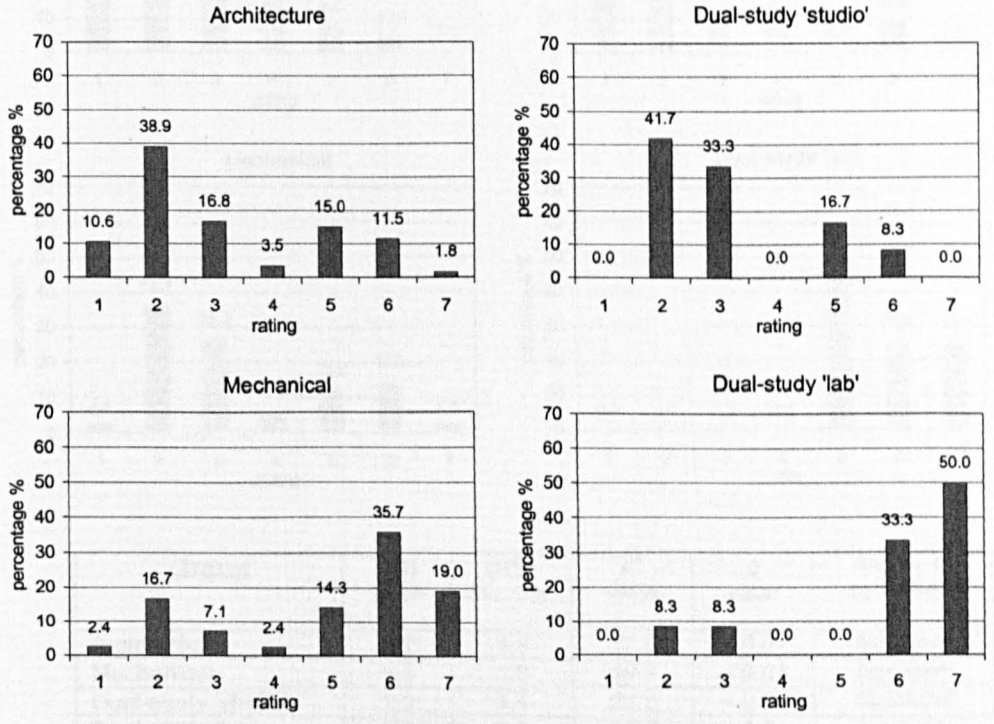
Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	4.2	1.6	*43.4*	*< 0.01*	Significant
Mechanical	4.8	1.7	*43.4*	*< 0.01*	Significant
Dual-study 'studio'	4.2	1.1	*23.0*	*< 0.01*	Significant
Dual-study 'lab'	6.7	0.5	*34.7*	*< 0.01*	Significant

Figure and Table 7.25 show that the degree of agreement on ratings *(r)* among the participants in each group is significant. The mean values suggest Architectural and Dual-study students

share a similar tendency of agreement towards the *Tutor-led* construct *(M=4.2)* based on their experiences in design studio. Mechanical and Dual-study students share a similar tendency of agreement with respect to the *Tutor-led* construct *(M=4.8, M=6.7)* based on their lab experiences. These results suggest that peer learning situations in both environments are tutor-led.

- Free – Ordered

Figure and Table 7.26 – Rating distributions by each group on 'Free - Ordered'



Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	3.2	1.7	*73.1*	*< 0.01*	Significant
Mechanical	5.0	1.9	*24.7*	*< 0.01*	Significant
Dual-study 'studio'	3.2	1.4	*14.8*	*< 0.05*	Significant
Dual-study 'lab'	5.9	1.7	*19.5*	*< 0.01*	Significant

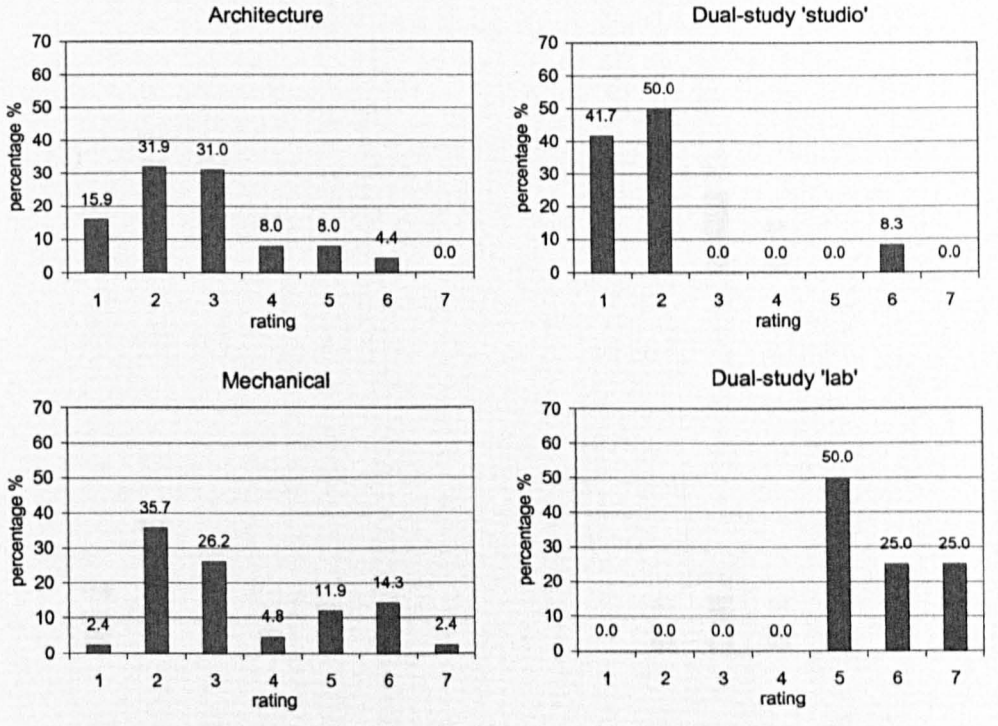
Figure and Table 7.26 also show the degree of agreements on ratings *(r)* among the participants in each group is significant.

In the design studio, Architectural and Dual-study students display a significant degree of agreement with respect to their ratings toward the *Free* construct *(M=3.2)*. Conversely, Mechanical and Dual-study students display a significant degree of agreement towards the *Ordered* construct *(M=5.0, M=5.9)* when in the engineering lab.

These results suggest students in the design studio are working with more freedom while those in lab are working with more order.

- Casual - Formal

Figure and Table 7.27 – Rating distributions by each group on 'Casual - Formal'



Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	2.7	1.3	*77.5*	*< 0.01*	Significant
Mechanical	3.4	1.6	*29.5*	*< 0.01*	Significant
Dual-study 'studio'	1.9	1.4	*24.2*	*< 0.01*	Significant
Dual-study 'lab'	5.8	0.9	*19.5*	*< 0.01*	Significant

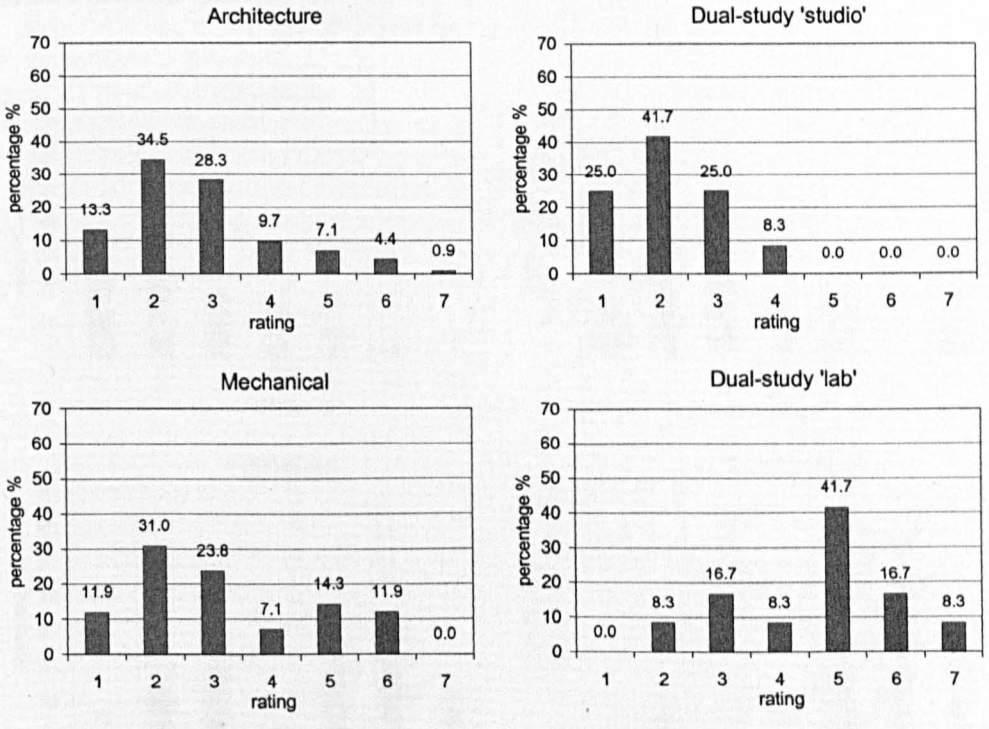
Figure and Table 7.27 demonstrate that the degree of agreement on ratings *(r)* among the participants in each group is also significant.

In the design studio, Architectural and Dual-study students display significant degree of agreement towards the *Casual* construct *(M=2.7, M=1.9)*. While in the lab, Mechanical students also have a tendency of agreement towards the *Casual* construct *(M=3.4)*, although their mean value is higher than the other two groups. Based on their lab experiences, the Dual-study students have a significant degree of agreement towards the *Formal* construct *(M=1.9)*.

These results suggest Dual-study students have different experience of learning situations between the design studio and engineering lab. Interestingly, Architectural and Mechanical students have similar experiences of casual learning situations in their particular learning environments.

- Social - Individual

Figure and Table 7.28 – Rating distributions by each group on 'Social - Individual'



Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	2.8	1.3	*77.0*	*< 0.01*	Significant
Mechanical	3.2	1.6	*18.7*	*< 0.01*	Significant
Dual-study 'studio'	2.2	0.9	*13.7*	*< 0.05*	Significant
Dual-study 'lab'	4.7	1.4	*9.0*	*> 0.1**	*Not Significant*

Figure and Table 7.28 demonstrate that the degree of agreement on ratings *(r)* among the Architectural and Mechanical students is significant. Dual-study students have a significant degree of agreement when they are in the design studio; however, they do not display significant degree of agreement in the engineering lab.

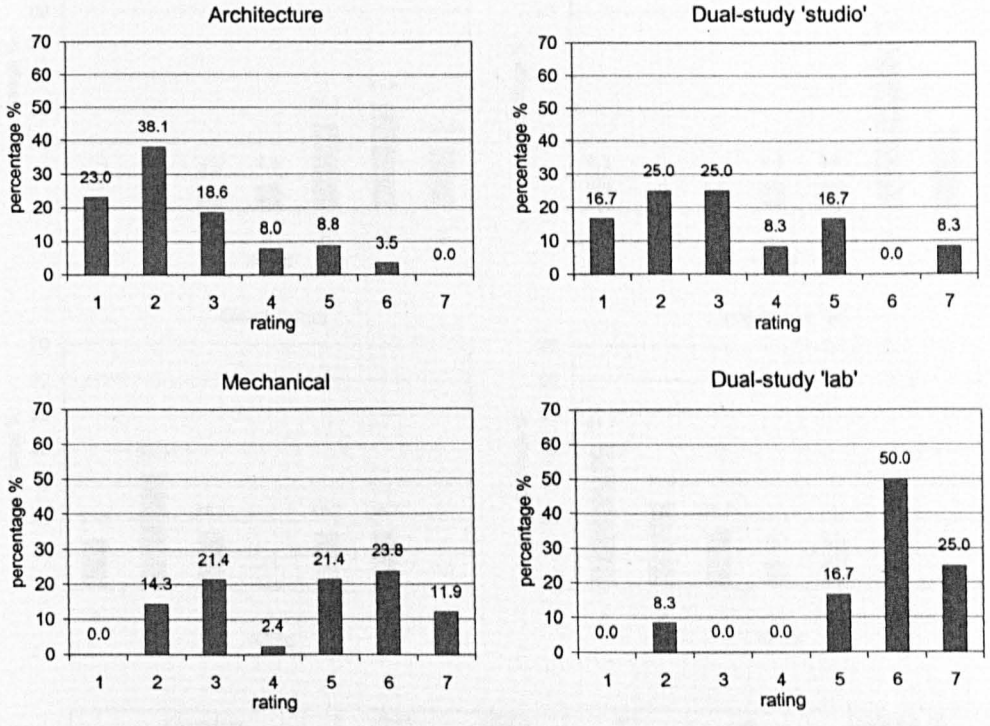
Architectural and Mechanical students have a tendency towards agreement on the *Social* construct *(M=2.8, M=3.2)*. In the design studio, Dual-study students also have a tendency of agreement towards the *Social* construct *(M=2.2)*. While in engineering lab, Dual-study students' tendency of agreements tends toward the *Individual* construct *(M=4.7)*, however this is not significant *(p> 0.1)*.

These results suggest Architectural and Mechanical students are having similar experience of social learning situations in their particular learning environment. Dual-study students also have similar experience when they are in design studio.

7.8.2 Degree of Agreement on constructs related to 'Learning' events

- Aim at Exploring – Aim at Achieving

Figure and Table 7.29 – Rating distributions by each group on 'Aim at Exploring – Aim at Achieving'



Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	2.5	1.4	*82.9*	*< 0.01*	Significant
Mechanical	4.6	1.7	*16.7*	*< 0.01*	Significant
Dual-study 'studio'	3.2	1.8	*4.3*	*> 0.1**	*Not Significant*
Dual-study 'lab'	5.8	1.4	*17.2*	*< 0.01*	Significant

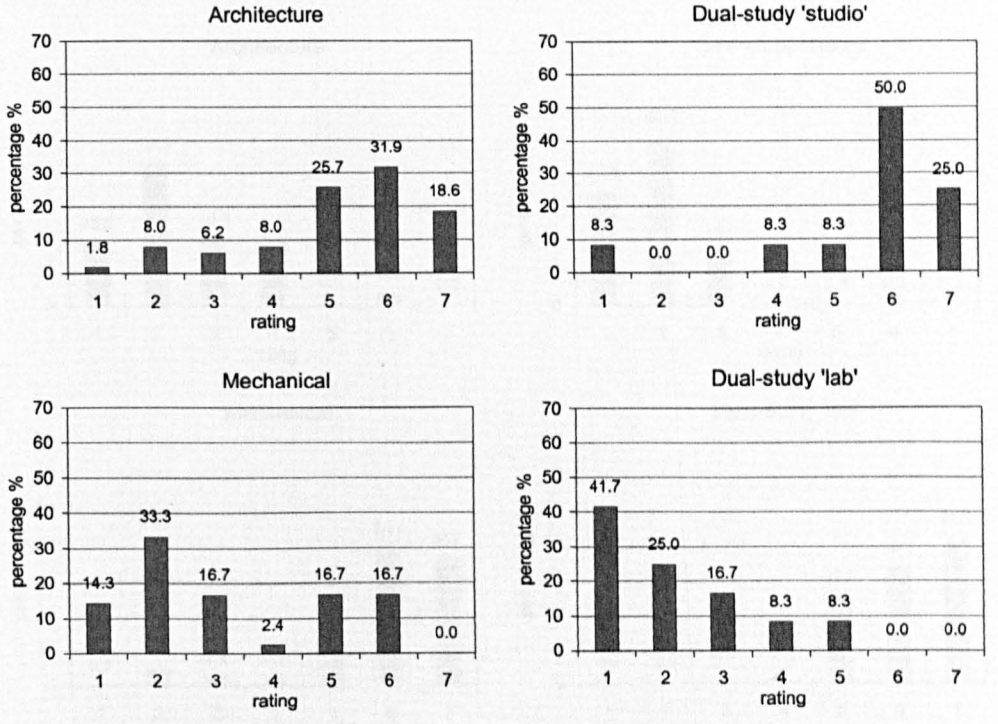
Figure and Table 7.29 show that the degree of agreement on ratings *(r)* among the Architectural and Mechanical students is significant. Dual-study students display a significant degree of agreement when they are in engineering lab; however, they do not show significant degree of agreement in design studio.

Architectural students have a tendency of agreement towards the *Aim at Exploring* construct *(M=2.5)*, while Mechanical students have a tendency of agreement towards the *Aim at Achieving* construct *(M=4.6)*. In the engineering lab, Dual-study students' tendency of agreement is also towards the *Aim at Achieving* construct *(M=5.8)*.

These results suggest that Architectural students are more interested in exploring ideas while learning in the design studio. Conversely, Mechanical and Dual-study students are more interested in accomplishing a given learning task when they are in the lab.

- Solution based – Problem based

Figure and Table 7.30 – Rating distributions by each group on 'Solution based – Problem based'



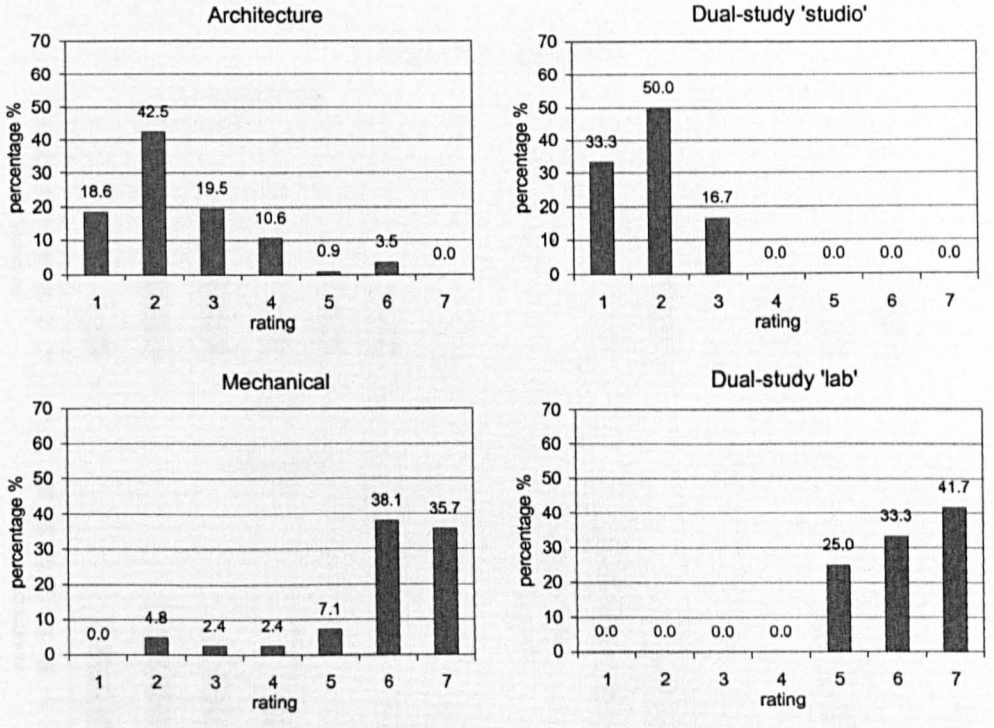
Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	5.2	1.5	*60.0*	*< 0.01*	Significant
Mechanical	3.2	1.8	*21.3*	*< 0.01*	Significant
Dual-study 'studio'	5.6	1.7	*16.0*	*< 0.05*	Significant
Dual-study 'lab'	2.2	1.3	*11.3*	*> 0.05**	*Not Significant*

Figure and Table 7.30 show that the degree of agreement on ratings *(r)* among the Architectural and Mechanical students is significant. Dual-study students have a significant degree of agreement when they are in the design studio; however, they do not show a significant degree of agreement in the engineering lab.

Architectural students have a tendency of agreement toward *Problem-based* construct *(M=5.2)*. In design studio, Dual-study students' tendency of agreement is also towards the *Problem-based* construct *(M=5.6)*. While in the lab, their degree of agreement is towards the *Solution-based*, however it is not regarded as significant *(M=2.2, p > 0.05)*. Mechanical students also have similar tendency of agreement toward *Solution-based* construct *(M=3.2)*. These results indicate that Architectural and Dual-study students considered their learning activities in the design studio to be mainly problem-based. Conversely, Mechanical students considered their learning activities in the lab to be solution-based.

- Episodic – Semantic

Figure and Table 7.31 – Rating distributions by each group on 'Episodic – Semantic'



Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	2.4	1.2	*111.7*	*< 0.01*	Significant
Mechanical	6.0	1.3	*53.4*	*< 0.01*	Significant
Dual-study 'studio'	1.8	0.7	*20.7*	*< 0.01*	Significant
Dual-study 'lab'	6.2	0.8	*17.2*	*< 0.01*	Significant

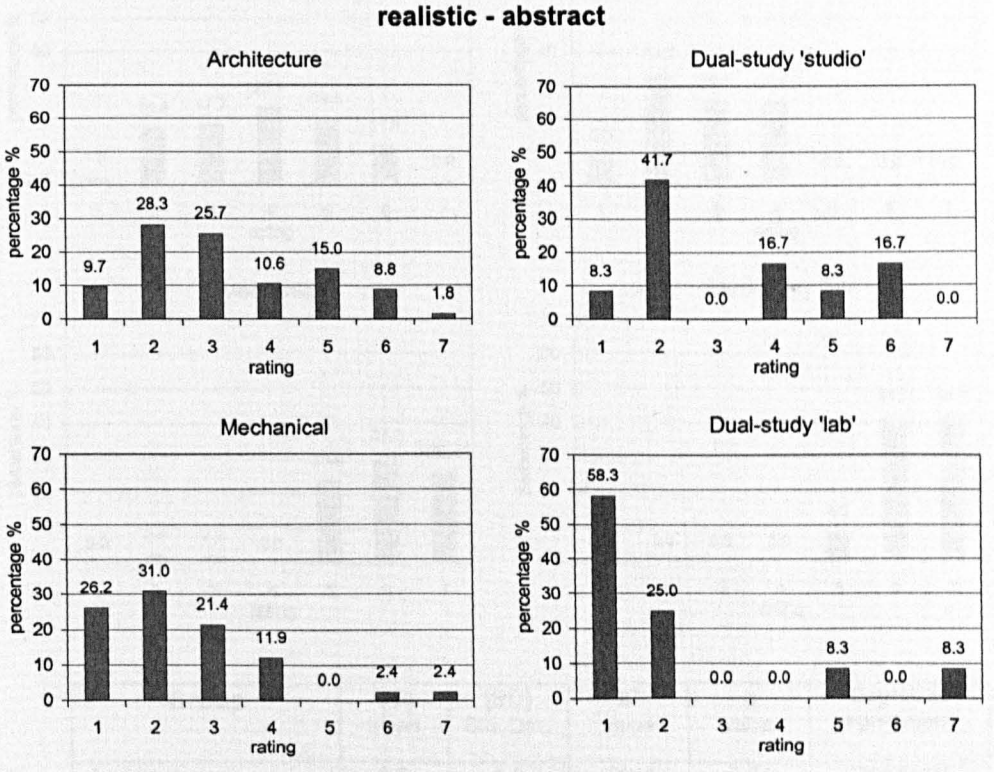
Figure and Table 7.31 demonstrate that the degree of agreement on ratings *(r)* among the participants in each group is also significant.

In design studio, Architectural and Dual-study students show a significant degree of agreements towards the *Episodic* construct *(M=2.4, M=1.8)*. Conversely, Mechanical and Dual-study students have a significant degree of agreement towards the *Semantic* construct *(M=6.0, M=6.2)* based on their lab experiences.

These results suggest that students are relying on memories of events and places while learning in design studio. On the other hand, students are relying on facts and formulae when they are learning in the lab.

- Realistic – Abstract

Figure and Table 7.32 – Rating distributions by each group on 'Realistic – Abstract'



Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	3.3	1.6	*43.3*	*< 0.01*	Significant
Mechanical	2.4	1.4	*29.7*	*< 0.01*	Significant
Dual-study 'studio'	3.3	1.8	*11.3*	*< 0.01*	Significant
Dual-study 'lab'	2.1	1.9	*23.0*	*< 0.01*	Significant

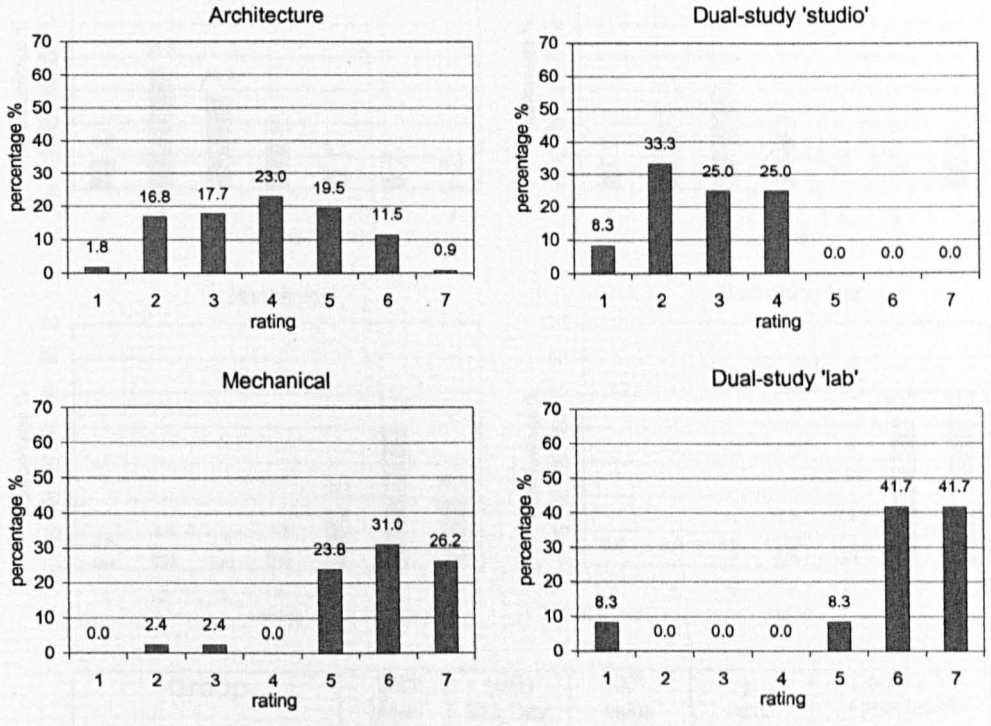
Figure and Table 7.32 show that the degree of agreement on ratings *(r)* among the participants in each group is significant.

Architectural and Dual-study students display a significant degree of agreement towards the *Realistic* construct *(M=3.3)* based on their experiences in the design studio. Mechanical and Dual-study students also share a similar degree of agreement towards the *Realistic* construct *(M=2.4, M=2.1)* based on their lab experiences.

These results suggest that students considered their learning activities in both environments to be based on real-world circumstances.

- Tacit – Explicit

Figure and Table 7.33 – Rating distributions by each group on 'Tacit - Explicit'



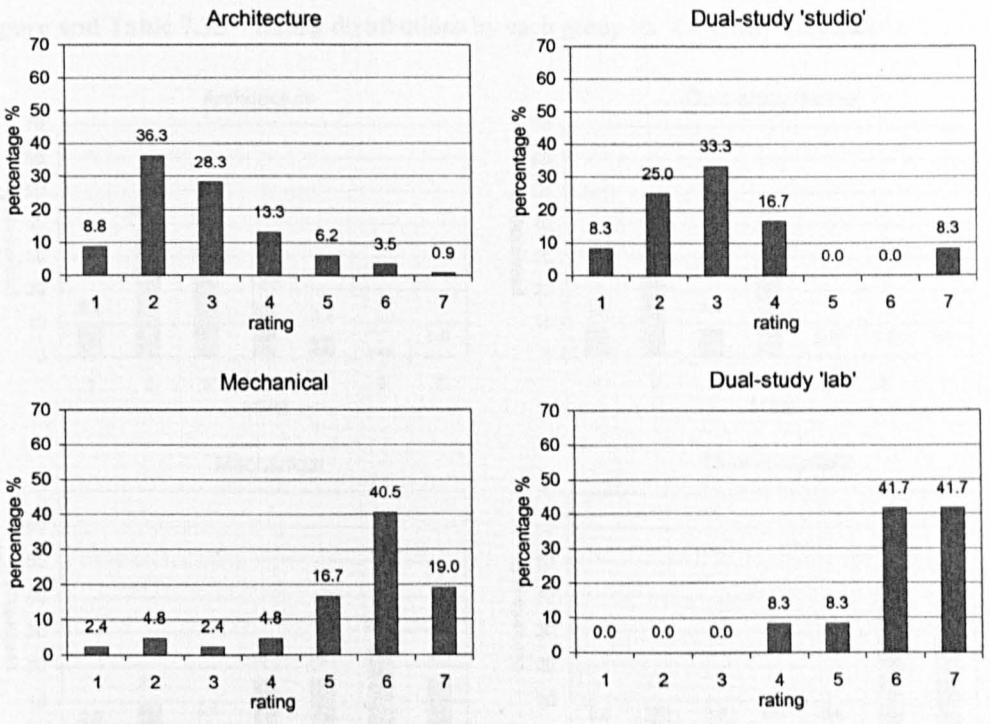
Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	3.9	1.4	*39.4*	*< 0.01*	Significant
Mechanical	5.8	1.1	*40.2*	*< 0.01*	Significant
Dual-study 'studio'	2.7	1.0	*11.3*	*> 0.05**	*Not Significant*
Dual-study 'lab'	5.9	1.7	*18.3*	*< 0.01*	Significant

Figure and Table 7.33 show that the degree of agreement on ratings *(r)* among the Architectural and Mechanical students. In the engineering lab, the degree of agreements among the Dual-study students is significant, although their degree of agreements in respect to the design studio is not significant.

Architectural students have a slight tendency of agreements towards the *Tacit* construct *(M=3.9)*. In the design studio, Dual-study students' tendency of agreement is towards the *Tacit* construct, however it is not to be regarded as significant *(M=2.7, p > 0.05)*. While in the lab, their tendency of agreements is towards the *Explicit* construct *(M=5.9)*. Mechanical students also show a similar tendency of agreement towards the *Explicit* construct *(M=3.2)*. These results indicate students are more likely to use tacit and unconscious knowledge in their studio learning activities. Conversely, Mechanical students mainly use explicit and specialized knowledge in their lab learning activities.

- Broad – Focused

Figure and Table 7.34 – Rating distributions by each group on 'Broad - Focused'



Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	2.9	1.3	*87.0*	*< 0.01*	Significant
Mechanical	5.5	1.5	*39.0*	*< 0.01*	Significant
Dual-study 'studio'	3.1	1.6	*8.7*	*> 0.1**	*Not Significant*
Dual-study 'lab'	6.2	0.9	*18.3*	*< 0.01*	Significant

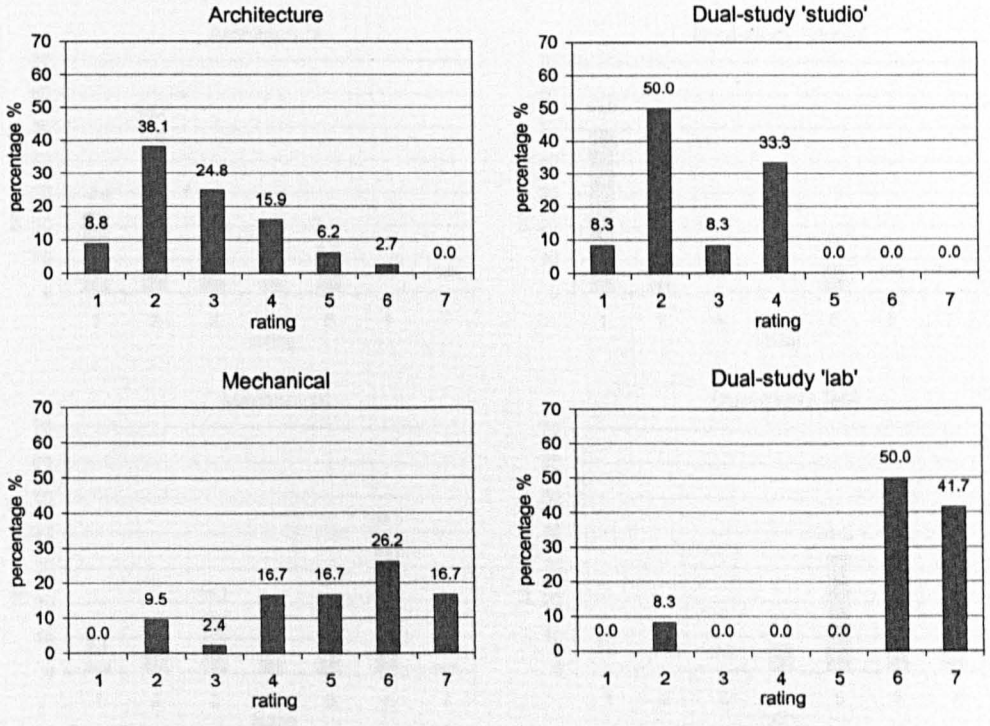
Figure and Table 7.34 show that the degree of agreement on ratings *(r)* among the Architectural and Mechanical students is significant. Dual-study students display a significant degree of agreement when they are in engineering lab but not have in the design studio.

Architectural students have a tendency of agreement towards the *Broad* construct *(M=2.9)*. The Dual-study students degree of agreement is also inclined towards the *Broad* construct *(M=3.1)* when they are in the design studio, although it is not significant *(p>0.1)*. Mechanical students have a tendency of agreement towards the *Focused* construct *(M=5.5)*. In the engineering lab, Dual-study students' tendency of agreement is also towards the *Focused* construct *(M=6.2)*.

These results reveal that Architectural students are dealing with a wide body of knowledge while learning in the design studio. On the contrary, Mechanical and Dual-study students are dealing with specific domains of knowledge while doing a particular learning activity in the lab.

- Original – Accurate

Figure and Table 7.35 – Rating distributions by each group on 'Original - Accurate'



Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	2.8	1.2	*91.0*	*< 0.01*	Significant
Mechanical	5.1	1.5	*16.9*	*< 0.01*	Significant
Dual-study 'studio'	2.7	1.1	*19.5*	*< 0.01*	Significant
Dual-study 'lab'	6.1	1.4	*24.2*	*< 0.01*	Significant

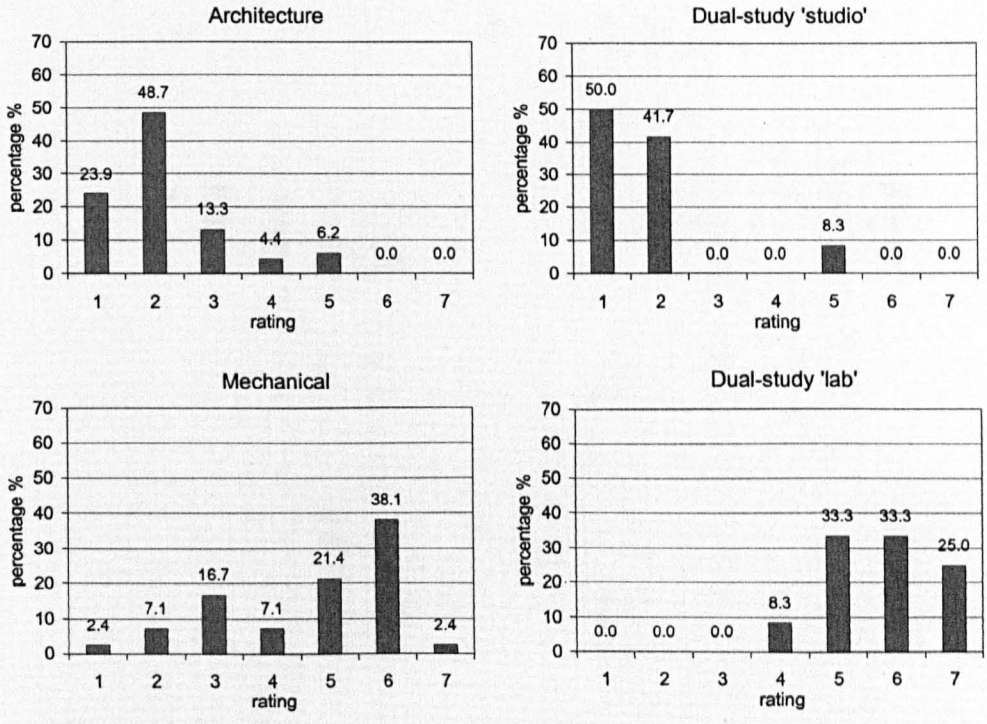
Figure and Table 7.35 illustrate that the degree of agreement on ratings *(r)* among the participants in each group is significant.

In the design studio, Architectural and Dual-study students show a significant degree of agreement towards the *Original* construct *(M=2.8, M=2.7)*. Conversely, Mechanical and Dual-study students have a significant degree of agreement towards the *Accurate* construct *(M=5.1, M=6.1)* based on their lab experiences.

These results suggest Architectural and Dual-study students are more interested in originality in their learning outcomes. Conversely, students in the lab environment are more concerned with accuracy.

- Integrative - Discrete

Figure and Table 7.36 – Rating distributions by each group on 'Integrative - Discrete'



Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	2.2	1.1	*151.3*	*< 0.01*	Significant
Mechanical	4.7	1.5	*31.1*	*< 0.01*	Significant
Dual-study 'studio'	1.8	1.1	*24.2*	*< 0.01*	Significant
Dual-study 'lab'	5.8	1.0	*12.5*	*< 0.05*	Significant

Figure and Table 7.36 show that the degree of agreement on ratings *(r)* among the Architectural and Mechanical students is significant. Dual-study students have a significant degree of agreement when they are in the design studio; however, they do not have significant degree of agreement when in the engineering lab.

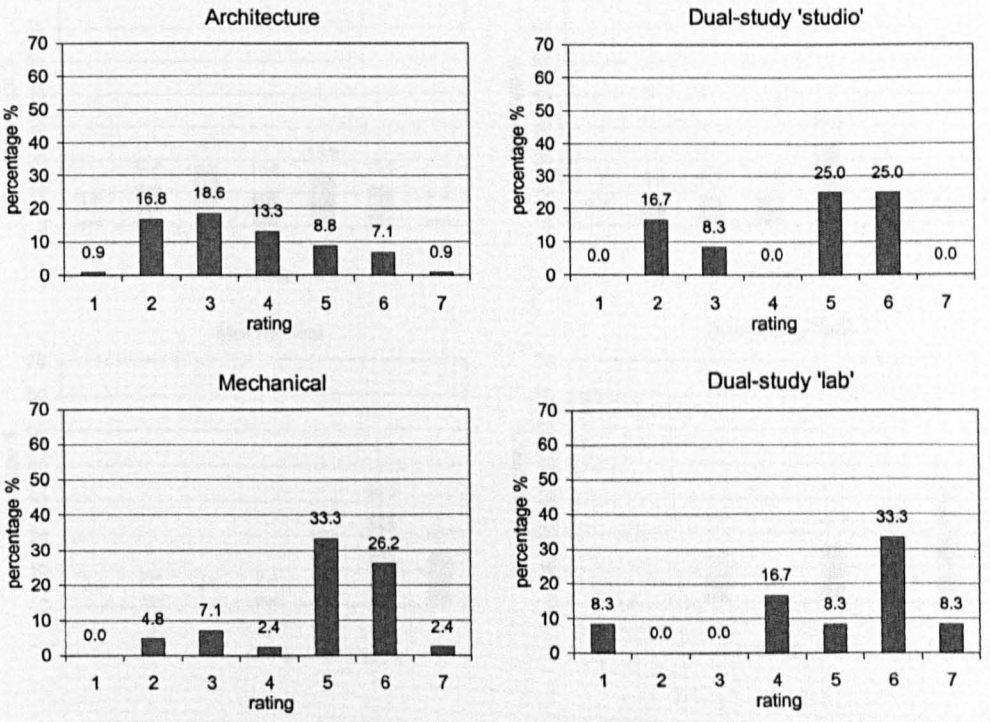
Architectural students have a tendency of agreement towards the *Integrative* construct *(M=2.2)*. In design the studio, Dual-study students' tendency of agreement is also towards the *Integrative* construct *(M=1.8)*. Meanwhile, Mechanical and Dual-study students have a tendency of agreement towards the *Discrete* construct *(M=4.7, M=5.8)* in the lab.

These results indicate that students in the design studio are integrating various ideas and activities where one is related to the other. Conversely, students in the lab regarded their learning activities as being done separately from one to another in the lab.

7.8.3 Degree of Agreement on constructs related to 'Socialising' events

- Evocative - Direct

Figure and Table 7.37 – Rating distributions by each group on 'Evocative - Direct'



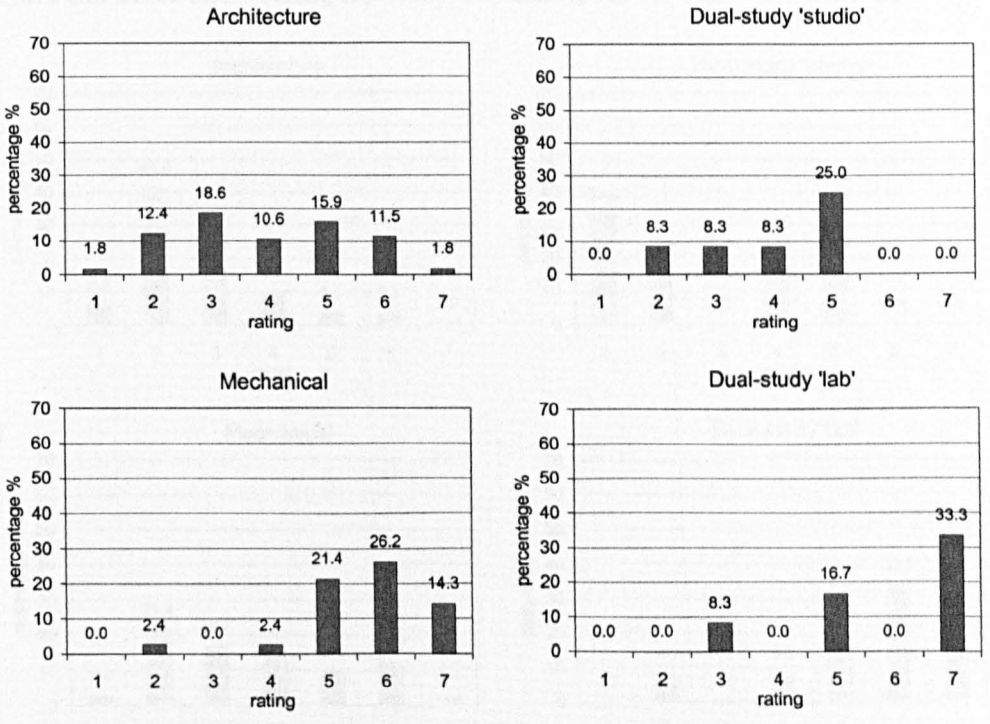
Group	(M) Mean	(SD) Std. Dev.	X^2 value	*p* value	Degree of agreement
Architecture	3.6	1.4	*36.3*	*< 0.01*	Significant
Mechanical	5.0	1.2	*40.6*	*< 0.01*	Significant
Dual-study 'studio'	4.4	1.7	*8.9*	*> 0.1**	*Not Significant*
Dual-study 'lab'	5.0	1.8	*8.9*	*> 0.1**	*Not Significant*

Figure and Table 7.37 show that the degree of agreement on ratings *(r)* among the Architectural and Mechanical students is significant. However, Dual-study students do not have a significant degree of agreement when they are in the design studio and also in the lab. Architectural students have a significant tendency of agreement towards the *Evocative* construct *(M=3.6)*. Mechanical students display a significant degree of agreement towards the *Direct* construct *(M=5.0)*. In the design studio and lab, Dual-study students show a degree of agreement towards the *Direct* construct *(M=4.4, M=5.0)*, however, their degrees of agreements are not significant *(p>0.1)*

These results indicate that Architectural students are more likely to have evocative conversations for the purposes of exchanging several different ideas among their studio peers. The Mechanical students are more interested in simple and short conversations with lab peers because they share common ideas.

- Metaphoric – Literal

Figure and Table 7.38 – Rating distributions by each group on 'Metaphorical - Literal'



Group	(M) Mean	(SD) Std. Dev.	X^2 value	p value	Degree of agreement
Architecture	3.9	1.5	*27.4*	*< 0.01*	Significant
Mechanical	5.7	1.1	*32.0*	*< 0.01*	Significant
Dual-study 'studio'	4.0	1.3	*8.0*	*> 0.1**	*Not Significant*
Dual-study 'lab'	5.9	1.6	*14.0*	*< 0.05*	Significant

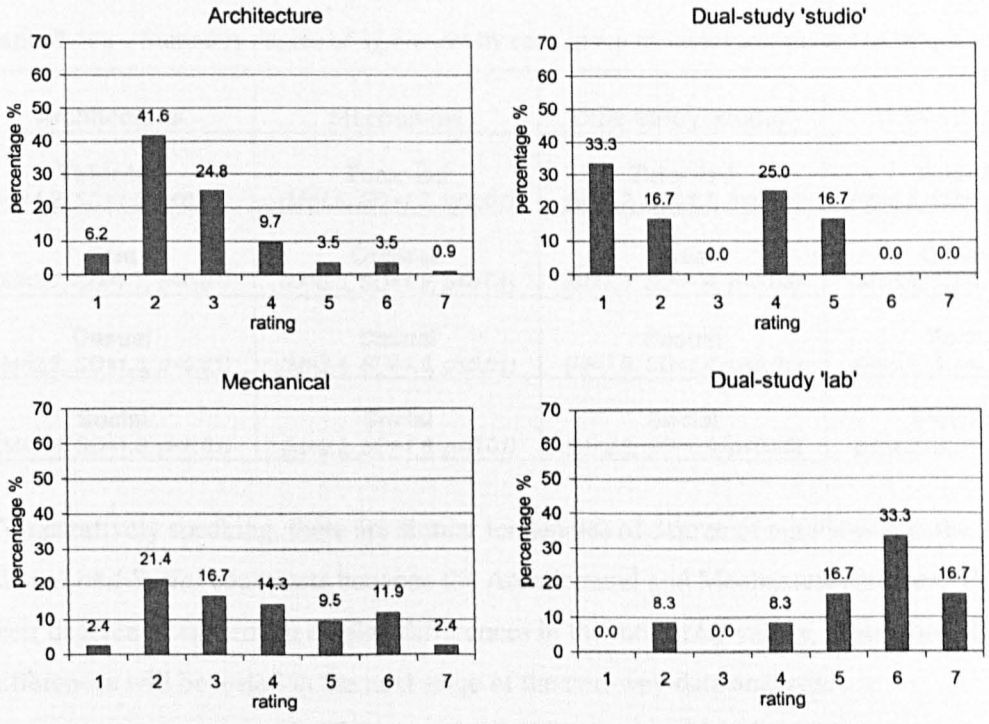
Figure and Table 7.38 show that the degree of agreement on ratings *(r)* among the Architectural and Mechanical students is significant. Dual-study students have a significant degree of agreement when they are in the lab, but this is not significant when it comes to the design studio.

Architectural students have a slight tendency of agreements towards the *Metaphorical* constructs *(M=3.9)*. Mechanical students' tendency degree of agreement is towards the *Literal* construct *(M=5.7)*. In the lab, Dual-study students display a tendency degree of agreement towards the *Literal* construct *(M=5.9)*. While in the design studio, their tendency is neither toward the *Metaphorical* nor the *Literal* construct *(M=4.0)* and it is not significant *(p>0.05)*.

These results indicate that students are more likely to have conversation using a particular word that represents many sets of ideas in the design studio. Students in the lab are more interested in using a particular word to represent a specific idea or purpose.

- Extrovert - Introvert

Figure and Table 7.39 – Rating distributions by each group on 'Extrovert - Introvert'



Group	(M) Mean	(SD) Std. Dev.	X^2 value	p value	Degree of agreement
Architecture	2.7	1.2	*117.3*	*< 0.01*	Significant
Mechanical	3.7	1.6	*11.3*	*> 0.1**	*Not Significant*
Dual-study 'studio'	2.7	1.7	*10.0*	*> 0.1**	*Not Significant*
Dual-study 'lab'	5.4	1.5	*8.2*	*> 0.1**	*Not Significant*

Figure and Table 7.39 show the degree of agreement on ratings *(r)* among the Architectural and Mechanical students is significant while others are not significant.

Architectural students display a tendency of agreement towards the Extrovert constructs *(M=2.7)*. Mechanical students also have a slight tendency degree of agreement towards the *Extrovert* construct *(M=3.7)*, however it is not significant *(p>0.1)*. In the lab, Dual-study students have a tendency degree of agreement towards the *Introvert* construct *(M=5.4)*. While in the design studio, their tendency is towards the *Extrovert* construct *(M=2.7)*. However, their degrees of agreement are not significant *(p>0.1)*

These results suggest that Architectural students look upon themselves as extrovert individuals who are open in their peer interactions. Based on the mean values of ratings by Mechanical and Dual-study students, there is a slight indication that students in the lab are more likely to be introverts; however this has been determined as not significant.

7.8.4 Summary of the one-way test findings

In events related to 'situations', there are significant degrees of agreement among participants in each group with regard to the constructs shown in the following Table 7.40a:

Table 7.40a – Summary degree of agreement by each group on constructs related to 'situations'

Architectural	Mechanical	Dual-study 'studio'	Dual-study 'lab'
Tutor-led *(M=4.2, SD=1.6, p<0.01)*	**Tutor-led** *(M=4.8, SD=1.7, p<0.01)*	**Tutor-led** *(M=4.2, SD=1.1, p<0.01)*	**Tutor-led** *(M=6.7, SD=0.5, p<0.01)*
Free *(M=3.2, SD=1.7, p<0.01)*	**Ordered** *(M=5.0, SD=1.9, p<0.01)*	**Free** *(M=3.4, SD=1.4, p<0.05)*	**Ordered** *(M=5.9, SD=1.7, p<0.01)*
Casual *(M=2.7, SD=1.3, p<0.01)*	**Casual** *(M=3.4, SD=1.6, p<0.01)*	**Casual** *(M=1.9, SD=1.4, p<0.01)*	**Formal** *(M=5.8, SD=0.9, p<0.01)*
Social *(M=2.8, SD=1.3, p<0.01)*	**Social** *(M=3.2, SD=1.6, p<0.01)*	**Social** *(M=2.2, SD=0.9, p<0.05)*	**Individual** *(M=4.7, SD=1.4, p>0.1*)*

Comparatively speaking, there are similar tendencies of degree of agreement on the *Tutor-led, Casual and Social* constructs between the Architectural and Mechanical students. However, their degrees of agreement display differences in the mean *(M)* values. Therefore, these differences will be tested in the next stage of the two-way data analysis.

In contrast to the comparison between the Architectural and Mechanical students, there is only one similar degree of agreement between the Dual-study students' studio and laboratory experiences. In addition, the mean *(M)* differences are also higher. There is no significant degree of agreement of ratings *(r)* on the *Social – Individual* bi-polar constructs based on their lab experiences.

In events related to 'learning', there are significant degrees of agreement among participants in each group on the following constructs as shown in the following Table 7.40b:

Table 7.40b – Summary degree of agreement by each group on constructs related to 'learning'

Architectural	Mechanical	Dual-study 'studio'	Dual-study 'lab'
Aim at Exploring *(M=2.5, SD=1.4, p<0.01)*	**Aim at Achieving** *(M=4.6, SD=1.7, p<0.01)*	**Aim at Exploring** *(M=3.2, SD=1.8, p>0.1*)*	**Aim at Achieving** *(M=5.8, SD=1.4, p<0.01)*
Problem-based *(M=5.2, SD=1.5, p<0.01)*	**Solution-based** *(M=3.2, SD=1.8, p<0.01)*	**Problem-based** *(M=5.6, SD=1.7, p<0.05)*	**Solution-based** *(M=2.2, SD=1.3, p>0.05*)*
Episodic *(M=2.4, SD=1.2, p<0.01)*	**Semantic** *(M=6.0, SD=1.3, p<0.01)*	**Episodic** *(M=1.8, SD=0.7, p<0.01)*	**Semantic** *(M=6.2, SD=0.8, p<0.01)*
Realistic *(M=3.3, SD=1.6, p<0.01)*	**Realistic** *(M=2.4, SD=1.4, p<0.01)*	**Realistic** *(M=3.3, SD=1.8, p<0.01)*	**Realistic** *(M=2.1, SD=1.9, p<0.01)*

Table 7.40b (Continued)

Architectural	Mechanical	Dual-study 'studio'	Dual-study 'lab'
Tacit *(M=3.9, SD=1.4, p<0.01)*	**Explicit** *(M=5.8, SD=1.1, p<0.01)*	**Tacit** *(M=2.7, SD=1.0, p>0.05*)*	**Explicit** *(M=5.9, SD=1.7, p<0.01)*
Broad *(M=2.9, SD=1.3, p<0.01)*	**Focused** *(M=5.5, SD=1.5, p<0.01)*	**Broad** *(M=3.1, SD=1.6, p.0.1*)*	**Focused** *(M=6.2, SD=0.9, p<0.01)*
Original *(M=2.8, SD=1.2, p<0.01)*	**Accurate** *(M=5.1, SD=1.5, p<0.01)*	**Original** *(M=2.7, SD=1.1, p<0.01)*	**Accurate** *(M=6.1, SD=1.4, p<0.01)*
Integrative *(M=2.2, SD=1.1, p<0.01)*	**Discrete** *(M=4.7, SD=1.5, p<0.01)*	**Integrative** *(M=1.8, SD=1.1, p<0.01)*	**Discrete** *(M=5.8, SD=1.0, p<0.05)*

These significant results illustrate that there are notable differences on agreement and mean *(M)* values of constructs' ratings between Architectural and Mechanical students. Those notable differences are also found among the Dual-study students as they move between their two different learning experiences. These findings suggest that the peer experiences related to learning events in the studio-format differ considerably from those in the laboratory environment. These differences will also be tested for significance in the next stage of the two-way analysis.

In events related to 'socialising', there are significant degrees of agreement among participants in each group on the constructs shown in the following Table 7.40c:

Table 7.40c – Summary degrees of agreement by each group on constructs related to 'situations'

Architectural	Mechanical	Dual-study 'studio'	Dual-study 'lab'
Evocative *(M=3.6, SD=1.4, p<0.01)*	**Direct** *(M=5.0, SD=1.2, p<0.01)*	**Direct** *(M=4.4, SD=1.4, p<0.01)*	**Direct** *(M=5.0, SD=1.8, p>0.1*)*
Metaphorical *(M=3.9, SD=1.5, p<0.01)*	**Literal** *(M=5.7, SD=1.1, p<0.01)*	**Metaphorical/Literal** *(M=4.0, SD=1.3, p>0.1*)*	**Literal** *(M=5.9, SD=1.6, p<0.05)*
Extrovert *(M=2.7, SD=1.2, p<0.01)*	**Extrovert** *(M=3.7, SD=1.6, p>0.1*)*	**Extrovert** *(M=2.7, SD=1.7, p>0.1*)*	**Introvert** *(M=5.4, SD=1.4, p>0.1*)*

The degrees of agreement on ratings *(r)* among the Architectural and Mechanical students are mostly significant. Among the Dual-study students, there are only two significant degrees of agreement on ratings *(r)*: one for the design studio and the other for the lab.

In general, there are significant degrees of agreement among the Architectural and Mechanical students within their own particular group on the events related to the 'situations', 'learning' and 'socializing'. However, the degrees of agreement among the Dual-study students are slightly less particularly with regard to the events related to the 'socializing'.

7.9 Statistical findings – Two way test

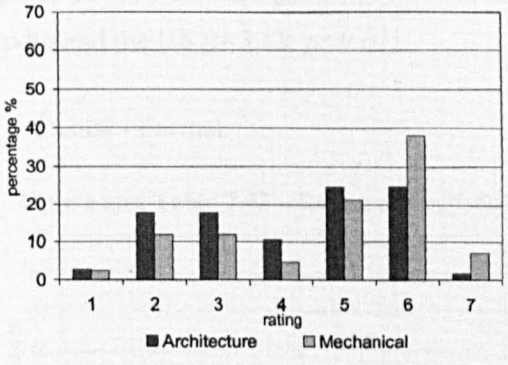
The main purpose of this statistical test and analysis is *to determine the possible significant differences on the degree of agreement between the groups* based on their experiences in the design studio or engineering lab.

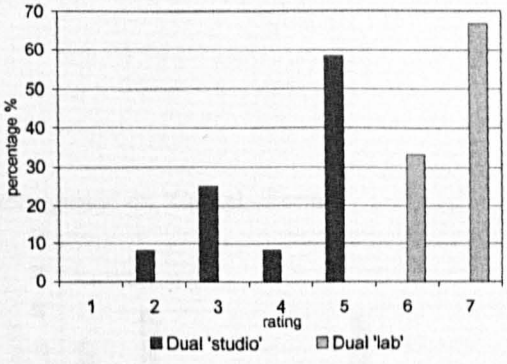
Two statistical tests were used in this analysis. The 'Chi-Square 2-Way' test was used to analyse the differences between two independent groups: *Architecture and Mechanical students*. The 'Related T' test was used to analyse the differences between two related groups: *Dual-study students*. This is because they were requested to rate bi-polar constructs based on each of their different experiences in the design studio and also the engineering lab.

7.9.1 Differences on Degree of Agreement on constructs related to 'Situations' events

- Student led – Tutor led

Figure and Table 7.41 – Rating comparison between groups on 'Student led – Tutor led'





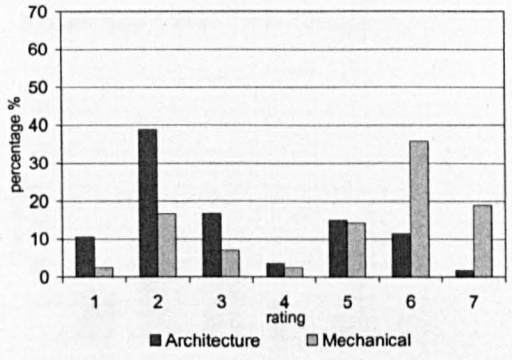
Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	4.2	1.6	7.2	*(p>0.1*)* not significant
Mechanical	4.8	1.7		

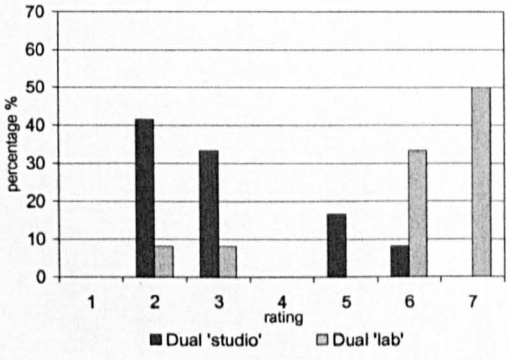
Group	M	S.D.	*t value*	Differences 'degree of agreement'
Dual 'studio'	4.2	1.1	6.59	*(p<0.01)* significant
Dual 'lab'	6.7	0.5		

Figure and Table 7.41 show that there is no significant difference on the degree of agreement between Architectural and Mechanical students *(X^2=7.2, p>0.1)*. On the contrary, for the Dual-study students there is a significant difference in degree of agreement between experiences in the design studio and the lab *(t=6.59, p<0.01)*.

- Free - Ordered

Figure and Table 7.42 – Rating comparison between groups on 'Free - Ordered'





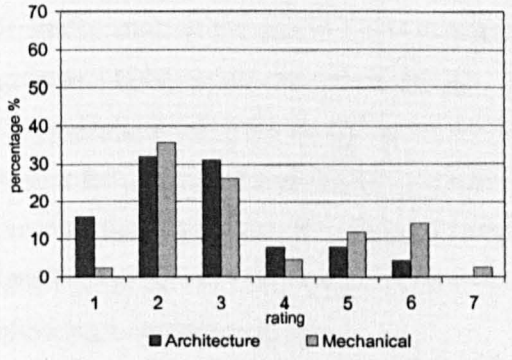
Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	3.2	1.7	*33.4*	*(p<0.01)* significant
Mechanical	5.0	1.9		

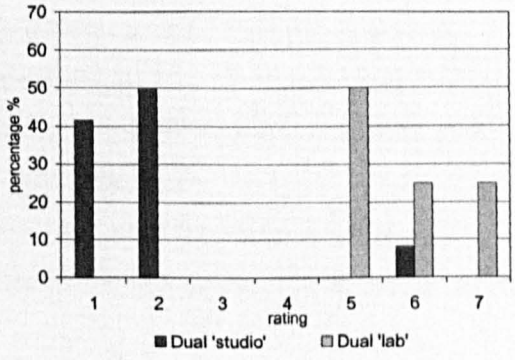
Group	M	S.D.	*t value*	Differences 'degree of agreement'
Dual 'studio'	3.2	1.4	*3.88*	*(p<0.01)* significant
Dual 'lab'	5.9	1.7		

Figure and Table 7.42 show that there is a significant difference regarding the degree of agreement between Architectural and Mechanical students *($X^2=33.4$, $p<0.01$)*. The degree of agreement also differs significantly between Dual-study students' experiences in the design studio and the lab *($t=3.88$, $p<0.01$)*.

- Casual - Formal

Figure and Table 7.43 – Rating comparison between groups on 'Casual - Formal'





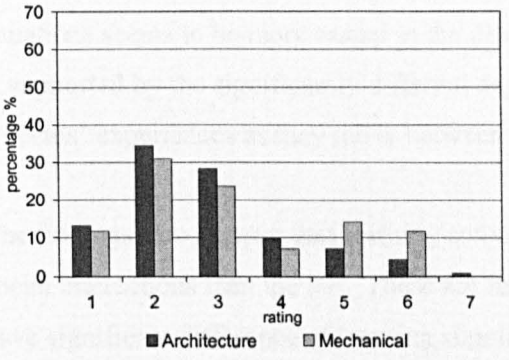
Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	2.7	1.3	*12.9*	*(p<0.05)* significant
Mechanical	3.4	1.6		

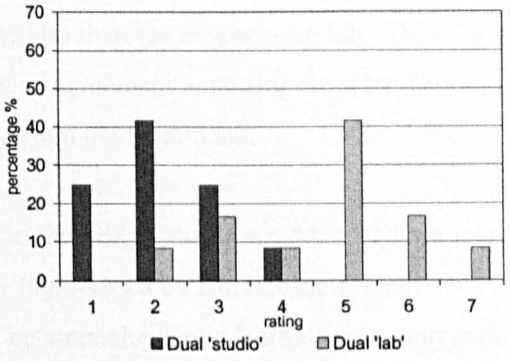
Group	M	S.D.	*t value*	Differences 'degree of agreement'
Dual 'studio'	1.9	1.4	*8.69*	*(p<0.01)* significant
Dual 'lab'	5.8	0.9		

Figure and Table 7.43 illustrate that there is a significant difference in the degree of agreement between Architectural and Mechanical students *($X^2=12.9$, $p<0.05$)*. Similarly, the degree of agreement also differs significantly between Dual-study students' experiences in the design studio and the lab *($t=8.69$, $p<0.01$)*.

- Social - Individual

Figure and Table 7.44 – Rating comparison between groups on 'Social - Individual'





Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	2.8	1.3	5.4	*(p>0.1*)* not significant
Mechanical	3.2	1.6		

Group	M	S.D.	*t value*	Differences 'degree of agreement'
Dual 'studio'	2.2	0.9	5.53	*(p<0.01)* significant
Dual 'lab'	4.7	1.4		

Figure and Table 7.44 show that there is no significant difference on the degree of agreements between Architectural and Mechanical students *(X^2=5.4, p>0.1)*. However, there is a significant difference of agreement based on Dual-study students' experiences between the design studio and the engineering lab *(t=5.53, p<0.01)*.

7.9.2 Summary of the two-way test findings on 'Situations' events

Generally, most of the results illustrate significant differences regarding the degrees of agreement between the two sets of groups. There are two results that show no significance. Those results involve the ratings given by the Architectural and Mechanical students to the *Student led –Tutor led* and *Social– Individual* bi-polar constructs.

Based on the Chi-square *(X^2)* values, the degrees of agreement are shown to differ significantly between the Architectural and Mechanical students when they are rating on the following bi-polar constructs:

- *Free – Ordered (X^2=33.4, p<0.01)*
- *Casual – Formal (X^2=12.9, p<0.01)*

Based on the *(t)* values, there are significant differences on degrees of agreement among the Dual-study students when they are rating on the following bi-polar constructs:

- *Student led – Tutor led (t=6.59, p<0.01)*
- *Free – Ordered (t=3.88, p< 0.01)*
- *Casual – Formal (t=8.69, p<0.01)*
- *Social – Individual (t=5.53, p<0.01)*

The findings reveal that learning activities are more tutor-led in the lab than in the design studio. Results also suggest that student have more freedom in design studio. On the other hand, learning situations experienced by students are more ordered in the lab whereas learning situations seems to be more casual in the design studio than the engineering lab. This finding is supported by the significantly different degrees of agreement emerging from the Dual-study students' experiences as they move between the design studio and lab.

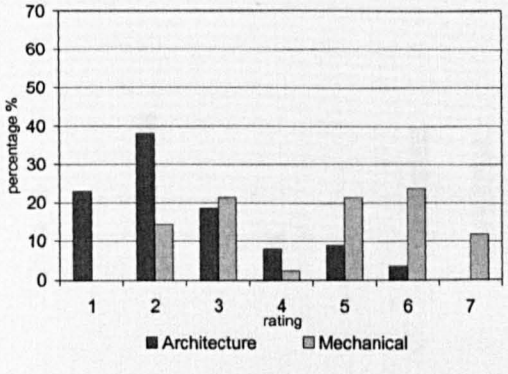
The findings also suggest that learning activities in the design studio are done through more social interactions than the lab. These are further highlighted by Dual-study students' who have significant difference of learning situations between those two learning environments. In the design studio, their learning activities mainly involve with social interactions. Conversely, activities in the lab are done individually.

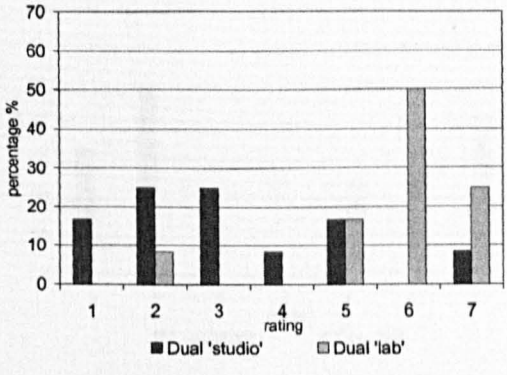
The overall findings indicate that, based on the 'situations' events that take place within those environments, there are notable differences on peer cultural experiences between the design studio and the engineering.

7.9.3 Differences on degree of agreement on constructs related to 'Learning' events

- Aim at Exploring – Aim at Achieving

Figure and Table 7.45 – Rating comparison between groups on 'Exploring – Achieving'





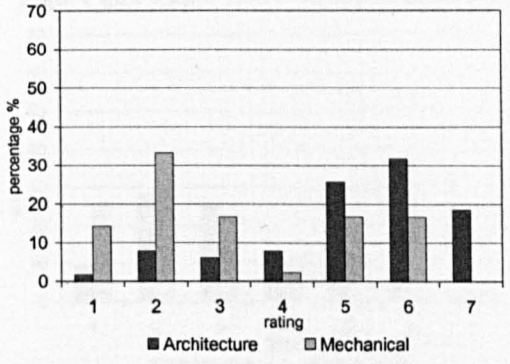
Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	2.5	1.4	*49.1*	*(p>0.01)* significant
Mechanical	4.6	1.7		

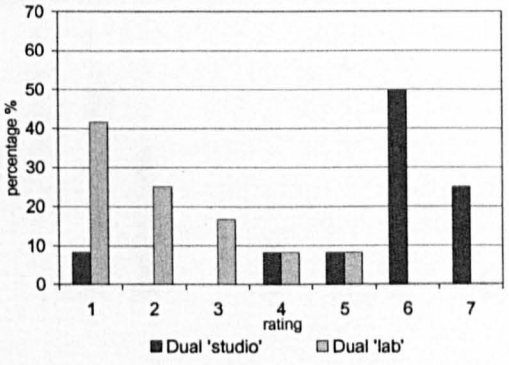
Group	M	S.D.	*t value*	Differences 'degree of agreement'
Dual 'studio'	3.2	1.8	*3.48*	*(p<0.01)* significant
Dual 'lab'	5.8	1.4		

Figure and Table 7.45 illustrate that there is a significant difference in the degree of agreement between Architectural and Mechanical students *(X^2=49.1, p<0.01)*. Dual students also display a significant difference of agreements between the design studio and the lab *(t=3.48, p<0.01)*.

- Solution based – Problem based

Figure and Table 7.46 – Rating comparison between groups on 'Solution based – Problem based'





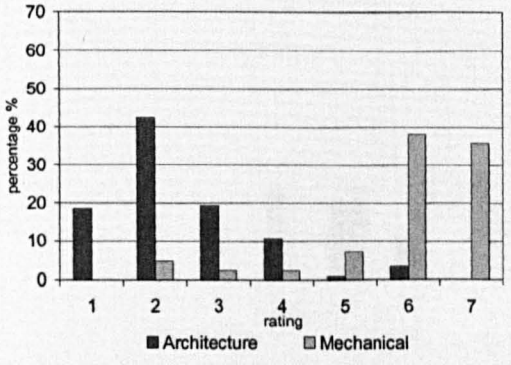
Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	5.2	1.5	*39.2*	*(p<0.01)* significant
Mechanical	3.2	1.8		

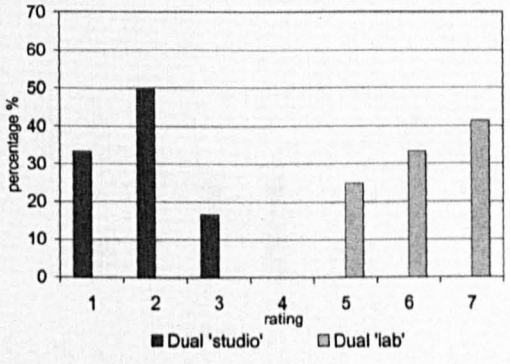
Group	M	S.D.	*t value*	Differences 'degree of agreement'
Dual 'studio'	5.6	1.7	*4.16*	*(p<0.01)* significant
Dual 'lab'	2.2	1.3		

Figure and Table 7.46 show that there is a significant difference in the degree of agreement between Architectural and Mechanical students *(X^2=39.2, p<0.01)*. Similarly, Dual-study students also have significant difference of agreements between the design studio and the lab *(t=4.16, p<0.01)*.

- Episodic - Semantic

Figure and Table 7.47 – Rating comparison between groups on 'Episodic - Semantic'





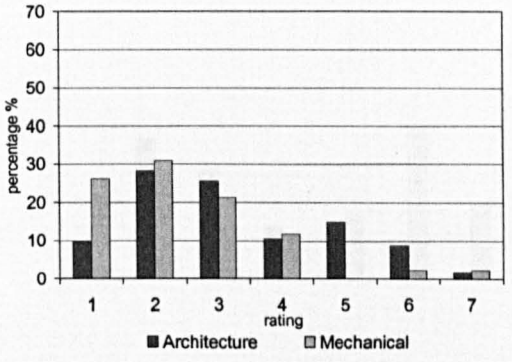
Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	2.4	1.2	*105.7*	*(p<0.01)* significant
Mechanical	6.0	1.3		

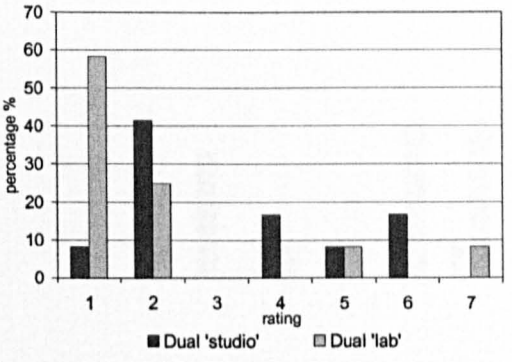
Group	M	S.D.	*t value*	Differences 'degree of agreement'
Dual 'studio'	1.8	0.7	*13.00*	*(p<0.01)* significant
Dual 'lab'	6.2	0.8		

Figure and Table 7.47 show that there is significant difference in the degree of agreement between Architectural and Mechanical students *(X^2=105.7, p>0.1)*. On the basis of the Dual-study students' experiences in both the design studio and the engineering lab, a significant difference in the degree of agreement is also apparent *(t=13.00, p<0.01)*.

- Realistic - Abstract

Figure and Table 7.48 – Rating comparison between groups on 'Realistic - Abstract'





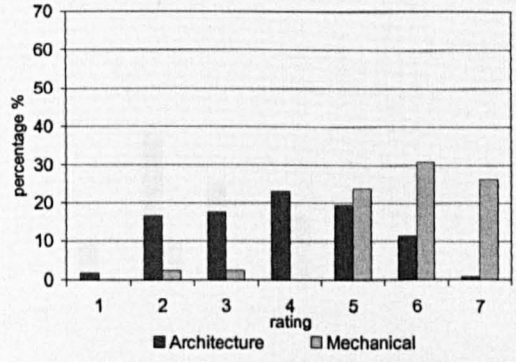
Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	3.3	1.6	*14.6*	*(p<0.01)* significant
Mechanical	2.4	1.4		

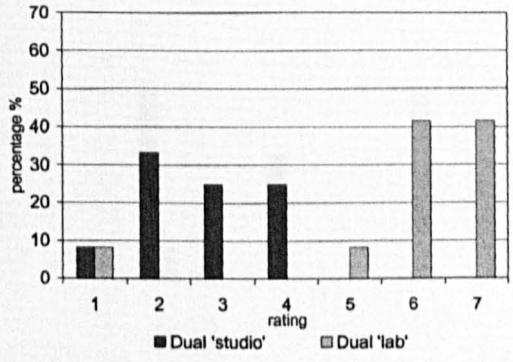
Group	M	S.D.	*t* value	Differences 'degree of agreement'
Dual 'studio'	3.3	1.8	*1.75*	*(p>0.1*)* not significant
Dual 'lab'	2.1	1.9		

Figure and Table 7.48 illustrate that there is a significant difference in the degree of agreement between Architectural and Mechanical students *(X^2=14.6, p<0.01)*. However, the degree of agreement is not significantly different when it comes to the Dual-study students' different experiences in the design studio and the lab *(t=1.75, p>0.1)*.

- Tacit - Explicit

Figure and Table 7.49 – Rating comparison between groups on 'Tacit - Explicit'





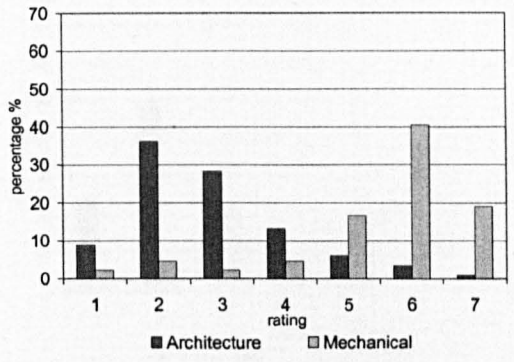
Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	3.9	1.4	*54.6*	*(p<0.01))* significant
Mechanical	5.8	1.1		

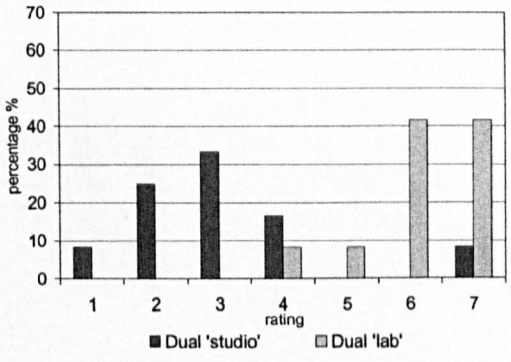
Group	M	S.D.	*t* value	Differences 'degree of agreement'
Dual 'studio'	2.7	1.0	*4.54*	*(p<0.01))* significant
Dual 'lab'	5.9	1.7		

Figure and Table 7.49 indicate that there is a significant difference on the degree of agreement between Architectural and Mechanical students *(X^2=54.6, p<0.01)*. There is also a significant difference of agreements based on the Dual-study students' different experiences in the design studio and the engineering lab *(t=4.54, p<0.01)*.

- Broad - Focused

Figure and Table 7.50 – Rating comparison between groups on 'Broad - Focused'





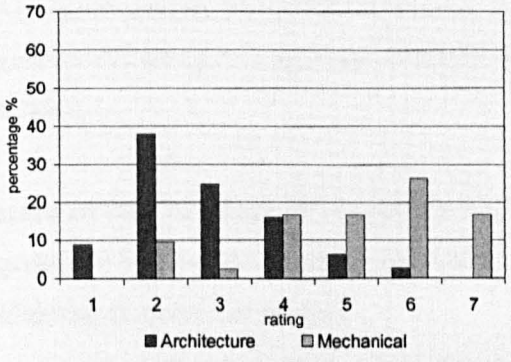
Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	2.9	1.3	*78.9*	*(p<0.01)* significant
Mechanical	5.5	1.5		

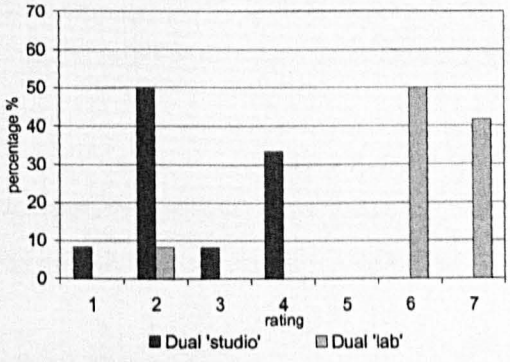
Group	M	S.D.	*t* value	Differences 'degree of agreement'
Dual 'studio'	3.1	1.6	*5.56*	*(p<0.01)* significant
Dual 'lab'	6.2	0.9		

Figure and Table 7.50 illustrate that there is a significant difference in the degree of agreement between Architectural and Mechanical students *(X^2=78.9, p<0.01)*. Similarly, the degree of agreements is also differs significantly between Dual-study students' experiences of the design studio and the lab *(t=5.56, p<0.01)*.

- Original - Accurate

Figure and Table 7.51 – Rating comparison between groups on 'Original - Accurate'





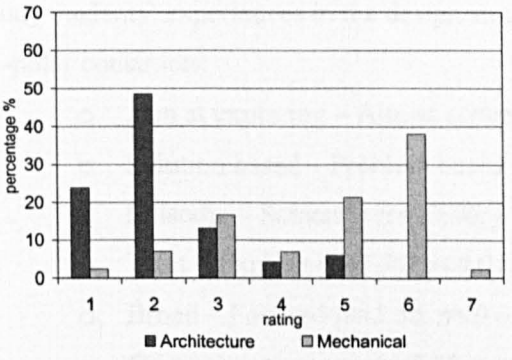
Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	2.8	1.2	*64.0*	*(p<0.01)* significant
Mechanical	5.1	1.5		

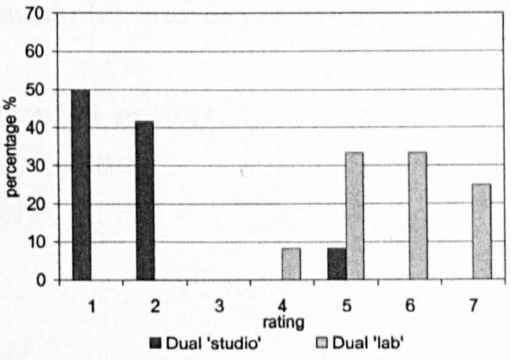
Group	M	S.D.	*t* value	Differences 'degree of agreement'
Dual 'studio'	2.7	1.1	*7.57*	*(p<0.01)* significant
Dual 'lab'	6.1	1.4		

Figure and Table 7.51 indicate that there is significant difference in the degree of agreements between Architectural and Mechanical students *(X^2=64.0, p<0.01)*. There is also a significant difference in agreement that emerges from the Dual-study students' experiences of both the design studio and the engineering lab *(t=7.57, p<0.01)*.

- Integrative - Discrete

Figure and Table 7.52 – Rating comparison between groups on 'Integrative - Discrete'





Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	2.2	1.1	75.7	*(p<0.01)* significant
Mechanical	4.7	1.5		

Group	M	S.D.	*t value*	Differences 'degree of agreement'
Dual 'studio'	1.8	1.1	8.12	*(p<0.01)* significant
Dual 'lab'	5.8	1.0		

Figure and Table 7.52 illustrate that there is a significant difference in the degree of agreement between Architectural and Mechanical students *(X^2=75.7, p<0.01)*. Likewise, the degree of agreements is also differs significantly between Dual-study students' experiences of both the design studio and lab *(t=8.12, p<0.01)*.

7.9.4 Summary of the two-way test findings on 'Learning' events

Almost all the results reveal significant differences in the degree of agreement between the two sets of groups. Nevertheless, there is only one result that shows no significance. This involves the ratings' comparison on the *Realistic-Abstract* construct made by the Dual-study students.

Based on the Chi-square *(X^2)* values, there are significant differences in the degree of agreement between the Architectural and Mechanical students when they are rating the following bi-polar constructs:

- Aim at exploring – Aim at achieving *(X^2=49.1, p<0.01)*
- Solution based – Problem based *(X^2=39.2, p<0.01)*
- Episodic – Semantic *(X^2=105.7, p<0.01)*
- Realistic – Abstract *(X^2=14.6, p<0.05)*
- Tacit – Explicit *(X^2=54.6, p<0.01)*
- Broad – Focused *(X^2=78.9, p<0.01)*
- Original – Accurate *(X^2=64.0, p<0.01)*
- Integrative – Discrete *(X^2=75.7, p<0.01)*

Based on the (*t*) values, the degree of agreement is also significantly different between Dual-study students' experiences in the design studio and the lab when they are rating the following bi-polar constructs:

- Aim at exploring – Aim at achieving *($t=3.48$, $p<0.01$)*
- Solution based – Problem based *($t=4.16$, $p<0.01$)*
- Episodic – Semantic *($t=13.00$, $p<0.01$)*
- Tacit – Explicit *($t=4.54$, $p<0.01$)*
- Broad – Focused *($t=5.56$, $p<0.01$)*
- Original – Accurate *($t=7.57$, $p<0.01$)*
- Integrative – Discrete *($t=8.12$, $p<0.01$)*

In the design studio, students are given the opportunity to explore different ideas. As such, they are more likely to rely on episodic thinking and use their tacit knowledge while searching for possible solutions to ill-defined problems. They usually refer to real situations and people's works as part of the process of generating potential ideas. When designing, they tend to deal with a broad range of knowledge and try to integrate their work and ideas. Students in the design studio place more emphasis on the qualities of originality and distinctness in their learning.

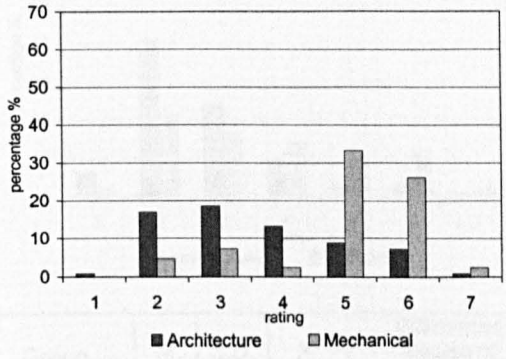
In the lab, students are more concerned about dealing with a specific given task. They depend more on semantic thinking and explicit knowledge in order to focus on a particular learning task and problem. Therefore, facts, figures and formulae become their main source of learning reference. They are also more interested in pursuing precision and accuracy in their learning activities. Each learning task and problem is tackled separately within a given period by the students.

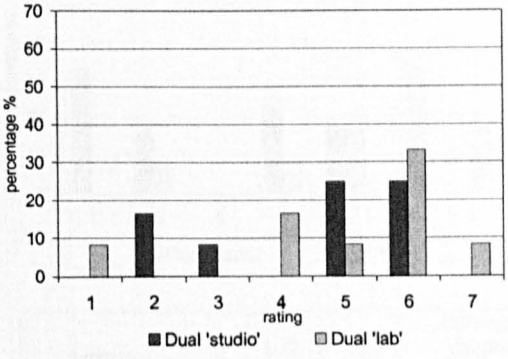
These notable differences of agreements further support previous findings with regard to peer learning experiences between the studio and laboratory environment. In other words, student peers in the design studio have their particular signifying practices in relationship to the 'learning' events. These practices are regarded as being influential on their 'designerly' way of thinking, knowing and doing.

7.9.5 Differences on degree of agreement on constructs related to 'Socialising' events

- Evocative - Direct

Figure and Table 7.53 – Rating comparison between groups on 'Evocative - Direct'





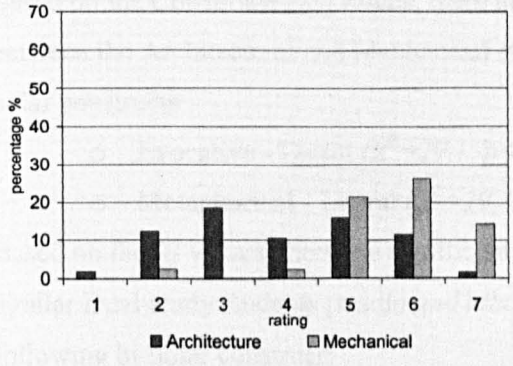
Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	3.6	1.4	*29.1*	*(p<0.01)* significant
Mechanical	5.0	1.2		

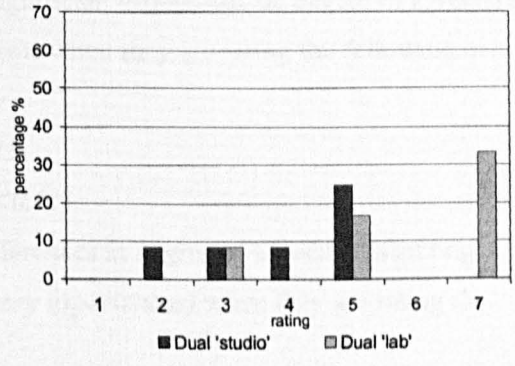
Group	M	S.D.	*t value*	Differences 'degree of agreement'
Dual 'studio'	4.4	1.7	*0.60*	*(p>0.1*))* not significant
Dual 'lab'	5.0	1.8		

Figure and Table 7.53 illustrate that there is a significant difference in degree of agreement between Architectural and Mechanical students *(X^2=29.1, p<0.01)*. However, Dual-study students do display significant differences of agreements based on their experiences between the design studio and the lab *(t=0.60, p>0.1)*.

- Metaphorical - Literal

Figure and Table 7.54 – Rating comparison between groups on 'Metaphorical - Literal'





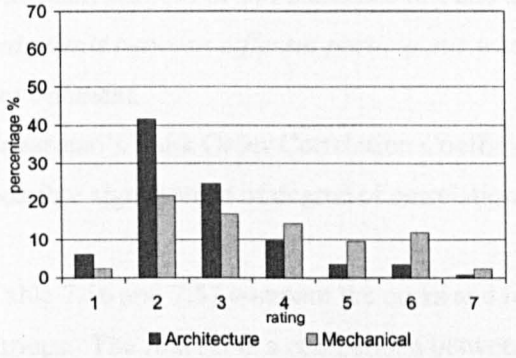
Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	3.9	1.5	*29.3*	*(p<0.01)* significant
Mechanical	5.7	1.1		

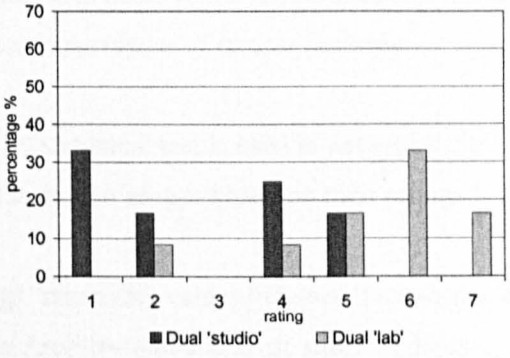
Group	M	S.D.	*t value*	Differences 'degree of agreement'
Dual 'studio'	4.0	1.3	*1.69*	*(p>0.1*)* not significant
Dual 'lab'	5.9	1.6		

Figure and Table 7.54 show that there is a significant difference in the degree of agreement between Architectural and Mechanical students *(X^2=29.3, p<0.01)*. Conversely, the degree of agreements is not significantly different between Dual-study students' experiences in the design studio and the lab *(t=1.69, p>0.1)*.

- Extrovert - Introvert

Figure and Table 7.55 – Rating comparison between groups on 'Extrovert - Introvert'





Group	M	S.D.	X^2 value	Differences 'degree of agreement'
Architecture	2.7	1.2	12.5	*(p>0.05*)* not significant
Mechanical	3.7	1.6		

Group	M	S.D.	*t value*	Differences 'degree of agreement'
Dual 'studio'	2.7	1.7	3.82	*(p<0.01)* significant
Dual 'lab'	5.4	1.5		

Figure and Table 7.55 show that there is no significant difference on the degree of agreement between Architectural and Mechanical students *($X^2=12.5$, $p>0.05$)*. However, Dual-study students do have significant difference of agreements based on their experiences across the design studio and lab learning environments *($t=3.82$, $p<0.01$)*.

7.9.6 Summary of the two-way test findings on 'Socialising' events

The results show that there are 3 significant differences and 3 non-significant differences on the degree of agreements between the two sets of groups.

Based on the Chi-square *(X^2)* values, there are significant differences on degree of agreements between the Architectural and Mechanical students when they are rating the following bi-polar constructs:

- Evocative - Direct *($X^2=29.1$, $p<0.01$)*
- Metaphorical - Literal *($X^2=29.3$, $p<0.01$)*

Based on the *(t)* values, there are significant differences in degree of agreements among similar Dual-study students *(studio and laboratory experiences)* when they are rating the following bi-polar construct:

- Extrovert - Introvert *($t=3.82$, $p<0.01$)*

The findings suggest that there are quite notable differences of experiences on the socialising-related events between Architectural and Mechanical students. In the design studio, students are communicating with peers using meaningful words representing several sets of ideas. In the lab, students prefer to have simple and direct conversations with their peers.

A finding based on the Dual-study students also reveals that social interaction in the design studio is considered a beneficial part of their peer assisted learning process that allows for the exchange of design ideas. In the lab, peer socialisation plays a minimum role in learning.

7.10 Statistical findings – Correlation test

The main purpose of this statistical test and analysis is *to observe the relationships of rating judgments between different participants who have experiences of similar learning environment.*

Spearman's Rank Order Correlation Coefficient *(r)* statistical test is used to determine for the possible significance of degree of correlation between two groups based on their ratings.

Table 7.56 and 7.57 compare the ranks and ratings' mean *(M)* values between the two sets of groups. The first set is a comparison between the Architectural and Dual-study students based on their similar design studio learning experiences. While, the second set is a comparison of the Mechanical and Dual-study students based on their similar engineering lab experiences.

Table 7.56 – Correlation between Architecture and Dual-Study (Design studio)

Constructs	Architecture		Dual 'studio'		Rank Diff
	Mean	Rank	Mean	Rank	
student led - tutor led	4.19	*14*	4.17	*13*	1
free - ordered	3.15	*9*	3.17	*9.5*	-0.5
casual - formal	2.73	*4*	1.92	*3*	1
social - individual	2.79	*6*	2.17	*4*	2
exploring - achieving	2.52	*3*	3.17	*9.5*	-6.5
solution - problem	5.18	*15*	5.58	*15*	0
episodic - semantic	2.41	*2*	1.83	*2*	0
realistic - abstract	3.27	*10*	3.27	*11*	-1
tacit - explicit	3.87	*12*	2.73	*6.5*	5.5
broad - focused	2.85	*8*	3.09	*8*	0
original - accurate	2.80	*7*	2.67	*5*	2
integrative - discrete	2.17	*1*	1.75	*1*	0
evocative - direct	3.56	*11*	4.44	*14*	-3
metaphorical - literal	3.94	*13*	4.00	*12*	1
extrovert - introvert	2.75	*5*	2.73	*6.5*	-1.5
					r = 0.83

Table 7.56 shows that there is a high correlation value *(r=0.83)* between the Architectural and Dual-study students. In general, the means' rank differences are small which also indicates similar direction of ratings between the two groups. The lowest means' rank difference is *0 (Solution based-Problem based, Episodic-Semantic, Broad-Focused, Integrative-Discrete).* The highest means' rank difference is *6.5 (Aim at Exploring – Aim at Achieving).*

These results suggest that different groups of students are sharing similar experiences of 'situations', 'learning' and 'socialising' events when they are in the design studio.

Table 7.57 – Correlation between Mechanical and Dual-Study (Engineering lab)

Constructs	Mechanical		Dual 'lab'		Rank Diff
	Mean	Rank	Mean	Rank	
student led - tutor led	4.78	*8*	6.67	*15*	**-7**
free - ordered	4.98	*9*	5.92	*10.5*	**-1.5**
casual - formal	3.41	*4*	5.75	*6.5*	**-2.5**
social - individual	3.17	*2*	4.67	*3*	**-1**
exploring - achieving	4.58	*6*	5.76	*8*	**-2**
solution - problem	3.24	*3*	2.17	*2*	**1**
episodic - semantic	5.97	*15*	6.17	*13.5*	**1.5**
realistic - abstract	2.43	*1*	2.08	*1*	**0**
tacit - explicit	5.83	*14*	5.92	*10.5*	**3.5**
broad - focused	5.50	*12*	6.17	*13.5*	**-1.5**
original - accurate	5.11	*11*	6.08	*12*	**-1**
integrative - discrete	4.70	*7*	5.75	*6.5*	**0.5**
evocative - direct	5.00	*10*	5.00	*4*	**6**
metaphorical - literal	5.68	*13*	5.86	*9*	**4**
extrovert - introvert	3.67	*5*	5.40	*5*	**0**
					r = 0.76

Similarly, Table 7.57 indicates that there is a high correlation value *(r=0.76)* between the Mechanical and Dual-study students. However, the value is slightly lower.
The means' rank differences for the means are also generally small. These also indicate a similar direction of ratings between the two groups. The lowest means' rank difference is *0 (Realistic-Abstract, Extrovert-Introvert).* The highest means' rank difference is *7 (Student led-Tutor led).*

These results suggest that different groups of students share similar experiences of 'situations', 'learning' and 'socialising' events when they are in engineering lab.

Findings from the correlation tests also support the significant findings of the two previous one-way and two-way analyses which indicated that peer experiences between the design studio and the laboratory learning environments are significantly different. Therefore, these also suggest that student peers in the design studio share particular signifying practices that are considered influential on their underlying subjective evaluation judgments.

7.11 Comparative semantic differential charts

This section presents two semantic differential charts *to visually compare the differences between two groups* based on their different peer learning environments. The first chart compares the differences between Architectural and Mechanical students. Based on the Dual-study students' experiences, the second chart compares the differences between the design studio and laboratory environments.

The charts have been refined with several adjustments. One of the adjustments was to reposition several constructs from one side of the measurement to the other. The repositioning will create a better visualization of the differences of mean score, going from high to low. Bar chart of the Standard Deviation (S.D.) is also incorporated in the semantic differential charts to support the visualization of mean score differences.

Table 7.58a – Mean scores and standard deviation (Architecture, Mechanical)

Constructs	Architecture		Mechanical		Mean Diff
	Mean	S.D.	Mean	S.D.	
episodic - semantic	2.4	1.2	6.0	1.3	3.6
broad - focused	2.9	1.3	5.5	1.5	2.6
integrative - discrete	2.2	1.1	4.7	1.5	2.5
original - accurate	2.8	1.2	5.1	1.5	2.3
exploring - achieving	2.5	1.4	4.6	1.7	2.1
tacit - explicit	3.9	1.4	5.8	1.1	2.0
problem - solution	2.8	1.5	4.8	1.8	2.0
free - ordered	3.2	1.7	5.0	1.9	1.8
metaphorical - literal	3.9	1.5	5.7	1.1	1.7
evocative - direct	3.6	1.4	5.0	1.2	1.4
extrovert - introvert	2.7	1.2	3.7	1.6	0.9
abstract - realistic	4.7	1.6	5.6	1.4	0.9
casual - formal	2.7	1.3	3.4	1.6	0.7
student - tutor	4.2	1.6	4.8	1.7	0.6
social - individual	2.8	1.3	3.2	1.6	0.4

Table 7.58b – Mean scores and standard deviation (Dual 'studio', Dual 'lab')

Constructs	Dual 'studio'		Dual 'lab'		Mean Diff
	Mean	S.D.	Mean	S.D.	
episodic - semantic	1.8	0.7	6.2	0.8	4.3
integrative - discrete	1.8	1.1	5.8	1.0	4.0
casual - formal	1.9	1.4	5.8	0.9	3.8
original - accurate	2.7	1.1	6.1	1.4	3.4
problem - solution	2.4	1.7	5.8	1.3	3.4
tacit - explicit	2.7	1.0	5.9	1.7	3.2
broad - focused	3.1	1.6	6.2	0.9	3.1
free - ordered	3.2	1.4	5.9	1.7	2.8
extrovert - introvert	2.7	1.7	5.4	1.5	2.7
exploring - achieving	3.2	1.8	5.8	1.4	2.6
social - individual	2.2	0.9	4.7	1.4	2.5
student - tutor	4.2	1.1	6.7	0.5	2.5
metaphorical - literal	4.0	1.3	5.9	1.6	1.9
abstract - realistic	4.7	1.8	5.9	1.9	1.2
evocative - direct	4.4	1.7	5.0	1.8	0.6

Figure 7.58a – Semantic differential chart (Architecture, Mechanical)

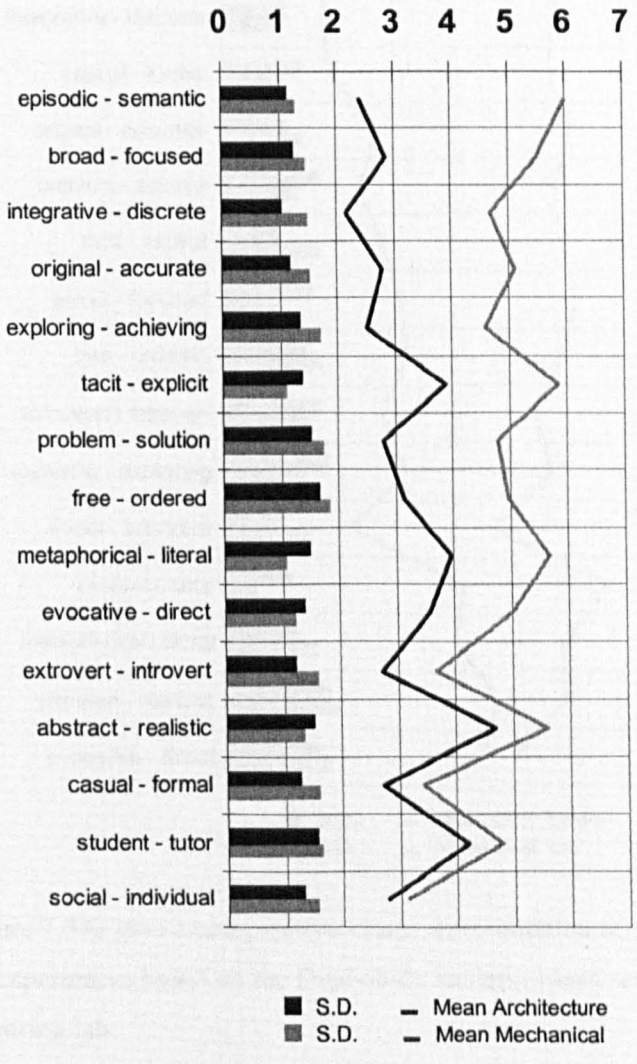


Table and Figure 7.58a give a comparative visual representation of the differences between Architectural and Mechanical students' peer learning experiences based on the mean scores. From the chart, there are larger divergences of difference which involve the *Episodic-Semantic, Broad-Focused* and *Original-Accurate* bi-polar constructs. The smallest divergences of difference are shown by the *Social-Individual* and *Student led-Tutor led* bi-polar constructs.

This visualization gives further supports to previous findings that suggest studio peers have their particular ways of thinking and doing, especially with respect to 'learning' events.

Figure 7.58b – Semantic differential chart (Dual 'studio', Dual 'lab')

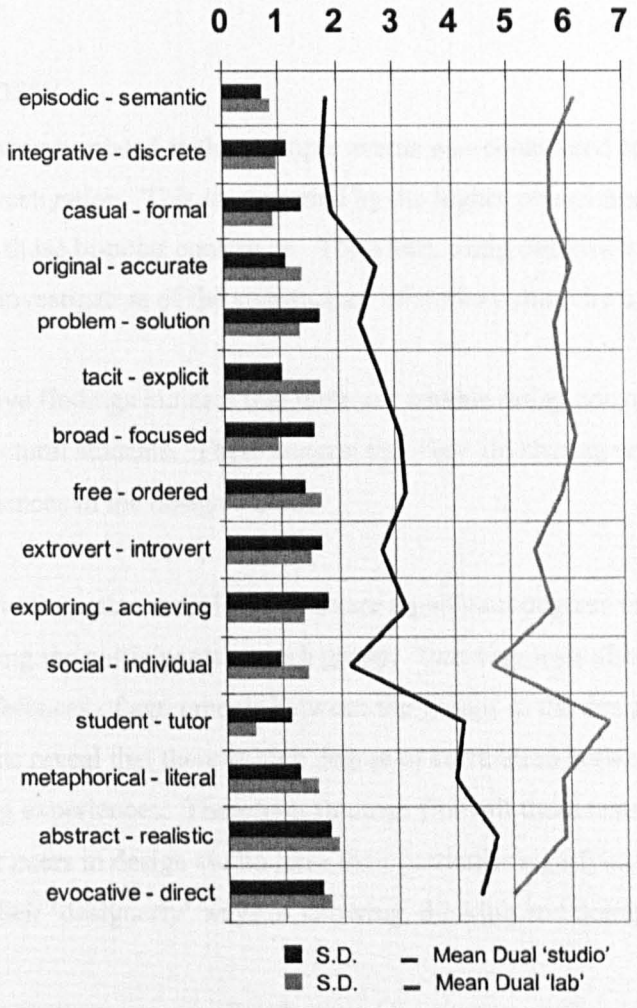


Table and Figure 7.58b give a comparative visual representation of the differences between peer learning experiences based on the Dual-study students mean scores in the design studio and the engineering lab.

From the chart, there are larger divergences of difference which involve the *Episodic-Semantic, Integrative-Discrete, Casual-Formal* and *Original-Accurate* bi-polar constructs. The smallest divergences of difference are shown by the *Evocative-Direct* and *Abstract-Realistic* bi-polar constructs.

The overall divergences of differences are wider than those shown in the previous chart that illustrated the differences between Architecture and Mechanical students. These wider divergences may suggest that Dual-study students, due to their unique experiences in both environments are more sensitive to the peer learning differences that exist between the design studio and the lab. In short, they are not only observers; they are also active participants in both groups of peers' signifying practices.

This graphic illustration also gives further supports to the previous findings that suggest the significant influence of peer culture on design learning process.

7.12 Summary

The use of constructs related to the multiple events was considered appropriate in this quantitative investigation. This is supported by the higher percentages of responses given by participants on those bi-polar constructs. Therefore, using constructs provides a meaningful way to further investigation of the significance of studio culture by means of comparison.

Initial descriptive findings indicate that there are notable rating convergences of constructs among Architectural students. These suggest that they are sharing commonalities in their peer learning experiences in the design studio.

One-way test findings also reveal that there are significant degrees of agreements on many constructs among the participants in each group. Two-way tests also indicate that there are significant differences of agreements between the groups in the design studio and the lab. Correlation tests reveal that there is high degree of correlation between two groups having similar learning experiences. Therefore, findings from all these tests provide further support to the idea that peers in design studio have their particular signifying practices which are influential in their 'designerly' ways of knowing, thinking and doing.

The significant findings are visually illustrated by semantic differential charts that indicate there are notable differences in peer learning experiences and practices between design studio and the engineering lab. Interestingly, one of the charts also indicates wider divergences of differences based on the Dual-study students' experiences in both learning environments.

These findings and illustrations support the main hypothesis of this quantitative investigation:

***(H_1)* – 'There are <u>differences</u> between the peer culture in the studio format environment and peer culture in a learning environment from other fields of study'**

Therefore, the verification of this hypothesis reinforces the theoretical assumptions of this research that suggest there is a signifying studio peer cultural phenomenon in the designing activities that take place within multiple events of 'situations', 'learning' and 'socialising'.

Chapter 8
Conclusion

8.1 Introduction

Studio peer culture in architectural education is an intriguing and unique phenomenon. This research investigation attempts to explore and gain deeper understanding about this phenomenon and its relationship with design learning.

This chapter begins with discussions of the main issues surrounding the core interest of this research. These issues are based on the reviews of the principal literatures. These are followed by the descriptions on the key findings and results of the various stages in the investigation. The implications of the findings from this research on existing knowledge and practical applications will also be discussed. Later, there will be several reflections on the limitations and also suggestions for further directions of this research.

8.2 Issues from literature reviews

In the early chapters, reviews of literatures highlighted several important issues that provided this research study with its theoretical background, assumptions and considerations. The brief discussions of those issues were as follows:

- **Designerly ways of knowing**

This notion of 'designerly ways of knowing' emphasizes that design learning and activities have their particular way of thinking, knowing and doing (Cross 1982; Cross 2001). Design is not only concerned with skills to do with making artifacts or products; it is also concerned with the process of generating and constructing new knowledge as part of intrinsic intelligence (Cross 1999). Designers are 'divergent' and 'convergent' thinkers because they are engaged in integrating their 'parallel lines of thoughts' to deal with ill-defined, ill-structured or unrefined problems in the pursuit of solutions that are both innovative and practical (Hudson 1968; Lawson 1993). Therefore, design intelligence is considered to be as important as numerical and literary intelligence (Cross 1982).

- **Design studio as a 'Holding Environment'**

Studio-format environment have vital roles in architectural education. It serves as a physical and also virtual space for learning. As a physical space, it provides a locus for students to learn while interacting with peers and tutors: as a virtual space, it creates the stimulation, identity and security (Lawson 2001) that promote reflective and situated learning (Phillips and

Soltis 1998). In short, the design studio is functioning as a domain for learning by doing (Lackney 1999) at both the personal and interpersonal levels. These design studio qualities create a shared and interactive learning atmosphere for productive, active thinking among architectural students (Goldschmidt 1983; Schon 1988).

- **Ideals and realities of architectural education in the design studio**

Design education within the design studio has huge potentials as an exemplary learning model of dealing with multi-faceted and problematic situations. However, recent developments indicated that there is a 'hidden curriculum' (Dutton 1987) that is influential to the teaching and learning experiences particularly in the studio peer community. There seems to be the emergence of 'inequality', 'subjectivity' and 'exclusivity' phenomenon in this community (Ahrentzen and Anthony 1993; Groat and Ahrentzen 1996; Groat and Ahrentzen 1997). Such phenomenon may also create several negative impacts to the cultural practices of the design studio peers. A number of recommendations were proposed in order to demystify and also to overcome the 'hidden curriculum' syndrome. These are to ensure for the positive transformations (Groat and Ahrentzen 1997) of architectural education that is more open, realistic and caring for others without any prejudice based on gender, race and status.

- **Peer group processes and socialisation**

Design is a social process (Cross and Cross 1995). Peers become the primary socialising agents that promote peer assisted learning (Wilson 1981; Parr and Townsend 2003) in design studio. As curious learners, studio peers are learning from others by transacting diverse design ideas and solutions through the 'similar-yet-different' design situations (Gero and Kannengiesser 2003; Gero and Kannengiesser 2004). They are using their shared learning similarities to ground their existing knowledge before they are able to construct a new personalised knowledge. It is a dynamic and unique design learning process that proceeds from solidarity towards the personalization of knowledge (Hogg 1992).

- **Signifying practices and cultural manifesting elements**

Peers in a design learning community may display a tendency to form their particular signifying practices (Storey 1993) which allow them to communicate and interact more effectively. These practices may be influential to their underlying subjective evaluative judgments (Wilson 1996) as part of their collective mental programming (Hofstede 1991; Matsumoto 1996). Therefore, these may also create a clustering phenomenon (Lawson and Dorst 2005) in the way they act, think and make design moves and actions. Such practices may manifest themselves into observable and non-observable cultural elements such as symbols, words, norms and values (Persell 1990; Macionis and Plummer 1998).

- **Multiple events and constructs**

Designing involves multiple events of situations, learning and socialising (Sosa and Gero 2003). These events provide a design situated setting for students to recall memories, ideas and experiences in order to create and generate better ideas and knowledge while dealing with ill-defined problems. Underlying those events are constructs that students may have developed as part of their particular construing system (Kelly 1955; Bannister and Fransella 1980). Such constructs are considered helpful for design students to predict and prepare for their future events in the real world. In doing so, they avoid unnecessary conflicts that may distract from their efforts to deal with the complexities of design learning.

8.3 Key findings: Qualitative and quantitative

In this study, qualitative, quantitative and comparative investigations have revealed several notable findings in relation to the research key questions that emerge from the reviews of literatures. Those key questions were stated in the introductory chapter as follows:

- Are there any signifying practices commonly shared among the design studio student peers?
- What are those signifying practices and their characteristics, if such practices exist among the students?
- What are the possible learning benefits from such signifying practices?
- Are there any differences of signifying practices between the architectural design students and those from other fields of study?

- **Qualitative findings**

Qualitative interview investigations are used to explore for the possible commonality of signifying practices and their benefits among the peers in the design studio. The investigations have discovered that there are signifying practices in the form of shared commonalities that exist among architectural students while learning and interacting with their peers in design studio. Those shared commonalities are *use of meaningful words, symbols, norms and values* (Section 6.8).

This investigation also indicates that these students gain several learning benefits from their shared commonalities. Design students are able to express and exchange ideas more effectively by using meaningful, evocative words. Actual architects are referred to as realistic learning models and act as 'short hands' that provide students with valuable sources of references in the form of coherent sets of design ideas and precedents. Such references provide a good way of tackling design uncertainties. Their norms in the form of unusual acts generate multiple affordances. Design students are taking advantages of the various objects'

properties in order to construct new ideas. Roles are also exchanged among peers as part of the supported and assisted learning process and the values intrinsic to them provide them with encouragement, a sense of purpose and practicality in design.

Qualitative focus group sessions with Dual-study students also support findings on peer signifying practices and their benefits that evolve in the design studio. Based on their dual peer learning experiences, qualitative results illustrate that there are several fundamental differences between design studio and engineering lab (Section 6.10, Section 6.11). Those key differences are discussed as follows:

- Learning settings

In the design studio, activities are predominantly led by the students. The atmosphere is casual and sociable. Such settings give Architectural students more freedom to express and exchange ideas while socialising.

In the lab, activities are explicitly structured and mainly led by the tutors. Its atmosphere is formal and that provide students with more time to focus on their particular tasks.

- Learning process

In the design studio, students explore ideas and focus on solutions to design problems. They rely on episodic thinking in the search for possible solutions. Design students are more interested in the original and distinctive quality of ideas and products. They also tend to deal with a wide domain of knowledge.

In the lab, students emphasise more on the performance of an explicit given task. In this respect, they are utilising semantic thinking that relies on theories and formulae. They have a common concern on precision and accuracy in tackling problems. These students deal with specific knowledge while working on a particular task.

- Verbal and non-verbal behaviours

In the design studio, students are fascinated with having meaningful conversation with their peers. They are more likely to communicate using evocative and metaphoric words. They also have the tendency to play around and alter the properties of the objects around them for different purposes in order to generate ideas. Design students are also more likely to spend longer hours while integrating various works and ideas.

In the engineering lab, students prefer to use simpler words and have shorter conversations with peers when they are discussing their learning activities. These students also have a tendency to work independently and with more discretion. They are able to organize their work and time accordingly.

- Peer relationships

In the design studio, students feel that socialisation allows for openness and supportive relationships among peers.

In the lab, students consider that learning is more effective as individuals when it is separated from socialising with peers.

- Opposing 'constructs'

Qualitative findings on those fundamental differences also reveal that there are underlying, opposing constructs that represent the multiple events within the signifying shared practices between design studio and laboratory environment. In other words, students in design studio have their own particular ways of construing 'situations', 'learning' and 'socialising' events compared with students in the engineering laboratory.

The findings from qualitative study have given meaningful insights into the studio peer culture and its influences. Nevertheless, there are still uncertainties regarding its significance. This is because qualitative findings have several weaknesses. These involve the issues of subjectivity and also the possibly biased interpretations of the researcher. Therefore, the identified underlying constructs provide a valuable opportunity for a more objective, quantitative investigation. Those constructs allow the researcher to devise a survey with standardized variables in order to further examine the significance of studio peer culture by means of comparative study.

- **Quantitative, comparative findings**

The main purposes of this investigation is to identity for the possible differences of signifying practices as stated in the early section of Chapter 7. Here the rating distributions of 3 groups of survey participants were compared and analysed namely, Architectural, Dual-Study and Mechanical Engineering students. This investigation demonstrates that there are 4 notable findings related to those main purposes. The notable findings from this investigation are explained as follows:

- Meaningful constructs among peer group members

Findings demonstrate that students have meaningful constructs as part of their peer learning experiences in relation to the interrelated events of 'situations', 'learning' and 'socialising' within their particular learning environment. These findings are supported by results that show there are higher percentages of overall response for participants on the series of bi-polar constructs used in the survey (Section 7.6). Therefore, the use of identified constructs from earlier qualitative study is considered appropriate as part of further investigation of the significance of studio peer culture.

- Commonalities within members of a group

The findings suggest that there is a high degree of commonalities among members of each group. These are illustrated by the significant degrees of agreements among the Architectural and Mechanical students within their own particular group on constructs related to the 'situations', 'learning' and 'socialising' events (Section 7.8). However, the level of commonality among the Dual-study students is slightly lower in comparison with the other two groups of students. This comparison is particularly on constructs related to the 'socialising' events.

Although qualitative findings indicate there are differences on constructs between the design studio and the lab, quantitative findings reveal there are several similarities between Architectural and Mechanical groups particularly on constructs related to 'situation' events (Section 7.8.4). Both groups considered their learning environments to be tutor-led, social and casual. However, the mean values indicate that between the two groups there are differences concerning degree of agreement. Tutors have more authority with regard to the learning activities in the lab than do tutors in a design studio. Similarly, the situation is more casual and sociable in the design studio than in the lab. This was highlighted by results from the Dual-study students and further supported by findings from two-way statistical test.

Sharing commonalities is considered one of the key indicators of the existence of an influential culture operating within a community or group. Therefore, these results suggest that studio peer culture has an influential role on the peer learning activities because design students display a high level of shared commonality. Furthermore, these findings support most of previous qualitative findings with regard to shared commonalities of cultural manifesting elements.

- Differences of shared commonalities between groups

In this study, Mechanical and Dual-study students serve as comparative groups that determine the significance of the studio peer culture. Findings from the comparative statistical test reveal that there are significant differences in peer learning experiences that exist between the design studio and the laboratory environment (Section 7.9). These further indicate that Architectural students have their distinct shared signifying practices that are not similar to Mechanical students. In other words, studio peer culture is considered influential on the ways students think, do and socialise in the context of their design learning process.

- Correlations between different groups with similar learning experiences

Findings also suggest that different groups of students share similar experiences of the 'situations', 'learning' and 'socialising' events when they are learning and interacting in a particular learning environment. Correlation test results (Section 7.10) demonstrate that there are high correlation rank values *(r)* between the Architectural and Dual-study students. There are also high correlations between Mechanical and Dual-study students who have learning experiences in the laboratory environment.

Findings from the correlation tests also support the findings from the previous quantitative results which indicate that there are significant differences between events that are experienced in the design studio and the laboratory learning environments. Therefore, these findings further demonstrate that student peers in the design studio have shared commonalities of signifying practices which are considered influential on their underlying subjective evaluation judgment. Such practices are less common particularly in the laboratory environment.

- Higher sensitivity due to diverse learning cultural exposures

Students with such diverse exposures have the tendency to be more sensitive or conscious on the differences between learning environments. In this study, the results illustrate that Dual-study students have wider divergence of their ratings on constructs between design studio and laboratory (Section 7.11). One of the possibilities is that they need to make important adjustments in their thinking process and practices to accommodate the different learning events between those environments. Architectural and Mechanical students do not have to make major shifts in their mental programming and practices because learning activities are mainly done within their own environment.

8.4 Research implications

The findings and process of this investigation contain two implications which are as follows:

- **Theoretical implications**

This study has contributed additional information to the existing theoretical knowledge on the relationships between peer interactions and design learning in several respects.

Firstly, it provides better understanding of peer group processes within the studio peer culture. Studio peers are developing learning cohesion by sharing intangible and tangible manifesting cultural elements which allow them to transact ideas more effectively. This study gives

supportive knowledge to the notion of 'multi-designers situations' (Gero and Kannengiesser 2004) which suggests that designers construct better memories when they interact with others in 'similar-yet-different' situations.

Secondly, the study further illustrates the importance of social process as part of enhancing design competency as suggested by (Cross and Cross 1995). This study reveals that through the parallel process of design and social cognitions, students have more opportunity to produce innovative ideas or make 'creative leap'. Such processes involve multiple events of situations, learning and socialising that evolves from the studio peer culture.

Thirdly, this study has also discovered meaningful constructs representing multiple events within the studio peer culture. These constructs make for a more explicit knowledge of studio peer culture and its relationship to design thinking, doing and making. In other words, they provide different kinds of views in order to give a more detailed picture of the studio peer culture. This further synthesizes knowledge of the various properties of this phenomenon into a more coherent understanding.

Fourthly, the deeper understanding of the design learning process through the meaningful peer cultural practices to construct innovative ideas can be used to support the importance of the studio-format environment as part of the higher learning communities in an institution. This is because such environment has the potentials to be an exemplary model of learning that deals with multi-facet problems and situations through personal, situated and social cognitions.

Finally, this study provides the basis of knowledge on the benefits of studio peer learning to be shared or integrated with various disciplines in order to enhance mutual understanding and generate new cross-disciplinary ideas. This is to ensure that architectural education is not to be misjudged as a 'specialist' field of education with the tendency of forming isolation from the others. Therefore, this may prevent any tensions, struggles or conflicts between different groups of people and disciplines within a particular institution.

- **Practical implications**

In relationship to the theoretical implications, this study also provides some possible practical applications in educational study particularly in design education.

Firstly, it provides an alternative method with which to examine the relationships between peer interactions and learning within a particular environment. Such a method utilizes multiple-strategies by combining qualitative and quantitative approaches through a series of

investigation. This is considered to be a reliable method for the cross-examination of data and results in order to determine the level of significance of a particular peer group phenomenon. Therefore, this leads to a higher level of confidence in the overall findings.

Secondly, the study is able to identify underlying cultural properties and express them into the form of manifesting elements and constructs. Therefore, each property can be examined in detail to gather more specific knowledge on its relationship with the various stages of design learning. For example, an investigation can be conducted on changes of non-verbal behaviours or socialising constructs as a design student progresses through different years of study. Another method of investigation is by observing the impact of changes on specific cultural property when a design student moves from one learning environment to another, such as from the design studio to the history class.

Thirdly, such study can be practically applied to investigate the characteristics of low, average and high achievers among design students. The variations and levels of shared commonalities among different group of design students may have some influences on their performance and competency in designing. Information from such studies will help design tutors to take necessary steps to improve teaching and learning in design studio. Furthermore, a study using cultural properties and constructs may minimise discriminative effect on students with varying degrees of design ability. This is because students are quite sensitive when they are asked direct questions on their learning accomplishments.

Fourthly, an illustrative measuring tool has been developed in this study to visually present the similarities and differences between peer learning groups. The use of this tool was seen as an effective way of composing and displaying all relevant findings into a simple yet meaningful graphic illustration. From this tool, one may able to capture the various associations between the research variables *(e.g. constructs, events, groups)* within a single frame of reference. Therefore, such a tool is applicable in other studies that require the comparison between various types or groups of people.

Finally, this study may offer a better information and framework to undertake discussions and exchanges of constructive ideas pertaining to the design studio peer learning between the students, tutors and others. This is considered as meaningful and practical because it helps to identify the transformation process of the peer cultural practices from negative to positive or vice versa. Proper initiatives can be taken accordingly for the purpose of the improvements and sustaining the effectiveness of the design learning and teaching process.

8.5 Limitations of the research

Although this study has suggested a number of positive implications, there are several limitations in several aspects to do with scope, method, literature, size and the type of participants.

- **Scope**

This research is regarded as an early attempt to examine the studio peer cultural phenomenon. It was conducted in a higher institution by observing and comparing peer learning experiences between three different groups of students. The scope of the study is limited to a single institution, location and a few groups of students. Therefore, the findings from this study may not be representative of other institutions in various other locations or regions.
Due to these limitations, this study can be extended by using similar approaches in schools in different regions or locations. Additional groups of students from other fields may also be useful as part of the extended study. Therefore, findings from such further studies may contribute information that is more valuable and allows for better generalization in the wider context of the understanding of this phenomenon.

- **Method**

There are also several limitations in relation to the methods of investigation. Firstly, the number of individual interview and focus group session are considered minimal. This study will be able to gather more meaningful qualitative data if there are more such sessions. The main reason for these fewer sessions is the time constraints imposed on students and also the researcher. Students were preoccupied with final exams and submissions during the planned sessions. The researcher also had a restricted period in which to complete his study.
Secondly, in the survey, constructs related to 'socialising' events are not supported by amplifying sentences. Initially, those non-amplified constructs are considered sufficient for participants to understand when asked to give their response to the survey. Nevertheless, based on several feedbacks, few participants had difficulties to respond because they found those constructs were ambiguous. Therefore, these constructs will be supported by amplifying sentences in order to improve the survey for further study.

- **Literature**

There is a lack of literature on the study of peer learning in architectural education especially regarding its cultural aspects. Study on socialisation and preferences among architectural students by (Wilson 1996) is considered one of the few literatures that have contributed important ideas to this study. Therefore, several key literatures on the peer group phenomenon

from other fields of study such as sociology and psychology were also referred to and reviewed. The main purpose of these efforts was to gather further knowledge to help build up sufficient theoretical bases for conducting a reliable study.

- **Size and type of participants**

In general, the number of participants was considered adequate for the purposes of an initial study of studio peer culture. However, larger numbers of participants particularly from the Dual-study students may help to contribute better statistical results to the study. In addition, all Mechanical Engineering participants who serve as a comparative group are in their 3rd year of study. There is the possibility of varying differences or similarities in peer learning experiences between 1st, 2nd, 3rd and 4th year Mechanical students. However, this study does not take into account those possibilities that may have minor implications for the findings. Therefore, future investigation may include Mechanical Engineering participants who represent wider year groups. Similar considerations may also be applied to other participants of comparative groups such as Mathematic or Sociology students in future investigations.

8.6 Directions of further research

This research study and its outcomes have provided a vast number of opportunities for the researcher or perhaps others to widen the knowledge on this influential studio peer culture.

The study can be extended by comparing studio peer culture between architectural schools from various regions or countries. This is to observe if there are further similarities in a wider context. It will provide a more profound picture of this phenomenon that may go beyond the physical or regional boundaries. In addition, such a study may able to look out for the existence of several differences in studio peer culture that may due to the possible influences of the regional culture i.e. Asian culture.

It may also be extended by engaging in comparative study with other dominant fields of study, such as medicine and law. Such studies may uncover interesting findings that will offer better perspectives on the potentials and weaknesses of each peer learning culture. In addition, those findings may bridge the gap between various disciplines for collaborative learning and academic projects. It also provides useful information for designing the curricula of multi-disciplinary courses that involve design and non-design related fields of study. Furthermore, this may help architectural students deal with other professionals while working on design projects or research before they enter the work force.

It is also worthy of investigation to compare studio peer cultures in academic and professional practice environments. This is to observe similarities and differences in peer interactions between expert and novice designers while they are dealing with design problems. From this kind of study, the researcher may be able to search for any possible transformations of peer culture in various levels of design competency.

Another way of extending this study is by taking into considerations the views of design tutors with regard to studio peer culture. It is important to know how tutors play their teaching and consulting roles within such culture. Such a study may involve the comparison of tutors' and students' expectations on positive peer learning. This study may provide beneficial information in promoting more effective teaching and learning environments. In addition, it helps to minimize the phenomenon of the 'hidden curriculum' which is also described as the 'mystery-mastery' game (Section 1.3) that creates barriers between tutors and students in the realization of real learning purpose.

8.7 Final notes

As an architectural academic, this researcher has gained a better awareness from this study of peer culture within the studio-format environment which may be characterized as follows:

- It is an environment that encourages generative and constructive thinking in order to search for potential solutions to the ill-defined design problems
- It promotes the use of meaningful words and codes to economise and optimize the speed of design thinking
- It consists of interactive and integrative design activities that incorporate verbal and non-verbal transactions in order to foster dynamic learning experiences
- It is an environment of non-hierarchical, non-linear structure of activities that are culturally organised for productive design actions and moves
- It offers wide opportunities for generating a pool of precedent-based knowledge that may be applied to a range of design solutions
- It encourages self-determination and confidence in dealing with a high level of design uncertainties
- It provides an active and supportive social learning atmosphere for challenging and competing ideas

Out of such awareness, the researcher has acquired new dimensions of knowledge concerning the role and potential of the studio-format environment along with its peer culture as a vital part of a vibrant design learning process.

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APPENDIX A

Interview and focus group guide and questions

Individual interview guide and questions

1.0 Preparation of session

- Make call to participant 24hrs before the session as a reminder
- Get keys to the meeting room
- Make the proper room arrangement for interview session
- Setting up and testing equipment for the recording (extension wire, digital recorder, batteries, etc.)
- Prepare and placing sign-up form
- Placing refreshments (drinks , chocolate bar)

2.0 Opening Session

- Welcome and good morning. I wish to thank you for sparing some of your valuable time to take part in this session.
- Asking participant to fill sign-up form
- Invite participant for refreshments
- Ice breaking – *'Talk about the nice weather' or 'cultural issues' – 'shaking hands' – 'bowing head'*
- First of all, I would like to give a brief description about our session today.
- The discussion is going to be based on your studio experiences with peers and the main purpose of this session is to discuss on,
    - **The commonalities among peers in the design studio environment**

  These will also include,

    - **Cultural practices such as symbols, words, norms and values**
    - **Level of commonalities about those practices among peers**
    - **Benefits of such practices in peer interactions**

- And before we begin, let me make few requests of you.

  First, please, do speak up and don't worry what others may think. We are here to exchange opinions and have fun while we do it.
- This session will be tape recorded for reference and further analysis. And, I would like to ensure you that all information given and discuss is strictly confidential.

  Thank you, I really appreciate it.
- Why don't we begin by introducing ourselves? *My name is Ismail.....*

3.0 Questions

	Questions	Intentions
1	Tell us your first name and your favourite signature or famous architect who becomes your 'idol' for your future career.	General opening question to encourage everyone to talk and feel comfortable in the session.
2.	A British comedian makes quite a delightful remark about architect as a profession. He said, *'Architecture offers quite extraordinary opportunities to serve the community, refresh the environment and to advance mankind - the successful architect needs training to overcome any pitfall, however, and start earning some serious money'.* What do you think? Do you share his remark when you first decide to take architectural study? Probes: • Does anyone encourage you to take this study? • Do you think that your previous experience in high school may play some influences?	Identifying the possible intrinsic motivations that influence students pursuing architectural study. These factors include family members, friends, schools, special interests.
3.	Imagine that the Design studio is like a zoo *or to be more polite, like a jungle.* What are the species that you can find in this zoo? Probes: • Do you find any panthers, parrots, and chameleon? Why? • How do they interact? (verbal and non verbal behaviour) • What are their conversation materials? • What are the favourite conversation materials related to design?	Examining architectural students' perception about their general society and the signifying practices that may create a kind of shared sociocultural framework for interactions, negotiations. This is related to the idea of social identification, categorisation by comparison among their peers. Also looking for common practices, interests and behaviours among peers.
4.	People outside the department of architecture find it hard to understand what the studio is. How would you describe the studio to some body else? What do you mean by studio? Probes: • What kind of places is the studio like? *Is it a bazaar, club, hive, monastery, museum, art gallery?* • What is helpful and unhelpful about studio on your design? • What do you like it more like to be? *(e.g. school, club, hive)*	Gathering insights from the experience of students on the quality and role of studio environment toward their experience on learning design. This is also to examine students' extrinsic motivation and studio as zone of proximal development. Studio as a dynamic environment for heuristic and active learning.

5.	Success in design in the studio could be rather seen as either luck or talent. Which do you think it is? What are the characteristics of a successful project? Or, maybe it is to impress your design tutor? Probes: • What kinds of knowledge, values and skills those are important in architectural design?	Identifying the developmental process of the kinds of knowledge, values and skills that may further become the underlying guiding principles and primary generators in design process.
6.	Let's go back to the work of the signature architects like Foster, Calatrava, you can see there are coherent set of ideas and principles in their design. Do you think that is a good way and very useful in design? Probes: • Do you think you are beginning to understand, it might also be important to you? • How do you decide in having such ideas and principles? • What about architects, buildings, conservation, technology? • In what ways these are helpful in your designing process	Identifying the importance of such knowledge, values and skills in enhancing the design process. Looking for patterns of design guiding principles and primary generators.
7.	Let's assume that the studio is like a karaoke lounge. When you sing you try to sing differently but at the same time you are imitating the person in the TV screen. What do you think about this design situation of similar-yet-different? Do you find this in the studio? Probes: • What are the good and bad aspects? • What types of similarities that you see? What types of differences that you see? (e.g. knowledge, values and skills)	Determining the socialization process and its possible influences toward group identification based on the social identity theory in a similar yet different design situation. How different it is okay to be before it starts being suitably imitated?
8.	Do you find you talk differently about architecture in the studio, as compare to when you talk to your parents? What are the differences? Probes: • What are the aspects of this language that use in the studio? Is it words, concepts, references? • What it is and its importance to you and your design peers? • Any different with different year group?	Beginning to investigate the commonalities between closer peers on the surface context. To identify the basis of underlying subjective judgment for situational cohesion.

9.	Is design something that you can do as a group? Probes: • If you were trying to put a design team together, what do you need to do to make it work? • Do you need to have common set of references, values or guiding principles? What are they? • How do you feel about personalization and solidarity among the members in a team? • Who does better in design, a loner or a team?	Investigating deeper into the types of commonalities and their importance. Examining the level of commonalities based on the situational cohesion. Work in collaboration.
10.	In general, how would you describe your relationship with your peers in the studio, from year one until now?	Overall perspective on the peer relationship within the studio.

4.0 Closing of session

- Summarisation of the discussion***
- Asking participant for additional ideas and thoughts to improve future session***
  'Is there any area of commonalities among studio peers that we have not cover?'

- Giving souvenir and incentive
- Offering full script of discussion if requested and available
- Wishing participant good luck on their design projects and exams.
- And have a great summer holidays
- See them again in Autumn

Interview guide and questions for focus group discussion

1.0 Preparation of session

- Makes call to participant 24hrs before the session as a reminder
- Get keys to the meeting room
- Makes the proper room arrangement for group discussion
- Setting up and testing equipment for the recording (extension wire, digital recorder, batteries, etc.)
- Prepare and placing sign-up form and name card on the table
- Placing refreshments (drinks , chocolate bar)

2.0 Opening Session

- Welcome and good morning to everyone. I wish to thank you for sparing some of your valuable time to take part in this session.

- Asking participants to fill sign-up form
- Writing names of participant on the cards and placing cards on the table
- Invite participants for refreshments

- Ice breaking – *'Talk about the nice weather' or 'cultural issues' – 'shaking hands' – 'bowing head'*

- First of all, I would like to give a brief description about our session today.

- The discussion is going to be based on your uniquely 'dual experiences' and the main purpose of this session is to discuss on,
    - **The differences of the student peer culture between the architecture and engineering, particularly in the studio and laboratory environment.**

  These will also include,
    - **Interactions among the peers**
    - **Learning activities**
    - **Interests and values**
    - **Cultural benefits in learning and peer sharing**

- And before we begin, let me make few requests of you.

  First, please, do speak up and let's try to have just one person speak at a time. I will play like a traffic controller and try to assure that everyone gets a turn. Don't worry what others may think. We are here to exchange opinions and have fun while we do it.

- This session will be tape recorded for reference and further analysis. And, I would like to ensure you that all information given and discuss is strictly confidential. However, if anyone is uncomfortable with being recorded, please say so and you are allowed not to participate.

  Is there anyone.....? Thank you, I really appreciate it.

- Why don't we begin by introducing ourselves? *My name is Ismail.....*

3.0 Questions and Discussion Session

	Questions	Intentions
1	Since you have experience both the learning environment in the architectural studio and the engineering lab. So, if the studio is described like a bazaar, club or gallery. How would you describe the engineering lab? Probes: • What is helpful and unhelpful about each of these, the lab and the studio? • What kind of changes for each to be a better place for learning?	Gathering general insights from the experience of students on the different qualities and roles between the lab and studio environment toward their learning experience.
2.	Now, let's get into the differences of peer activities between the two environments. In the studio, the design students are being quite playful and sometimes you can find them jumping on the table. Do you find students behave the same unusual way in the lab? Probes: • What are the differences in peer behaviour between the studio and the lab? • Do they differ in the way they interact among themselves? What are the differences? Eg. Groupings...moving in small herd.... • Why there are such differences? • How such behaviours benefit the way of learning, in the studio and also in the lab? • What about the sharing benefits among the peer?	To look for the possible differences in behavior between non-designers and designers To compare the meaning and purposes of behaviours to the learning and peer sharing between the two culture *Cues: 'multiple affordances'* *'debating and challenging ideas'* *'long hours'*
3.	Do you find you talk differently about architecture in the studio as comparison to when you talk about engineering in the lab? Probes: • What are the aspects of this language that are different? Is it the particular words, concepts, references?- architects? • What it is and its importance to the peers in each environment?	To look for the possible differences in communication behaviour between non-designers and designers To explore the meaning and purposes of such communication behaviours if they are beneficial to their group and learning *Cues: 'photoshop rash', 'CAD Monkeys'*
4.	Drawings and models are the 'heart and soul' of learning in the studio. So what are the 'heart and soul' of learning in the engineering lab? Probes: • What kind of materials or references that are commonly in the lab work? • How helpful are those materials or references? • Do you make models and drawing in the lab for learning purposes? What are the main purposes?	To explore the differences in materials and methods for learning To investigate the differences in interest about the process and product as part of their learning *Cues: 'architects for model of reference'* *'lack of perfect model for solution'*

5.	'Success could be rather seen as either luck or talent' What do you think? Probes: • What are the characteristics of a successful studio work? • What are the characteristics of a successful lab work? • Which of these works, you feel more certain and less confused while working? Why? • What are the differences in the kinds of knowledge, values and skills those are important in each type of work?	To explore the differences in values which are important among the peers in each field *Cues: 'courage due to uncertainties' 'openness', 'practicality'* *'fortunes favour the braves'*
6.	Do you learn better as a group in the studio or in the lab? Why? Probes: • What are the differences working peers between the lab and the studio? Are they about references, values or principles? • How do you feel about personalization and solidarity while working among peers?	Examine the level of cohesion Investigating the differences about working in a group between the two environments. Work in collaboration. *Cues: 'tendency to group because everyone experience uncertainties'*
7.	In general, how would you describe your relationship with your peers between the studio and the lab? Probes: • What are the strengths and weaknesses between these two? • How do you response/adjust to these differences? • How does it benefit you? • Which of these peer cultures has a stronger 'pulling factor' on you?	Overall perspective about the differences in peer relationship between the studio and the lab.

4.0 Closing of session

- Summarisation of the discussion***
- Asking participants for additional ideas and thoughts to improve future session***
  'Is there any area of common differences between the two cultures that we have not cover?'

- Giving souvenir and incentive
- Offering full script of discussion if requested and available
- Wishing all participants good luck on their design projects and exams.
- And have a great summer holidays
- See them again in Autumn

APPENDIX B

Transcripts of interview

Pseudoname for Interviewee: Sam (S), Year 1, Male
Name of Interviewer: Ismail (I)
Date of Interview: 27th May 2005
Time: 10.15am – 11.10am
Location: Meeting Room, 15th floor, Arts Tower

I: I am just wondering, do you have so called 'signature' architects that you favour in your design?

S: I am not very sure, if it comes through in may particular work yet, but I can tell you who is my favourite architect is, if that helps. I, think, Calatrava would be, because I think you will agree with me, his work is quite engineering and architectural, so that's obvious. I have a book of his work, actually, I like that a lot. Emm...

I: Any specific building that you ...really enjoy looking at it or studying it?

S: Of his? (Calatrava)

I: Yes, of his. (Calatrava)

S: I, think, all of his works are quite similar in a way. So, I don't think, it's right to pick to pick up a particular building. To be honest, I can't think of any, at the top of my head at the moment. Emm ... any particular building really, I just like to be around all buildings in general ... yeah. I think, my favourite building I've been most recently, it's not necessarily good, is probably the Swiss Re Building in London. That's probably, say, the most high profile building I've been recently. It's just interesting to be there, because it's obviously, it was designed by Foster.

I: Alright ... so, in a way you also favour Foster's work?

S: Emm ... No(short laugh). I am not a particular fan. I think some of his buildings are much better than others. I think he quite tried hard to be ... emm ... like imitative all the time. It always been imitative in the past, but I think, 'some'(Foster's Building) because of that, it doesn't work to be honest. Although, I admire him for like trying his best all this kind of thing and some of them do work. So, I think that's fine.

I: Alright ... A British comedian named Stephen Fry. You know him, right ...He made quite a delightful remark about architect as a profession. He said that, 'Architecture offers quite extraordinary opportunity to serve the community, refresh the environment and to advance mankind, however so, the successful architect needs training to overcome any pitfall, however, and start earning some serious money. What do you think about that?

S: Well ... ah ... probably I am training to be architect for two reasons. One of the main one is to because I love buildings and I want to design. Second thing, is because you get paid. Emm ... but it is the second thing, I think ... eh ... can I see (the quotes)? Have you got the quotes?

I: There, just the quotes (Showing S the quotes).

S: I, totally agree with the first bit that offers extraordinary opportunity, to serve the community ... refresh the environment, that's obviously very important and to advance mankind, that's obviously quite important as well. And, obviously it's very true about the training as well.

I: (Laugh) amused by the expression when S response on the training aspect.

S: Obviously, the main RIBA degree in this country is 7 years long but, because I did the M Eng that will be 8 years, if I choose to do the diploma after that. So, obviously, it's serious training, but then, it implying for me an 8 years degree to four year degree, perhaps, before you earn serious money and you have to ask yourself even then, it is really, actually serious money. I supposed, because you know, I went on a working experience placement once.

I: Oh... really //
S: With an architect and he was a very good bloke. And, I got a chatting with him about a lot of different things. And, obviously at that time, I was a bit younger than I was now. I asked him, well ... I wanted an answer, 'How much do you get paid?' basically, because I wanted to know. And he said, ' Well to be honest (S)....an architect gets pay a little more than a bricklayer', he said.

I: (Laugh) amused with the remarks.

S: Aah ... obviously that's not quite true because maybe some bricklayer get paid more than that (architect). But, I understand that we've talked about Foster just now. I think, Foster pay himself about 6 million pounds last year.

I: Wow. (Impressed by the amount of money)

S: So, obviously, from what I've known, 25 thousand pounds what a 35 year old architect might be on to what Foster on. There are obviously huge different in there. I don't really know how much more training can Foster has there, to be an architect. Perhaps, it's a bit of luck and perhaps, it's the people he works with and those kind of things. And you have to ask yourself... ah... some architects who have less training like better or worst than Foster, I supposed.

I: Okay. So, other than that, do you have any motivation that attracts you to take architectural engineering study? Like, for example, 'Is there any one in your family, something like that? Or ...

S: Ah ... No ... that is a good question. No. I am the first in my family to come in the university, first of all. But also, to take any kind of construction degree or anything like that. My father is a Bank Manager and my mum is sort of a housewife, really. She doesn't really work. My brother is going to a university very soon. He is going to the Hallam University down the road. And, he is going to a Law degree. I don't know why. He is not good in drawing. So, I'm the first person doing that. The reasons why I want to do that one. I've mentioned before, that there are two reasons. One is just that I love building, I've always done that, I'm very interested in building things.

I: Do you start love buildings since you were in early age?

S: Very early ... well. I'm sure you know what Lego is.

I: Yeah...Yeah

S: Yeah, I had that since 4 or 5. I've just played with it until 7,12, I can't remember the last time, to be honest. But, that's probably, maybe what's started me off on like actually, constructing things. I do need engineering aspect of this degree because when I was studying for GCSE, A level exams, I was better at Math and Sciences. I refer to it as academic, as supposed to creativity. Although, but I probably, enjoy more the creative side which is why I maintained both. And hence, I am doing this degree which perhaps has both sides of those things. And, hopefully, I achieve it very well. And, I think, I am doing okay at the moment.

I: Alright. Great ...okay. Now, we move on to our main question about the studio. You've been in the studio, and it seems like, studio sometimes, you can think it as a strange world, you know. You can call it's either like a jungle or it's like a zoo, for example. You can see a lot of species.

S: I can see a lot of those//

I: Yeah, right, you know. You can see a lot of maybe different clones of species. What do you know about that?

S: I totally agree. Emm ... you said that's a lot different kind of species, that's quite interesting.

I: Right, maybe you can find that there are certain crowds like, the chameleon, the panthers or the bats or something like that.

S: Oh, by doing that you are associating an animal with the type of human personality. Aren't you? So, I'm not sure what kind of animal I would be. That's very interesting. I would think about it later, perhaps.

I: What about the others? Do you notice on the on the spot, you know, this particular group of friends, probably, they are like chameleons, they like changing places, trading places, trading areas. Do you see these people in the studio?

S: Yes. You say yourself that people who like to move around and there are people who do that more obviously than others or people who like or, maybe only move once or maybe not move at all through the whole past months while we were up there. I think, it easiest to spot that kind of or, in order to notice when people move, actually, you have to notice people what they work for. So, it is easier to notice at this kind of thing at the beginning of the year. An obviously also, it's easier to ... first year impression, I think, you can tell ... so much about a person when they first talk to you. I think, I would say, that would be your first impression develop and the more you that person. But obviously, if I'm sure, there are some people, obviously, there are over 100 people in that room. I can't possibly know all of them. I know, I say, well over half of the people names, but, like the other half, I don't know, obviously. Some of those people, I only see next in the first week or maybe, two weeks of the year. And, I only have the first impression, so that kind of analogy of animal kind of behaviour, I was stuck because I don't know them any better.

I: Alright. Any particular instances, where you can find that there are certain groups that speak together very closely, they are very noticeable, you know, if you see one of them, you probably see another group of them join together.

S: Yeah. Let me tell you, first of all, there are two projects we did before Christmas which required us to work as a group. In fact, a couple of projects after that as well, required us to work certain of project in groups, as well. So, a lot of group exist in the studio are together from before where they worked before. Apart from that, there is also a sport group like it is a very good football team which would be the main one. Then there are, the group of people who live in the hall residence from outside the group of people. The ones, a kind of the group of people that are manufactured in downstairs.. isn't it I supposed, are the ones who personality are similar. And, I think it hinges very much so on how outgoing you are or, let me rephrase, on how loud you can assert yourself, perhaps, because there is one guy. Emm ... he was going to be the 'course rep' for the year, beginning of last year. He did put himself for an election for that role. Because he is very ... and quite ... noticeable, you know. He put his hair and those kinds of things; one way...is to clothes and all of those. And, he is generally quite loud and likes to be noticed. As a result, I think, he kind of attracts other people who like to do similar things. But at the same time, the other kind of group, I supposed, that isn't as noticeable, they are quiet people. Just because, they don't shout around the studio, it doesn't mean that they don't have their own group, it's quite opposite actually. They have a very strong group and they work very well together and that kind of thing.

I: Oh...so it's quite noticeable in your studio that there are certain groups. They are quite strong.

S: Yes, I think so. Yeah. I, personally tend to work, unless obviously, the thing we're doing is very integral in group work. I quite like obviously, we have to produce our own work. I like to work on my own, but I work very often in the studio for like, I supposed, main reason that we were encourage to do so is because other people are there. Other people are working and producing thing. We were told that we should work in the studio because that's the case. And, I've found that's the case, I think, it's true.

I: Do you find that there are also other groups that might not interested working in the studio?

S: I think, some groups prefer not to perhaps, because maybe, they already have a good drawing board, a large space to work in at home. And maybe, they have their friends around or whatever. And certainly, if that could be, they have their own mini studio, I supposed, or small studio, wherever they may be. I'm sure, you know, the hall residence is about a mile down there. So, if you are or if for whatever reason you have your 1:20 model, you don't want to bring it in. I don't know perhaps, that's the reason, perhaps not maybe it is a poor excuse but it's possible, I supposed

I: But, general speaking, many of them would spend more time in the studio ... working in the studio.
S: Yes, I think so.

I: Alright, so if, you notice, you know, let's say between you and your friend or maybe other group in the studio. Normally, do you talk about design a lot or there are sometime where you talk about other things than design?

S: Yeah, we do talk about design, obviously. Emm...but probably if you were to look at everything that was talked about, the percentage that was talked about on design would be quite a small percentage. Because, everything else, you know, resolve around what you're going to do tomorrow night.

I: (Little Laugh)//

S: What you're laughing at, is true. I think that much heavy (talking about design)

I: But, if you were talked about design, for example, right. What are the things that you would really like to become your priority when you want to talk?

S: Ahh...I quite often not just when the tutors were there. I quite often asked or get asked by other or my friends, 'What they think of their design?' or I asked them, 'What they think of mine?'. Emm, sort of, 'What do you think?' or some people might asked me, it has happened once or twice but not very often, asked a simple question, 'What do you think from an engineer point of view, will it stand up?'

I: Structurally?

S: Yes, exactly, structurally. Or, 'If I showed this to an engineer, what do you think? Yeah right, or ...(wrong).

I: Any particular concept of ideas that from time to time, for example, 'Oh, your building looks say, Post Modern or your building looks very sculptural'. Or, any articulate ideas or concepts that you, every once in a while, exchange with your friends about design?.

S: I, actually, it's funny that you mentioned Post Modern there because I'm very interested in what I called Post Modern. I don't really understand what it is very much. And, I think it's Michael Grave isn't it. I am very interested in his work. And, I think he should do more because I think it is very exciting, 'simpler', maybe kind of quite bad in many ways. And, I think as far as sculptural goes in is quite 'eccentric... I think, it's fantastic and it's great. And, so far in what I produced I haven't been able to implement anything of what I would call Post Modern. But, as far as any style would go ...I don't really know. I think, at this stage because we're only in first year. If you ask me the same question in the few years time, I'll be much more, it will much easier for me to tell you exactly, if any, would be implemented.

I: Probably, we're going to have another session next semester, you'll never know.

S: Maybe, I'll have even better ideas, as well and I'll be sure to tell you.

I: Now, we move to about how people look into the studio, right. From time to time, probably you know, you might notice or you might know that people outside the department of architecture seems to find it difficult to understand what is studio? So, if you were to tell your friend, say, from the computer department, for example. How would you tell them? How do you explain? How do you describe?

S: Emm...(thinking)

I: What kind of places is the studio for the architectural students if you were to tell your friends from various departments or even somebody who like to know about the studio?

S: Well of course, I have my housemates I live with. One does politic and one does geography, one does math and that sort of thing. My housemates do those degrees and obviously, don't have studio at all. So, when I tell them that I am going to the studio, they understand that to be that I'm going up there to produce some models or draw some buildings or anything might be. But, I think, they understand that it to be that I'm not going there and someone telling me to draw this line here or to cut this out and stick it on here whatever that is. I think, they know that is very, kind of informal, almost socialize, I supposed.

I: Oh, really.

S: And, I think they understand that what it is (studio). If I were to tell them exactly what was which the question is.

I: Can you give a particular description whether it looks like a bazaar or something like that, or is it look like an art gallery, you know.//

S: I'll tell them that it was a very busy place.

I: Is it like a club, or social club.//

S: Emm ... I think a club is quite a good way because obviously, I see everybody belong to this club and they belong to the 1st year architects. I think, bazaar is quite a good one, as well. It's obviously maybe dysfunctional in some way as well. But, because there is so many different types of people in there, it is also very international, obviously enough. So, if everybody were to speak their native tongue, you might have output of 20 different languages going on there. Obviously, you're going to have English and so many other things, as well. There are quite a couple of European ones, quite a lot of Far East, I think, and other Asian ones. I think, the international thing is very, very interesting because it gives you the... They have the potentials there, if you tap that and other different bits of international culture coming through. But obviously, there is a little bit of that and you have to know who is.

I: Do you think it is helpful in your design?

S: Yes.

I: I mean, such scenario, atmosphere that relate ...let say if you take this quality of studio, do you think you can design better?

S: Design better?

I: I mean, can you design better without such atmosphere?

S: I think just having that there are people there, whether you use into the full potential, perhaps, that doesn't sound very good, was it. But, you know what I meant. Just knowing, there are these people from potentially very interesting of their culture there. It is quite exciting really, and should you need to design a building which might have any influence or whatsoever from this other thing. It might spur you to investigate theirs. And ask these people the questions, I supposed, which obviously, if these people weren't there, you couldn't do that. So you have to go to the library, I guess. I think talking to a live person rather talking

to dead book is obviously quite valuable isn't it. I have to say, I haven't do that yet. But, as the situation arises, I have to do that.

I: I find it's very interesting. Do you find, as a 1st year when you first experience this studio, do you find it shocks you, something that 'wows' you?

S: For me not really because I think, I understood reasonably well what to expect. I came here in the open day and I walk through the studio, obviously, I was only in there for about 20 minutes, but I understood what went on here. Obviously, at the time, I mean, I saw this model on the floor, on the table and these drawings everywhere on the walls. These people busy working around all kinds of things. I talked to myself, I could do quite well in here. And, I can see myself enjoying doing these drawings, buildings, models and all that kind of things, so you know.

I: So, if you've got the chance to change about the studio, how can you make it better?

S: This particular studio, I think, maybe it's not in the best place being on the 13th floor of the Arts Tower. I'm sure a lot of people heard about that. So, there are obviously, there are few options, I think. You can stay there or you can move somewhere else. I think, it would be very interesting, if university has some land and we start from the scratch, and see what it can come up with. But, I don't think that's going to happen, so forget about that. I think, what's the question is, if it stays on there, how can we make it better?

I: Yes. Would you mind if convert it(studio) into a club, for example. Or maybe, creating a hive or something like that, you know, for the students create their own hive. They stay there, they play there, they sleep there.

S: That's very interesting concept but not for that floor. I don't think, you find any student sleeping in the studio. Although, you know, before hand in people will work through the night down there. So, I believe in the 2nd year studio, in the well upstairs. There are like sofas everywhere, I think it would be very interesting, if we have an area designated to recreation to a certain extent, where, we have our own vending machine or something. Or, to be honest, I quite like a mini bar. I would, I know that it can't happen.

I: Okay, now about design work. So, do you think success in the design studio is either the matter of luck or is it a matter of talent or skill? What do you think?

S: Emm ... I think luck plays a part in everything but, you can't if you have bad luck. And, I think, it's up to you to give yourself a bit of good luck. And, if you have good luck, well that's just good luck. I think that if you are talented at the same time, I think that's fantastic. I am not talented in this life ...unfortunately. Well, we'll leave that for now. Emm...I think, skill is the key because you can be taught skill and you develop your own skill. So, I think that's the key from what you've said there.

I: What type of skills that you personally, you think that you very much wanted to have or wanted to polish? those skills, for you to become a better designer. Probably, you need a very good skill as computer animator, for example.

S: It's funny, you say that. I have very little opportunity to the workshop and those kinds of things at the moment. And, next year, I would need to very, very much. Emm, because at the moment, I just can't do it. There are various sorts of things, like model making is not as good as my drawing. I think drawing is the key for me at the moment. I like to be able to improve the quality of my model very, very much at the moment. I need to improve but I think, yeah, my software ability at the moment is very weak. I like to improve that quite a lot. I think as far as the studio goes, obviously, we have to actually, leave the studio to go to a computer room at the moment. But, there are some computers, down there. But, it is better the other ones on this floor(15th floor), I think, I supposed you do that.

I: Any special talent that somebody needs to have for example, talent for you to have. Like a good public speaking, for example, to express your ideas.

S: Ah, that's very interesting. I used to have ... I used not to like that at all (rephrasing), talking to large group of people. But, I don't mind to take it on. I kind of, it's sort of question whether you have to do it, so you just do it. But, also you know ... I try and enjoy it as well. So, I don't have really a problem with that. I was going to mention quickly, actually, that I think the whole thing about time management and that kind of thing. That is just a skill that you just have to have. So, I thought, I mention that quickly. You know, those basic kinds of skill that everyone can have. It's even more important for architect to have and architect-engineer. You definitely need to have time management skill, for that.

I: Any personal value that you think once you have ...

S: Ah ...hardworking, definitely. If you can imagine what an architect does, ah, if you have any idea about how much an architect and engineer has to do, there is awful a lot there. And bear in mind, obviously, I want to do this degree, I want to get it. And obviously, I was going to do this work to get it, so I am going to do that (feeling quite emotional, lost in words).... I forgot what was your question was? What was it?
I: The values that...what you have said like hardworking and then probably, values say about sustainable, for example.

S: I am very concern about it. I think it's incredibly important. And, I am glad we are being taught to make aware of the issues, and how we can do something better about this thing. Emm...I think this is a general quality of an architect. It's to be aware of all this issue, in away, if that's make sense.

I: Okay, now let's go back, you know, you did mention about Calatrava as your signature architect. So, in a way you may notice that their buildings, you can say, that there are certain coherent set of ideas and values between their works. So, what do you think about that? Do you think that's a good idea about having that sets of general ideas?

S: Yeah, you can look at a building and you can, if it's Calatrava, It's almost obvious, using the concrete and the way it does. And it's quite skeletal and that kind of thing. Emm...and his bridges as well and that's obviously very engineering. It gives very high aesthetic qualities. I quite like to develop my own kind of visual style. And, I don't think Foster has one of those, really. Although the thing that gives it away, if it's Foster building it kind of, if it's big and if it's in England. If it's big, English famous building. It's reasonably high chances, it's to be designed by Foster, I think. But, that's kind of vague statement, but I hope you agree. I'm not really(felt uneasy)....Obviously, I am in my first year design studio yeah, I haven't really have the opportunity to designing a large scale building as yet, semi-professionally. So, I really don't know what I would come across. But, I mentioned that this Post Modern thing interests me very, very much and the visual style that goes along with that. And the visual style that goes along with what I know as Post Modernism, it interests me very much.

I: Yeah, if you say, if you put yourself, you probably...it's very important for you as an architect to have certain coherent ideas or principle in your design, to make your more prominent, more secure about your well being as an architect.

S: I think, if you look at the cross section of famous architect, today, vast majority of them have got a visual style which you can recognized and you can say,oh...that's Calatrava building, or that's what his name, Gehry is it. You know him(Gehry) with his aluminum is it, or glass building and you can instantly, that's one of his and I think that's great. If you have this visual style, you're more likely to gain prominence side and to get paid for it, I supposed.

I: Do you think that will really help you in your design process by having such guiding principles?

S: Not necessarily, because you're in danger of being confined there. But, if it is a well thought as principles and it's work before and obviously you can come across a problem and you can ballot the set of ideas, for guide.

I: Most probably for some people might use that ideas...you know...as inspiration to them.

S: Yes, that's right. I am certainly gaining almost all of my ideas and what I want to develop into the architect I would to be. Almost all of them, obviously, gain from the building I've seen somewhere, which has been designed by somebody else at some point.

I: In the studio, right, I meant if you notice even if you looked at the signature architect. If you were to look at Foster, Calatrava or even in the past Corbu, Van der Rohn. You will notice that these people(architects) or we look at ourselves(architectural students) we tend to dress like architect. What do you think?

S: Well, I can't remember the last time, I wear a suit of professional architects these days. Working in an office, wear office wear and the studio down there is not an office, I supposed, it's much more a casual club and it seems awkward to impose that everybody had to wear had to wear suit all day. I am very what kind of response, and I think you get quite a few laughs, to be honest. Emm...no, I don't think we dress up like that.

I: But, let's say in the studio, right, that the studio is just like a Karaoke lounge, for example. When you are singing, you're trying to be individual, but at the same time, you are also imitating the one in the screen(TV). So do you find that in the design studio?...in design situation. Do you find that among your colleagues or your peers, where you want to be different, but yet, there are certain similar aspects.

S: Yeah, I don't think you can get away from that. I think, at this stage because I think, half of the first year down here, have know like me that they want to be an architect. But, the other half they think, oh, I'll do architecture degree (referring to level of determination). So, what the one half, obviously probably, know quite a few architects and maybe like most than others or doesn't like most than others, and all these. And the other half, doesn't know any architect, and they have to learn about that. I think that the first half, obviously, might be what's you suggesting if at all. And the other half obviously, can't because they don't know any architect.

I: What happen to the other half? Do they tend to follow the other half, in terms of design, in away?

S: That's obviously, certainly influence by them and gain inspiration from them. But, I think that in a quite very interesting situation because they can develop a much more individual style quicker, I think, perhaps.

I: Alright. You mean the other half?

S: The other half that don't know any architects. Yes, I think so.

I: Oh, I see.//

S: If they're interested in buildings but they are unaware of a particular architect, style or you know or any style at all. But, they don't know what it is. They have to...they are to be forced to design building, so obviously, if they are going to develop their own set of principles here, but they don't know what it relates to, so, they're going to develop their own individually.

I: So, do you think that you feel comfortable if you were in that situation where you know, at times, you find that you want to be different but at the same time, there are certain things that you find similar to the others, in term of design.

S: Emm...well, there are certainly (finite?) numbers of things you can do with the buildings, I think. And obviously, as far as detail goes, I supposed, you can get into it far great varieties of different thing that you can do. I think being individual with building is incredibly difficult. So, no matter how individual I can get, it's always going to be, I would say, very similar that has happen before. So, I don't have a problem with designing a building that is identical to one that has already being built. I don't have problem of doing it.

I: What about having similar types or design approaches with colleagues or peers? You don't mind that?

S: No, I don't think so. Emm...we've been taught...

I: But, there are limits, right, certain tolerance, not a direct copycat.//

S: We've been taught down there by a group, say, a dozen of tutors, not that many. So, we're all bound to have a similar process by the end of the first year, obviously. It has been heavily what taught to us by these people. So, I think what's the process we have at the moment is quite similar, because it's what they want us to do, as what they talked to us.

I: Do you find it any different when you talk about architecture in the studio as compare to talk about architecture with your parents at home?

S: I do talk to my parents about architecture, obviously.

I: But, I mean the use of 'lingo', the style, the language, the concept, the ideas.

S: I think, it's easier to talk to those guys downstairs because they inherently more interested in it.
I: But, when back at home, when talking to your parents, any different kind of language, you know, for example, you may think that this word or particular phrase, they(parents) might not understand, you know.

S: Mum and Dad are quite intelligent people, so it's not so much I have to dump them language. But, you're quite right I used simpler kind of terminology and jargon. They are not architects, so some words, obviously they don't know. In our technology lecture last year, you have something like passive solar design, for example, they can guess what that might be but obviously, I know what it is but they don't, so I have to explain. So, if I was talking to my friend downstairs, they obviously know what it is. So, I can just refer to that without having to explain it.

I: Let say, for example, if you were to discuss or to say something about your design, right...you might, say for example, you talked about say organic architecture in the studio, your friend might understand. Do you have to change that kind of phrases, ideas or concepts when you talk to anyone from outside the studio?

S: No. But, obviously, they don't know what that is. So, I will have to think about what it is and explain what I mean by it. Yeah...Yeah.

I: So, you use different phrases in order for them to understand as compared to those in the studio because it's easier for you to communicate the architectural language.

S: Right.

I: So, one last question. Is design something that you can do as a group?

S: Yes. Definitely ...Yes. Well we've done it. I think as soon as you start working in a group...you...well, if you worked in a pair...in a group of two, surely, you instantly have twice as many things, problem with design, to think about ...whenever to solve or to change about design. So, as soon as you start working with more people because it's likely to get more involve but you can also be excited because this sort of person, people that you're working with might give you more ideas and improve the design as well. So, yeah, I think, of course you can design in a group. I think, it's quite important to realize as soon as possible what the advantages and disadvantages are.

I: So, if you were to put a design team, for example, in your case....What are the things that you are looking for? Do you think you should have a common set of principles, common set of ideas or values or skills within a team?

S: No, not at all. I don't think that you need to have the same principles, as far as design goes because as soon as you have it, obviously working in a group, you are entitle as many.

I: Different ideas?

S: Possible. As far as talent go though and skill, you obviously want to have as wide, diverse as possible. So, I supposed, when we assigned our groups at the beginning of 1st year, Stephen Walker haven't got any idea about what our talents at that stage. So, it is potluck really. You might be in a group of people who are like just interested in architecture or you might have a group of people who are very talented in drawing but, can't make model. Now, going for 2nd year perhaps, we have the opportunity to choose our own group and because we worked with each other at a certain stage before, then you can come out with a quite strong team where you know you have wide range of skills in there. When we go to practice, obviously, should I be like a partner or whatever in a firm, you're going to give people to do specific jobs to work in a team to produce the whole thing aren't you. You're not going to employ 10 people to do emm...to make model when, nobody can't do anything on computer.

I: But, if you have a partner, for example, in your practice. Do you prefer a partner who shares your ideas, who share your principles, who share your visions about design?

S: I wouldn't be too concern. I wouldn't be that worry, he/she didn't agree with it. All I need was that they understood, respect that and obviously, at the same time I am going to respect whatever their ideas, might be. I think, it's quite important to have different principles because you never know, one day you might...and decide what you're were doing before if it's good as that, and that person might think the other way around.

I: But, is there any room for having some basic common ideas?

S: About 'process group'. Yeah.

I: If there is any room, what it is?

S: Emm, I don't know.

I: Management?

S: Anything else, I don't know, really. Obviously, I'm not in practice yet, so I can't think of anything like that.

I: So, you don't mind, if your partner, you know, have such ideas. If you are the next generation of Calatrava and you don't mind partnering with another generation of gehry, for example.

S: No, because I think, that will be very, very exciting. And if you could in someway merge those things that would...and you could have various degrees of success. You can come up with a building that is quite stunning to look at and it's absolutely appealing, as well, as far as everything goes. Or, it can have the other way round, it looks quite horrid. It certainly works fantastically well. It obviously have been done many times before.

I: Let's take that situation; it's about personalization and also solidarity, a mixture of personalization and solidarity. Can you tolerate the situation where there are two architects who are very personal about their ideas and at the same time you need solidarity in their approach to collaborate?

S: Yeah, I agree with everything that you said, really. Well, I think at the same time though...What were you're saying about (asking further clarification)?

I: Collaborate. For example, let's say you are in a group, so you are the next Calatrava and there is another guy, the next Gehry and very personal about his work. Is there any room for them to come up with solidarity? First, you are personal about your design and all the sudden you need to collaborate, where you can sit down together to find a common ground for you to decide which direction you want to go.

S: I really think that well...(thinking). I don't believe in, you know, nothing is impossible. If there means to a way and only you have to do is sit down and decide how to go about doing, I think. I am not sure. I haven't had that situation arise yet. So, I can't give you example, where there would happen. As far as my design things downstairs has gone, I think quite a lot of time, I think my ideas are quite strong and so I would impose that on somebody else. But, I started off the year doing that, but very much so, at the same time listening to other people have to say. And, listening to their ideas, that sort you have to do.

I: So, at what stage do you think that thing become a bit tension, when you are working in a group? Is it at the conceptual stage, working stage.

S: Well, if you set up a clear concept at the beginning, so there is no room for misunderstanding at a later stage. As long as you clarified everything that you want in your building, in your concept in the beginning, than you will be fine, I think at the moment.

End.

Pseudo name for Interviewee: Maya (M), Year 2, Female, International Student
Name of Interviewer: Ismail (I)
Date of Interview: 6th June 2005
Time: 10.00am – 10.45am
Location: P/Grad Room 15.5, 15th floor, Arts Tower

I: So my first question is ... you've already told me your name. So, I would like to know. Who is your favourite signature architect? For example, Foster, Calatrava.

M: I'm into ancient architect more to the Greek and Roman. But, I don't know why. I just have this fascination about ancient architect. I do, you know, like more modern architect. I think. Who (taking time to think)? I can't remember. He did some work in Berlin, Sony Centre. Helmut Jahn. I really don't have any like preference. I don't have my favourite architect, yet. It's just too early. Like, I just exploring. But, I'm into ancient architecture (Greek and Roman).

I: So, in a way when you did mention about Helmut Jahn. Helmut Jahn had been doing quite a number of works related to classical architecture.

M: Yeah. He is more into bringing the new and old together, yeah.

I: Alright. In a way that reflects some of your interests in that particular area of great architecture.

M: Yeah.

I: Okay, going back to this interest about your, you know, you are developing your architectural knowledge. Let's have a look. This is a phrase from a British comedian (showing the written quotes of Stephen Fry). He said that architecture offers quite extraordinary to serve the community, refresh the environment and to advance mankind, so, the successful architect needs training to overcome any pitfall, however, and start earning some serious money. So, this is what, a British comedian, Stephen Fry, you know, he described how he thinks about architect. What do you think about architect's career?

M: I think, like when you were in the university, you tend to go, you know. Oh, architecture is not really physical and social, you know. It's a relationship of human behaviour, not really all physical. You go to all this process, you know, you try to justify architecture but then when you really get into the real world, you can afford everything inside. It's more about money, commercial, economic and, yes that sort of things.

I: Ahh...okay and that means first, you just jump to it because of certain interests.

M: Yeah...and no. You know because like Sheffield, they tend to tell the students, oh, architecture is not just about building. It's more about social and everything. They try to, they kind of brainwash you and then, but then...

I: Yeah, incalculate values.//

M: As you go into your career, you really take it like that, I mean you to. Because it is about social and human values but then, it's more, you know, about money and career. And at the end of the day, it's going to be that. Whatever you do has to be justified. It's going to be that. So education and career are two different things, yeah.

I: So, that means like what Stephen Fry did mention about, you know, somehow or rather you have to go through training then only, you know, you can start earning some serious money.

M: Yeah, yeah.

I: Okay, related to that, when you first take architectural studies, do you have anyone that might encourage you. Or, you have any particular person or experiences that might somehow make you attracted to architecture?
M: Ahh...after my first year of A level, I did a work scheduling in a company in (Asia Country). It gives me some introduction on architecture, that's what I think. I think, it was mostly because of my A level art and classic civilization. I did classic, so I was like going to these old buildings, Roman architecture, Greek architecture. So, I think that interest me.

I: So, when you decided on taking this classical civilization? Why? You don't know?

M: No, because I was hoping to do history and then they say, oh. We offer classical civilization. And so, I say why not, just try one class and see how it goes. And then, I just went there. It was more interesting than history, it was something way back, you know. It's not history. It's more like, you know, European history. It's like ancient. So, I thought why not try something totally different. And then, I liked it.

I: So, you like it. And that, really spark your interest into architecture.

M: Yeah, I think then it's also the traveling, as well. I had like really, really good tutor like in school, you know, they were...because it was a small college. So like, I had tutor paid total attention. She exposed so many things, you know, make me travel, make me see things.

I: Alright. You did mention about your tutor making you go to certain places ...traveling. So, what are the places?

M: We went to Italy, we went to Rom, Venice, Florence, Spain, Malaga, Cordoba. And, after that, I did my own. I went to Berlin, Munich, Switzerland.

I: So, when you first decided to take architecture in Sheffield, of course you did mention about your intention to your parents or someone related to you. So, how do they response?

M: They want me to be a doctor (laugh). Yeah. I did not have support from my family. But, I wanted to do it. So, I did it.

I: So, now going back to the design studio. I realized that your previous experiences, especially, at A level. You are interested in the Classical and very excited about it, very good. Now, let's say, our design studio is like a zoo or you can call it, it's like an animal kingdom. Of course you can find friends in the studio behave like certain species. Okay, what kind of species you might find in your studio?

M: People tend to go a bit wild. It's fun. I think, it helps to release the stress because you know...I see the difference between working at home and working at the studio. Of course, working at home you have no distraction. But then, when you get to the level of stress, you want people, you know, to throw things over the air, paint the wall, glue stick bottle with something on the wall. So, I think, in a way it helps the studio work. I mean, you just never know what inspiration you can get from those kind of things.

I: With this wild environment, can you see a group of people behaving in certain personality, you know, maybe you can find certain group that...peers or group that like to talk, they like to show off. Or, there are certain groups like they are very fierceful, like you can call them tigers. Or, certain groups like to jump from one area to another area, like chameleons. Can you that?

M: Yeah. I think during the first year, I got most of my studio experiences. People ten after a while, they tend to group themselves. They tend to put certain tables together and said this is ours, we stayed here. So, you've got those varieties. These people were hard working and those people who just go there and bring their laptop and watch DVD. Yeah, you know, you get that different variety. They're like that.

I: So, what about you? Do you consider yourself in any particular group?

M: Emm...I tend to jump around groups because like when I want to, you know, want noisy group, I tend to go to one group. And then, when I want to work quietly, I tend to go to one group. Sometimes, I just try to put table a side and work alone. That was what happened last year. This year (2nd year), I worked at home. I didn't work in the studio which I think maybe that was why I was a bit stressed out. Because you know, at home, you're just alone.

I: Is that an experiment or it is because of a certain reason?

M: I think, because now we are working with computers. So, I have my own computers at home. I have a lap top but, my lap top is really slow. And, we have the computer room, but it's not really, you know...so you want to work where you can do your modeling. You can move to the computer, like that. I mean the studio was not efficient.

I: So, going back to, you know, you did mention about group of people. So, normally, just think about any particular group that you think quite prominent to you, what are the things they like to discuss among them?

M: What they like to discuss? It varies.

I: Very wide.//

M: Yes, I mean, sometimes when they do work, it's not really work related, I mean because most of these groups, now they tend to live together. They are friends, they are not just friends in the studio, they are also outside together, as well. So, you know, they talked about more other things and not just work related.

I: Let's say, if they talked about other things, what are other things they might talked about?

M: Gossiping about their other housemates, you know, talking about homes. It's not really about work. They don't really talk about work (design work). They don't talk unless, you know, they've come to a problem in what they are doing, then they asked and then they discussed. But, you don't see them talking about architecture or the theory of architecture or architects or whatever it is.

I: So, you did mention about problem (design), if that's the case, what are the things that they discussed when they came up to a problem, if you are stuck in design, for example?

M: Then, they tend to like, you know, give suggestion and everything. And you know, like most of them usually, like say, one person had this problem with structure and one person will say, oh, you should look at this guy, he did similar thing. So, it is usually like that. When one person has a problem, the other one asked to refer to one architect. It's always like that.

I: Can you name the architect that you think, says for example in your case?

M: I think, I did...I was doing a glass roof structure and I had some problems. And, one of my friends asked me to look at...(trying to think the name of the architect), do you know the theater in London. I can't remember the name of the architect. Yeah, she asked me to look at his work.

I: So, does that helps you, actually?

M: Yeah, it does. Even the tutors do that. I mean the studio tutors, yeah. When we have problem, they don't tell us how to do it. They asked us to look at other's work.

I: So, now about the studio again. We think studio is something that you can experience a lot of things. We did mention that the studio is like a zoo or animal kingdom. And, sometime people outside the architecture department find it hard to understand what is studio is about. So, for example, say if you were to describe a design studio to a friend or somebody else, how would you describe design studio?

M: Oh..(feeling a bit reluctant). It's just where we work really, you know, we have like huge, long table and we all work there. Everything is looked all mess. Once you stayed there, you tend to stay for along time for one hour or two and stick there.

I: Let's put it in this way. We try to make it into an analogy. What is a studio looks like? What is a studio like? Is it like a bazaar? Is it like a social club? Or is it like a monastery? Or is it like a gallery, museum?

M: It will be a gallery.

I: Or a bee hive?

M: No...no...not a bee hives. I think, it's more like a bazaar, social club and also sometimes gallery. People tend to, you know, when they have their own space, they tend to paint the wall on that spacing oh, this is ours. But, I think, it's where you go to studio, you don't expect a quite, clean environment. You will expect there will loud music definitely and people jumping on the table and yeah...

I: Okay, that was when the tutors aren't around?

M: With the tutors around. They don't mind. I think, they prefer it like that. It is too stressful, if you work in that, you know, quite space...yeah.

I: Okay, that means the tutors can go along with that kind of situation.

M: Yeah, yeah.

I: Say, if you were given a chance to make your studio better. What would you like it to be?

M: Bigger (laugh). Bigger, our studio is so small. That's why, I was working at home because we don't have enough space. Like I think, one person share one share two desks, it's like impossible, you know. And then, you don't have like computer, like computer that really works. Because the computer in the studio, is the old computer and it's so slow. So, it's nice to have a big desk and computer next to it, so you can transfer thing, instead of going down the 15th floor.

I: But, you don't mind about the atmosphere?

M: No, I think, it's better.

I: That's the kind of atmosphere that keeps you running, right.

M: Yeah.

I: But, you do mind about the space (size).

M: Yeah. I think the quietness after awhile, it doesn't matter because you're not really reading. You're actually doing work, so it doesn't matter, but it's the space (referring to the small size of working space).

I: Okay, let's put it in this way. Studio is a studio and a lecture room is a lecture room. In term of developing yourself and architectural knowledge, which do you think has a greater value?

M: The studio (short laugh but confident)

I: Being with others is also very important?//

M: Yes, it's very important. It really helps because you want to do architecture, you tend to be like, you know, put these some division wall between you and other people who are not doing architecture. I mean, you do mix, but that's the division wall. I think like the lecture theater is a...it's too theoretical like when you want to start doing design work, you use that other side of your brain and you can't really absorb that kind of wording. It's more like those lecture, they do it in the studio and they have like physical thing and when you talked about window, it's just something they bring there, show us parts and that kind of thing. I think the studio class is more important.

I: Very good...because now we realized that in the studio, there is a lot to offer. It's not just about learning the theory, it's about the experience.

M: Yeah, it's important. I think, it's (studio) more closely related to what you're going to do in your career. Lecture theater has like...nothing...not really much.

I: Okay, between studio and lecture, right. How much you spend, I mean, in term of percentage of time?

M: I think about the same. Probably, slightly more in the studio, say 60/40, yeah. According to the time table, it is about 60/40, but we tend to do extra time in the studio. If we were to see the total, it's about, you know, 80/20.

I: So, there is a big number of percentage (studio).

M: Yeah, Yeah.

I: Okay, in the studio, this is about our performance, I mean, how we perform in the our design. Success in the design studio, could be rather seen as to be either luck or talent. What do you think?

M: Ugh...that's a hard one. Talent, I think but, sometime because they kind of related. Sometimes, it's talent but you don't see it, you said it's luck. But, I think it's talent...yeah talent and you're hardworking. I'm not sure about luck.

I: Okay, what are the things that you might think, you know, important talent or important skill that either you or you see at others that you think might be very beneficial?

M: Emm...I think it's like, you know, it's your determination. You know, because like I'm not born to be an architect or designer. I know my talent is not there. But, I wanted to do it. So, I think it's determination. Because I see some people who don't really like, you know work so much but when they come up with final project, they come up with great thing, so that's talent. But, I think there are some people who when they started, they know nothing. But now, you know, they've gone so far. So, it is determination.

I: Okay, let's say, you know, you were given the chance, what kind of talents or skills that you want to develop?

M: For me, drawing skill, computer skill, everything really. Yeah.

I: So, in developing your skill, do you have any help from your friends or do you learn on your own?
M: Learn on my own (feeling quite sad). Yeah. The tutors do give feedback but, not really. Some of them are good, some of them are like, ugh...they just criticized you, that's it. But, I do get the working experience back home, like every summer I work, so that helps my computer skill.

I: So, okay, now going back to your experiences working in a professional office, right...architect's office. Is that when you were in A level or before you ...?

M: A level and last year. I've been working two, three summers . I'll be coming back.

I: So, you...about this office, right. Is it here in UK or it is in....?

M: In K.L.

I: So, you will be going back?

M: I'm going to try that office for like couple of weeks, but then I'm going to try another office. Because I've been with that office for like 3 times, already. I might as well try another.

I: So, you want to try, to get different exposure. Very good.

I: Okay, about certain values, right. Earlier, you did mention that you value a certain, or your interest in Greek or Classical architecture. Is there any other values, you might think are also important as part of your design? I mean certain values.

M: Emm...yes. Social values, because I think what's great about the Greek architecture and Roman is it's the implement of their social, discipline, their law and everything in their architecture. But, it's not just something you see, oh wow...this is beautiful. It's not something that functions, it's beyond that. So, I think that's make architecture beautiful.

I: Okay, that means it's not just...what?

M: It's not function and form in the building.

I: It's not the physical, the so called the surface matter. It's more on the underlying matter.

M: Yeah.//

I: Alright, now let's go back to the work of the signature architects, for example, like you did mention about Helmut Jahn or perhaps some people might like Foster. And if you notice, if you look at their works that there are set of coherent ideas and principles in their design, you know for example, Helmut Jahn, I'm sure, you did mention about there are certain orders, or something like that. Do you think that's good way and very helpful in your design?

M: Emm...Probably, later in the career, you expect it. But, at this stage, no because they tend to pull you back, you know, you don't experience things, you've just other things.

I: So, at this moment, it's better for you to widen your...to explore everything.

M: Yeah, yeah to explore because you don't really know what you want, you know. It's too early in this stage.

I: If you were given, through time this set of ideas and principles, do you think you have reach to a point that you have develop a certain principles or ideas that you want to hold on it?

M: It's hard to say because....well, I haven't been in the position so I can't say. But, it tends to change with the world, economic and politic and so...I mean even like Corbusier and he did have these of a certain principles, but at the end of his career, he did shift a bit. So, it depends on how people react to your work, so I supposed maybe you have that big principles, but then you can shift a bit here and there.

I: But, still the principle will guide along the way in your design to establish your position.
M: Yeah, yeah, I supposed.

I: In a way, at this moment, at this stage, do you think it's helpful to have such ideas, principles or do you think that might be helpful in the end, I mean, when you're are beginning to be an architect. Now, it's better for you to explore.

M: But, I mean not like...I mean...you do have like certain kind of principles but to put other thing aside...I mean maybe...have a few guided principles not just one. And yeah, maybe that's help.

I: So, at this moment you are just trying out.

M: Yeah, trying and I mean have a few that I'm interested in what I do in my work.

I: Can you tell me?

M: I always try to but I don't know whether it is good because I don't know whether my tutor likes it. But, I like to try, like when I design something, I don't just buil something new, but peel back the history and try to put back and that's something I always do. Because nowadays, you don't have enough land so you tend to regenerate building rather than build it (new building). So, I mean that will help, you know. That's something I do and try to look now. Yeah, I have certain principles...

I: Great....the buildings and regeneration.

M: Yeah.

I: Do you think, it helps you in your design process, from time to time?

M: Ah, it does in certain projects, but not in all. When you have that guided principles and because you are like committed to these kinds of studio work, it's not like something that you choose this project. You know, the certain projects and time frame, so you can't put that principles in every project. So, that's why I think you must have a wide range of principles, yeah.

I: Okay, great. Okay, now it's about work among peers, design work among peers. So, now we go back to the area about analogy, about studio. So, let's assume studio is like a karaoke lounge where, you know, when you sing you try to sing differently but at the same time you are imitating the person in the TV screen, for example. Can you find that, this design situation in your studio?

M: Imitation?

I: Ahh...It's more like similar yet different among your peers in your design studio.

M: Yeah, you do get that, because it's those unconscious things. Sometimes when you look at other people, you say, wow...But then, it will be something totally different, but when you looked back at it after several months, you can see that there are similar principles or one aspect of it is similar. You tend to get like...emm..you know, when you're working together, you do get influence, yeah, by each other.

I: Can you give one example of certain project that you remember that might share similarities or maybe that you remember that you can see both situation, similar yet different?

M: Can't remember mine...But, I can give an example of my art project in school (A level?), because one girl did...she did like artist did it. It's like weird object, she put different objects together, shoes, flowers, cups and everything. She painted them, so she did a picture of shoes and the Al Khazaf...what it is (can't remember)...the one in Cordoba...I can't remember...the name. Yeah, she put them together and created an art piece. So, when I was doing my art piece, I did a traveling journey using shoes as well. It was two different concepts, two different ideas, but the principles of shoes...I didn't even think about it until couple of months ago and I thought...ehh..that's a shoe. So, it does happen in the studio...yeah.

I: So, most likely, there might be similarities in values, but there are also might be similarities in certain principles?

M: Yeah, and sometimes even form, I mean not just values, form or inspiration even. I mean, even two different things but with the same inspirations.

I: So, that means, from time to time, you might get this situation where, you know, you can realize that the other person who might have some similarities with you, but at the same time there are certain differences. But, it's not something that like you have a total different from the others. There must be certain overlapping.

M: Just like our previous project, we did this thing. It was a hillside, 9m different. So, what we did, most of us did for that project like to build underground, to create almost a flat surface on top. But the way...that's principle, but we took it differently, like I did it, the top part would be the public walk, public park and the down part would be the spa. Other people did it differently.

I: Ahh...but the basic principles are there.

M: It's the fact, it's you know, it follows the contour, and yeah it's almost like a flat surface with the building underneath, yeah.

I: So, most of your friends did that?

M: Yeah, they did that (giggle). I think, probably, maybe, I don't know whether it's the influence of each other or probably it's because it's not much you can do with the site. So, maybe really, that's the only option, yeah.

I: So, everybody aware this unconsciously, you know rather than...

M: Probably, it's because of the restriction of the site. It's the most practical thing you can do.

I: So, when you did realize that everybody was having the similarities, have you've got the time to discuss or you know, just to have some says with your friends, like how come most of us thinks similar?

M: Yeah, it is the same. Because I think we all have the same approach, because we studied the urban context and we studied the social and environment, so I think we did have this same like...the impact of the urban context was almost the same for all of us.

I: So, you did mention about studying the same approach, are referring to your tutor or your lecture or theory class?

M: It has to be the tutor.

I: Tutor?

M: Tutor.

I: So that means that there are several tutors?

H: Yeah, we've got several tutors.

I: So, under your tutor, how many students are there?

H: There are about 25, I think. But then, when we have tutorial, we break into 5 groups.

I: Okay, 5 groups. So, this tutorial is with the same tutor?

M: With the same tutor, but then, every project we shift tutors.

I: Okay, you are not sticking to the same tutor.

H: Yeah.

I: Any problem with that?

H: Some tutors are good, which is good because you get the different, you know, kind of tutors. So, you get the good one, you get the bad one. So, if say, you stick to one, you just get the bad one.
I: So, in your case for example, the bad one, you mean because they don't share your...(ideas).
M: It's not that. I mean, you don't expect people to share the same thing but then, I don't think maybe like I had one tutor...(feel quite reluctant to express)...who was very critical, but then he didn't see anything beyond what he was seeing. Because I think he has to be more open when you look at other project, because you know, when people do something you don't have to like it, which is true. But then, you have to look at it in a critical way, to see why it might be, you know, what this is...see it different. But then, that tutor was like, oh, your presentation is awful, that's it...okay.

I: (Laugh with the expression)//

I: Okay, now it's about communication. Do you find that you talk differently about architecture in the studio, as compare to when you talk to someone else?

M: Yeah, yeah.

I: In what way do you talk differently?

M: Because when you talked in the studio, you can see thing and assumed people know what you're talking about. It's different.

I: For example?

M: You know, when I'm talking about what I like certain building, like you know, I went traveling with architecture students and non architecture students. So when I see, you know, going with architecture students, you can say things vaguely that people know what you trying to put across but then when you are with other....

I: Non architecture students?//

M: Yeah, you have to, like, sometimes you know, you have to justify. Because like you know, when I went to Berlin, I was looking at the old buildings and by Bauhaus, you know all those modern 20th century buildings. I thought the buildings were good, but then my friends were like, oh my God, what, you know...ugly yellow building. Then you try to justify the things.

I: How do you justify with them?

M: You try to explain that, because it's a 20th century building, it's square, yellow, it's you know. So you try, to explain beyond the form, you try to go into the politics at the time. So, I try to go into social. So, you had to explain more detailed, I supposed, because like architecture students, they know the historical... at the time.

I: So, in this case, you have to explain them from the historical aspect and the political aspect of the building.

M: Even if like one of my friends, she is doing politic and law, so she knows about the political but I still has to relate both of them together (politic and architecture). So, you have to relate things.

I: Okay, for example, in the studio right, because I remember from time to time I read this email, people used the word 'well...at the well' at the 5th/6th year studio.

M: No, no. The 'well' is the middle in the 15th floor, yeah.

I: Yeah, the vertical staircase.

M: Yeah, that's the one.

I: Yeah, that's the one that commonly understood by all the architecture students. In your studio, for example, are there any prominent words that become so special among your peers in design studio?

M: (Silent and thinking). Juxtaposition, what else?

I: Okay, that's one word that people always used.

M: Emm...oh God...I can't remember.

I: One word is juxtaposition.

M: There is one word that people always used but, I can't remember, yeah. (Felt uneasy because she knew that there are other words).

I: So, in your case, for example, among your friends what are the common words that you normally like to use related to your design? So, you did mention about juxtaposition, just now.

M: Emm...(still trying to remember). 'Kind of', I don't know why people like to use that, a lot of people, yeah, yeah.

I: So, they like to use 'kind of'?

M: Because I think, they want to put in their ideas but they are not sure. But, they just try to say it, if that's just right. Sometimes, it's like simple words that you get it everywhere. It's not like you know, technical architecture, yeah.

I: Okay, any specific jargon or lingo that you might used in the studio?

M: No. Not with me. No.

I: Did you notice any other, I mean, studio from different years, you may noticed, in your case, that there is certain kind of different communication that you can observe quite different from the second year?

M: Emm..the first year are different because I've been in the first year before. First year and second year are totally different. Second year, you tend to be self absorbed. I think, once you get like in the upper years, you find to be self absorbed, but then during the lower years you tend like mingle and it's more social.

I: Okay, so let's say if you have a chance to, you know, to go and just drop in the third year studio, do you find any differences in the way the converse or with the way they communicate among themselves that you might think that you might not understand what they are talking about?

M: Yeah, I think it's more...I think because of the experiences, they get more architectural, you know, their language, the more technical stuff. Yeah, you know what I mean. If you get the experience like for the first year when you give like suggestion and comment to your friend, it's mostly like common sense, you know that kind of thing or maybe you can do that, it's just like ideas that come out just like that. But then, when you get into higher level, it's more something that you can refer to...emm, yeah something.

I: Because you have more accumulated vocabulary, specialized in architecture.

M: Yeah, that's one thing, more knowledge.

I: Okay, my last question. Is design something you can do as a group?

M: Ugh...that's hard. It depends on the group, I mean, I've been working with one group, it's just like really great. We did like really good work. I've been working with other group, we've just couldn't get along.

I: Okay, in that case, can you described, how is...you did mention about the group work where you have a good time with one group and were not having such a good time with the other. Can you describe, what aspects that you think that there is a group that's good for you and what aspects that make you feeling uncomfortable with the other?

M: I think, it depends on the project, as well. The projects were 2 different projects, so maybe that was one thing. Emm...compromise is okay but you can't keep on compromising because it doesn't get anywhere, that's one thing. Because that's what 'Sat' said, he is the tutor for the 3rd year. Because when you said that you never compromise in project, I was like, oh...that's really hard to work as a group. But then, when I thought, he's right. If you keep on compromising, you won't get anywhere. And so, one thing and emm...to give and take, you have to find the right balance and you have, it has to be these people you can work with. So, when you say that, oh I don't like this idea, you don't offend them. It has to be the people you can get along.

I: Let's say, right, you want to put up a design team, what are the things that you're looking for a member of a team?

M: Emm...different things from different people. Like in my group, like you know, was better understanding in structure, but I was not good in model making, so one must be in model making, one who is good in detailing, very fine detail work.

I: So, it's good to have people of various skills.

M: Yeah.

I: That you can combine together and you can also learn from each other.

M: Because, if we have same skill, everybody keep on finding things (no one to refer)

I: Okay, what about having different...you did mention about guiding principles, our own values, what about that? Can you have members that share the things, like principles, general ideas, concepts?

M: I think because the concept and the principle is like the main force of your idea, so I mean you can't compromise on the main force of your idea, you can't get anywhere, even if you can compromise, one member going to say, oh, I don't like that principles, so, therefore like during the course of the project, you will kind of withdrawn. But then, if you have the same principles with different, you know, interests, than you can put things together.

I: So, in a way, a group that has same principles but they can have various skills.

M: Maybe not totally same, but they're along the lines.

I: So, that will make the group work efficiently?

M: Well, so far from my experience, I haven't had a group with the same principles.

I: But, still you can work together, but not as what you really wanted it to be.

M: No. (Ideal group is hard to get)

I: So, in general, right, anything that you want to say about studio, peers and about your design development?

M: I think, studio really helps the design development that is like that because you know, it's like a relationship. It helps a lot and it keeps you sane.(little laugh)

I: What do you think about having other peers around you, as part of the studio? I am sure staying in the studio, it comes with the people, it comes with the atmosphere, it comes with your peers. So, how do you work with the peers being around you?

M: It helps a lot, it does help a lot, it does help a lot. And, it helps a lot especially, when your design peers are people who you communicate outside the studio, as well. Not saying that you don't mix other people, you do. But then, you're also mix the people in the studio, outside the studio, therefore you can work together in the studio. So, it's not just working relationship, yeah.

I: Really. So, having that kind of situation makes you feel, I mean, put you on track, in a way.

M: Yeah, yeah.

I: Let's say, imagine the studio and try to compare the studio and any type of learning environment, how do you feel about the peer relationship in the design studio.

M: Emm...(reflecting)

I: Although it might not have the same values, in term of the socialization, the atmosphere.

M: It's almost the same. We have groups, you know, that sort of thing. But then, there is time where people tend to be, even though, they are in this group, they tend to be self absorbed...ugh, this is my work, I don't people to see it. They might steal my ideas, that kind of thing. They have that kind of 'kiasu'(laugh).

I: Okay, now this is a final question, related to what we've discussed about the team. Is a loner a better designer, or is a group team a better designer?

M: Emm...so hard. Group, if you can get along. Group is good because it does open you up a bit. You don't get self absorbed, I think. If you get too self absorbed, I mean, even if you have the greatest design, you become famous but then, at the same time, if you look at it that design doesn't really reach up to certain people. I think you get a wider range of people who might like your design if you work with wider range of people.

End.

Pseudo name for Interviewee: Don (D), Year 3, Male.
Name of Interviewer: Ismail (I)
Date of Interview: 8th June 2005
Time: 11.45am – 12.30pm
Location: P/Grad Room 15.5, 15th floor, Arts Tower

I: Actually, I had this very interesting session with your colleagues from various years. So, it's very interesting. And, I am glad that you can make it, today.

D: Ahh..it's always good. It makes you feel better, if you sort of helps someone else with their research.

I: Yeah, that's great//.

D: Because we have to do project ourselves and I had to do dissertation earlier this year, and it's just like the people that you meet that are willing to give up their time to help you out or give you a little bit of insight on what they do. You can't really repay them. So, it's the best way. The next person that wants some, you know, research or something and help them out. Because it's not really any great cost for me, is it?

I: Yeah, that's true. So, do you have any plan this summer, going for a holiday?

D: I think about it, at the moment...

I: Taking a break after(laugh) the, you know, the tension, the pressure that you had all this while in the past few weeks, right.

D: Yeah, I think, what it is when you're there, you don't really notice it, you're under pressure. It's only when that pressure is removed...

I: And, then you realized it//.

D: Yeah...and suddenly you find yourself completely lax and not want to do anything, like forgetting to meet session when you supposed to.

I: Okay, can you tell me your favourite signature architects, who do you think?
Some call it as your 'ideals'.

D: Emm...I am very impressed and inspired by David Chipperfield and also I'm also taking with Imre Makovecz. And although, I find in my context of design, David Chipperfield is much more appropriate. And I am impressed by what Makovecz had done in his context, but I don't think, he is necessary an appropriate lead for me to follow, here.

I: Any specific thing that you really value about their work?

S: David Chipperfield, I am very impressed with the way that he takes potentially what a very difficult and dangerous form, way of making building and he handles them safely. Because he does, he often takes on working on conservation area, where you've got traditional form and he uses these forms because he makes sure that the building was very modern and, he does it in a way which is acceptable to the eye, from both; The architect is looking at it from being very modern and up to speed of modern day, but for the person in general public that will look at this building in the context...

I: Of their experience looking at the building//.

D: Yeah, that's right.

I: So, I would you to have a look at this quote (Showing the type written Stephen Fry quotes). This is a quote by Stephen Fry, a British comedian, which I think popular here.

D: Yeah, well known.
I: Alright. He said that architecture offers quite extraordinary to serve the community, refresh the environment and to advance mankind, so, the successful architect needs training to overcome any pitfall, however, and start earning some serious money. What do you think about this remark? Do you share his remark?

D: Yes, I think so. I'm a little bit interested in his motive for saying it because I was understood that he's an actor. But, maybe he has an architectural training. Yeah, definitely it offers some extraordinary opportunities. And, I think when you look through history, a lot of the advances that mankind might has made, could be architecture, but there are other things, like literature, sciences, etc.

I: And the other thing,right... like working very hard, you know, to avoid any pitfalls and then you start earning some serious money.

D: Yeah, I think so because, it's to be able to work in this environment where there are a lot of pitfalls which are quite high risk to yourself, so the one hand you can earn serious money, but on the other hand, if you fall into these pitfalls, and you're likely to lose a lot of money because the liability is quite high because you're doing a job which has got a lot of responsibility. And, I think, it's when you try emerge these ideas about serving community, refreshing the environment, advancing mankind which is very, very intangible and you can't put a quantity on advancing mankind. And if, you're trying to do this with quite, you know, their goals refreshing the environment, serving the community, their goals which on one level could be very practical but on the other could be very subjective and quite whimsical. An if you're trying too marry...with a quantitative product that you deliver at the cost and employed by someone, I think you're likely to....there are more frictions and pitfalls, possibly. Because you are trying to deliver something which is probably born out of inspirations or a dream or whatever you've got, as a concept when you're trying to work, but you're actually to deliver that through something which is measureable and quantifiable and rather than just saying, well I have got a shop and I've got so much a quantity of these, these and these and sold it in such an amount and then you sell it to person. It is lot less straight forward than that (referring to architecture).

I: What really attracts you when you first take architectural study?

D: Emm, personally I've read an article by the architects of the London Eye, and I was impressed by the way they talked about the project. And, but most of all, I was impressed by the way that they've enjoyed their work and they've got a lot out of it, themselves. They seem as though, they were working hard, but it was that the work actually gave them something to work for. So, it wasn't as though their job was, so that they could go home at the end of the day with the payback but they actually, enjoyed their work, if you like. And, made them want to do more of it. Because they were so enthusiastic about it and obviously, they will need a payback at the end of the day and surely they earned it.

I: Okay, you've heard about the news that the owner of the land, has been trying to raise the rental fees for the London Eye? Do you realize that?

D: Oh, really. I didn't know that.

I: Yeah, there was big news about that. So, they are considering about removing the London Eye. I am not sure about that. Well, see what happen.

D: Yeah (follows by short laugh).

I: Alright. Is there anyone that encourages you to take architecture? Someone in your family or someone related to you?

D: They were happy with the idea. I've done a lot of art at school and, I wasn't sure of how you would make a living out of that. And, architecture seems to be more of a profession which could deliver a wage rather than having to make my wage as an artist. Since coming to

the university, I've come to contact with a lot of artists that those who are having to make a living and make it work as business and, something which I've put down as experience. And, I've done... I've also be able to get a job in an architect's office.

I: Before you take architectural study?

D: No, during June in the summer. And, that is a good plus point for me.

I: So, how your parents feel about you decide to take architectural study?

D: They were encouraging.

I: Because some people (parents) will be surprise, you know. Some people thought that you better take medicine or something like that.

D: Yeah, I mean, I've talked to a lot of people who say if it's not medicine, it might be architecture. I think some people may view architecture as a good profession to go into. And I think, I was the same because it's a good profession to go to. I think, people were surprised because I had said quite a lot maybe architecture is not for me, I want to do art. But, when I made up my mind, I want to do...I want to do it. Probably, the reason that when I've seen, I've read what they've said, the way the whole outlook on it was so positive and it wasn't that they were trying to sell architecture, they weren't certainly just as a profession, but they were just what you can read from there.(referring to the article about the London Eye architects)

I: Okay, that's great. Let's say...now we go into the issues about the studio. Let's put it this way, let's say the studio, you can call it as a zoo, for example, or perhaps, it's like an animal kingdom. Okay, looking into your own studio, so what kind of species you might find in your studio among your peers? Or perhaps any personality that might be prominent?

D: No, no. Okay, I'll try and use the zoo analogy, that's quite good (start thinking).

I: Some people say there are bears who hibernate and turn up, every once in a while, every once blue moon, for example.

D: Yeah, that's true (referring to the bears). You're definitely got your packed of monkeys.

I: (laugh)//

D: Flocking around, making a lot of noise, there are definitely those. And you might also have your lions that sort of hide in, quite slowly and quite quietly, actually very impressive underneath. You've got...I don't know(thinking again), you probably got you fair share of parakeets who are very colourful and would show off quite a lot in the studio, by the work that was sort of pinned around them. And we've not got too many antelopes that about to lock horns. You don't have too much friction, that way.

I: Are you referring antelopes as somebody who are...?

D: Well, you know, you see them battling out, lock in horns. You don't get too much of that.

I: There are more understandings among you. Okay, good. You did mention about the monkeys, right. Sorry, to use such words. Normally, what do you notice about them? What do they normally do among them?

D: Emm...they are quite communal, so they were coming...

I: Any particular interesting thing that you see that they like to do or they like to talk about?

D: Often, it's things outside the studio, nothing to do with architecture.

I: Yeah...social things.

D: Yeah, yeah, social things or maybe things about music or sports.

I: Any particular sports like Sheffield Wednesday winning the playoff.
D: They might not. I think they may be more interested in the Premiership because they're not...not everyone is around Sheffield, so interest possibly elsewhere.

I: Like, Liverpool...recently.

D: Something like that.

I: European Cup, right. I'm sure, I saw few of them wearing this red t-shirt with this 'Carlsberg', you know (Laugh).

I: So, people outside the architecture department, they find it quite hard to understand what a studio is. So, how do you describe studio to someone else frm outside our department?

D: Emm...studio is a workspace which can incorporate a degree of informal activity and formal work. It is place you might try things out. It might also be a place where you bring people to socialize and it might be also somewhere you work very hard, very intensively and it should have...Studio is different from office. Studio is probably going to be more practical and you might have facilities to do with some sort of messy activities or dirty activities, so it can be cleaned up afterward.

I: Do you think, it's helpful, the studio? It's helpful in your design?

D: Yes, certainly. The main reason for this, is that there is cross fertilization of ideas.

I: Ahh..that's good word to use.

D: Yes, it's not mine. It's somewhere, I picked up. It's the way of describing it. But it is just that...you've got your ideas and you can look on the work of other people. And, you can put your ideas before them and they can you theirs, input their opinion on what you've done. And, it's often, in fact more often than not, they will say something that you haven't thought of. And, it will take you off on a completely different track of thought.

I: Do you find anything unhelpful about the studio?

D: Sometimes, well...If the studio run infinitely, you can infinitely go on and change your idea any number of times. Because we have deadlines which one good thing, because that means you get work done and you can guess and you can look at your work and be proud of it before moving on to the next thing. Because you have deadlines, sometimes you have got something done and often I find if I know what I've got to do, it's just the case of doing it. I can do it, just as we're at home, where it is quite and it's focus. Emm...where in the studio, I'm often distracted to do something else or talked to them.

I: There might be some distractions from time to time?

D: Yes, but I mean that it's always the same at home as well. You can always, find distractions with your housemate or the TV.

I: So, if you were given the chance to change the studio, what would you like it to be? Perhaps, like a social club.

D: No, I don't think like a social club. It would be good to have social areas attached quite close to the studio, so you kind make the distinction. So, you are not far away from the people socialising but at the same time, you could be in the studio to work. And, toward the end of the last term, we did have...we've just establishing a little area, I mean somebody brought a TV in and we've sort of arrange the sofa inthis particular way, so there is a space that you can go when you're having a bit of a break from work.

I: For contemplation?

D: Yeah, contemplation. It's a bit of relax, talked to the people. When it's toward the end of the term, we're really working hard, and I hardly did any work at home then. And I did all the work in the studio even, if it was the focused stuff, because it was getting that close to the end. Everyone was serious down there. I was getting on doing it.

I: Everyone pushing each other, right.

D: Yeah, exactly. It is good encouragement. Elements that I would change about the studio, possibly, make it sort of relax, chill out area a bit more apparent, something that definitely quite close to the studio. And, maybe, when it is more to do with the nature of the work we do, possibly, something, an area for more practical wood working. Yeah, I mean, an extended workshop and so you can encourage more people to use it. And, maybe put the workshop on the same level as the studio, so that you can do more workshop related studio.

I: So, it's more practical, right.

D: Just so, it's on the same level, you don't have to go up, up to the workshop.

I: It's more convenient for you.

D: Yeah, yeah.

I: So, okay. Success in design in the studio could be rather seen as to be either luck or talent. What do you think about that?

D: Emm... I think (thinking). Obviously, you can be lucky but you can also put yourself in the right position and the right time and you can make your own luck. Emm...Fortunes favour the Brave. And, I am not sure that's true or not. But, certainly if you are in the right place at the right time or you use your consent and you think, well, I've got this..this.. and this to do so, how I am going to do this well. Just get on with it on my own or do I need other people input on this, and you go take it to other people, you will get the most out of whatever time you've got.

I: So, you did mention about talent, right. What are the kinds of talents that you think would really help your design?

D: My own design?

I: Yeah.

D: For my ability to draw, that's probably high up there. My interest in other architects and...

I: So, that means, the more you know about architect the better you are.

D: Yeah. And, I think because the more you know about other people works, the more inspiration you could get. And the more, you can have an ability to get an agenda for a project and a certain amount of attitude to devise way of bringing out ideas about. But, those skills bringing these ideas about would be that much more powerful, if you had the knowledge of how other architect do it. Because you can use their effort to get to where you want your ideas to where you want to be. You know, you could draw the way that other architect to work their methods. And you know that might be the way, their choice of materials or their choice of forms, their choice of program or might be the way that they present their ideas, the way they use their models, the way they draw.

I: Okay, great. Let's go to the work of these signature architects. You did mention about David Chipperfield. So, other architects like Calatrava, Foster, you may see that there are

coherent set of ideas and principles in their design. Do you think that is a good way and very useful in design? Having coherent set of ideas and principles....

D: Oh, so they're not coherent between them but they have it in their work?

I: Yes, yes.

D: Yes, I think. I think, it's good and certainly it's good for them. Because they establish a brand that if they want a Foster building, they go to Norman Foster, knowing what they want to get. But, I think, it's got....You must get saturation point, I think there is a point to which it's acceptable, because everybody pursuing their own idea, their own agenda that would mean what they do would be really rich. But, they've always got to be acceptable to have to, you know, take a completely u-turn at some stage and do something different. But, they've got a central core of central belief that they always trying to work out. They're going to get that to a very high standard. I think that's good to enjoy as long, there is enough people doing their own thing. The whole spectrum would be quite broad and varied. But, each person would be very, very good at what they do.

I: So, personally in your case, for example, are you experiencing the developing of that central core, guiding principles, ideas within yourself?

D: Yes, I think so. I am trying to temperate though with trying new things because I understand that I am at University, now and I haven't learn everything that I will need to know. And, in fact, I will never learn. And these signature architects, well never learn all they need to know, as higher up they are. So, I never wanted shaped myself often doing new things, and saying that, I do have my own particular interest, things which I enjoy to do and things I have preferences toward.

I: Can you give few examples?

D: Yeah, I like timber construction. And, I like it as material and I like it's finishes and in fact that effect you get from it. And like the types of building which architect made when they use that material as well which is quite important.

I: Right, rather than hide the materials.

D: Yes, that's right. They're exposed.

I: More honesty to it.

D: Yes, certainly and I think that's sort of honesty in material and also helps to form the agenda and type of building to get so that, you can show where the materials, think about the materials and how is that work as material. And then, how do you incorporate other material and how do you join them and by use material can that influence what type of space, and if it's a material is for certain type of space surely that's going to have influence on the program. So, if you turn the other way, you've got program underneath which is certainly you'll think what was the appropriate material for that. And then, what's the appropriate for other activity and then what's the relationship between the two. And then, that kept me going.

I: I see. Okay. This is about the studio again. Let's assume that the studio is like a karaoke lounge, right. So, you are singing and you try to be yourself while singing, but at the same time, you are also imitating or following the person in the screen.

D: That's really a good analogy.

I: Yeah. So, do you find that in the studio? In a design situation... that similar yet different situation, between you and your peers within the studio.

D: Is this what you mean, are we all singing someone else song.

I: Yeah, but at the same time, you try to be individual, because you have your own voice, your style but at the same time, you look at the screen, you try to imitate, so that you can have a synchronization.

D: Yeah, that's definitely does happen. I think that happen to a greater or lesser extent. I think some people are better singers than others. And, although I think we might...we're trying bring more than one influence into one building and so you might have...it might sound a bit odd as a song, because, you might suddenly singing someone's verse and then you suddenly switching to someone else chorus. Or you're singing one song in a style of another artist. But, on the whole, that is what we're trying to do, and we try to match them word for word and get the tune right the best we can. But, we're not copying individual building, but we're taking on their approach.

I: Do you think that in a way, it's something that's acceptable or something that's natural?

D: I do think it's natural because if you're in other profession, I think or especially, if you were in trade or craft or even if you look back to the artist of the, you know, Renaissance people. What they would do is that, they have a whole school filled of people and often the works which were accredited to that artist. Actually, he was directing the students to do, but because he is the master, he knows how and that made it such a good piece. But, what's incredible, those students, they weren't doing their own thing. They were doing what they were told, they were replicating someone else styles, and if you're in other 'guild' or if you were in a trade, you'll be replicating what the top guy demand what's the master did, until you sure your apprenticeship and you were forced in your own right to go off and then choose what direction that you would take.

I: So, in this case, does the tutor play any role in this so called similar yet different design situation in the studio?

D: Oh, you mean?

I: Your tutor, in the design studio. I remember, I was informed that there are group of students under certain tutor that from time to time you are undergoing the same process.

D: I wouldn't say that. I think that now, it's much more our choice. If you follow a particular master, and that master might be the architect in the journal, if you want to follow his approach you can do, but I think. It's not...

I: The tutor//. (Agree)

D: The tutor will have a certain set of interest, I mean, if he wasn't, he wouldn't be a human being. If he didn't have his own tendency, you know, you probably a bit disappointed, because if you are really bland and not actually into anything. So, you wanted them to have, you know, you want to know that they were actually interested in something. And so you do get sense of what a tutor like. So, that can impinged your work a little bit, but at the same time, all the tutor respect hard work and if you work hard at what you want to do, they will respect you more than if you kind of give what you thought they like, and did it, half heartedly.

I: So, in a way, hard working, time management skills are also very important, right.

D: Yes, certainly.

I: So, do you find you talk differently about architecture in the studio as compared to when you talk to your parents or someone else outside the architecture school?

D: Yes, I think so. I think when you talk to somebody outside, you probably, put a bit more enthusiasm about the subject. And because, you want people to be interested in it and it is quite a complicated subject. So, if you talked about it and weren't very enthusiastic, people will turned off quite quickly. Where is, when in the studio, people know what you're talking about, so you can begin to express a little bit of frustration about it.

I: Any particular buzz words that you might used in the studio that only you and your peers knew about it or felt very significant about the buzz words?

D: Oh, yeah...try bringing some into mind now.

I: Someone said that it's 'photoshop rash'. What about other buzz words that you can think of?

D: Emm...CAD monkeys is one of the big, almost fears for the year out that the employer would simply put us behind the computer and makes us do all their drawing for them.

I: Oh, CAD monkeys you called it.

D: Yes, that's sort of, if you could imagine, the analogy of a monkey on a typewriter, just having rows of rows of these people just doing CAD. Because it's something you can be taught and it's time consuming and but, it needs to be done. It's almost as so, it's very basic activity, and you as a student, you lower down the ladder, you're probably the lowest station in the ladder. It's probably quite a one side view, because when you're doing the CAD, you're actually engaging with design at some level. But, I think it's people hoping that they weren't actually, stepped down under computer, all day, year in year out.

I: So, these CAD monkeys are those people who really struggle using the computer?

D: No, No. Say, your ideal year out placement was that when you did a little bit of CAD drawing and you were involved with the design process in the office, maybe you have to go out to site, went to site visit, you did survey, you make models and you saw clients, you get this very broad, all around appreciation of what happen in practice. If, though you were simply given set of drawings to produce on computer and that was all you did.

I: Ahhh.

D: That would make you a CAD monkey.

I: Do you find those people in your studio, the so called CAD monkey? Or everyone, every once in a while can be a CAD monkey.

D: I think, in the studio there are people that choose to work on computer and they are very good at it. But, I don't think that would make them a CAD monkey. The way the term has been appropriated is that if you refer somebody as a monkey, you're not really treated him with high regard. So, a student becoming a CAD monkey is someone who's gone to practice and hasn't been treated that because all they have been done, they just used for producing computer drawing, regardless, of whether they're good at it or not.

I: Alright, great. Do you think having buzz words among your peers, you find it helpful among you when you communicate in the studio?

D: Yes, I think so. You know what people talked about and it also offer a bit of humour as well, because you can attach appropriate different words to different things. We've had the....when our year tutor gives talk, his name is Sat, so we have Sat Chat.

I: Interesting (Laugh).

D: Yeah, it's just a little colloquialism.

I: Do you find any other year group that might have their own buzz words?

D: Yes, I think so. They probably do, but honestly I do not know because I'm not in their year. But, I do think we do have a close knit year.

I: Among the 3rd year?

D: Yeah. I think we are fortunate enough, in that sense. Toward the end of last year, the end of the year, the academic year that's just past. We've spent a lot of time in the studio.

I: So, that really helps each one having each other.

D: Yes, I think so. And also in the first year, I think a lot of people were involved together and that helped them a lot because they could come in bolts and nuts. They would lived, they would worked and socialized together. So, you can see people on different level, which is quite important, as well.

I: You know where you stand.
D: You know where you stand and also if you see the person on a social level, you can see them relax, and it probably helps you to relax a bit more. Because when you saw somebody when they were in the work mode, you might attempt to think, so why aren't I? When in fact, of course, they have time when they come in, they are serious but they've got time outside the studio when they can relax.

I: Okay, is design something that you can do as a group? What do you think about that?

D: Yes, you can. I think, you've got to be quite removed from your process sometimes, if you that sort of a person that tend to let your design quite personalized, probably, yeah. I, probably, camped myself in that category. I will always be mindful when I'm working in a group that what I think might not necessarily be what other people in the group think. And might not be the best thing for the group because the group that has a group of people, has its own character and probably, it's best to, you know, put forward your views and your concerns, anything which your commonsense dictates you should. But, don't expect that your ideas would be the one the group uses. But, once the group does get settle down on an idea, work hard to make sure that the idea got quality to it.

I: So, if you were trying to put a design team together, right, what do you need to do to make it work?

D: If it were to work, I think some people that were prepared working together but also socialized together would be a big plus.

I: Do you need any member to have common set of preferences, guiding principles or central ideas that they share with you? Or, do you mind sharing strong central ideas but having they with different specialized skills, for example?

D: I think that scenario sounds the best one. Because you've got different skills that people can offer. I even think that if you have people with different central beliefs, working together that could be advantages, as well. Because it might bring the other person to actually realize something which they haven't thought and they actually, do a project which is a little bit different to what they do on their own. But, it's something they might remember when they do their own work, later on. And even if you had polar opposite beliefs maybe that's still a good because it will make you realize something about that.

I: But, given a choice, right, in your situation, for example, you want a group where everyone has a central belief, central ideas but different skills and the other one having various ideas, which one do you think, you would prefer the most?

D: It would depend what it was for. If it was for mark piece, I would probably opt for the central, everybody who is kind of knew what their ideas were, but the group had several arms that were good at doing different things. But, if it's for piece of work that was trying something new, experiment to find out, I probably wanted as mixed bag as possible.

I: That's a good sense of explaining the situation about having different set of members.

I: So in another word who does better in design, a loner or a team?

D: I think, all the things we've talked about the studio and the cross fertilization of ideas, tells you that a team works better than a loner, I think.

I: Because of the cross fertilization? I think that's a very strong word that you used, there.

D: Because you see people that their ideas different to yours and people working in different ways and they get you maybe working a little bit like them and you pick up tips and tricks.

I: As a final question, in general how would you describe your relationship with your design peers in the studio, from year one until now?

D: In year one, I didn't interact with them as much in the studio as I could have done, or maybe, maybe I wasn't ready too....or maybe I wasn't quite understand what's the studio is about and how I should be in the studio (sosialising). It took me, probably, a good couple of years to learn how to actually do things in the studio. And I think be able to relax with my peer was a big plus with them. The more I could be relaxed with them, then the more opened I could be about my work, more ready I was to experience, to receive criticism from them. And also, consider my work against theirs that was quite important factor there. I could sort of put my work against theirs and to compare them and trust them.

I: So, is that really helps your maturity in design and ability in design?

D: Yeah, yeah, because if you understand someone else design, you certainly understand what's their approach is. See where they're coming from. It often makes you stand back and think, gosh, that person actually looking at it in quite a lot depth, in their particular field. So, when I go back to my project, I am thinking, right, that's the energy that they try to put in and let's do similar here, gets something out of it.

I: Right, very interesting, brilliant. Thank you very much.

D: You're welcome.

End.

Pseudo name for Interviewee: Zack (Z), Year 5, Male.
Name of Interviewer: Ismail (I)
Date of Interview: 7th June 2005
Time: 10.45am – 11.30am
Location: P/Grad Room 15.5, 15th floor, Arts Tower

I: Thank you for coming (Z). Alright, to begin with our discussion, can you tell your favorite or signature architects that you idealise, appreciate their works?

Z: Emm... favourite famous architect....I really like the works of Steven Hull and Alvar Aalto. Yeah, I think that.

I: Any particular, specific thing that your're very interested in their works?

Z: In term of those reasons why I like these architects, especially, I'm very interested in phenomenology...well especially natural phenomena and how they (architects) interpreted it into architecture.

I: I remember Alvar Aalto had one of these buildings, in the form of rectangular that shapes, looks like fingers within a landscape that follows the contour. It's quite interesting, in term of the materiality and the geometrical arrangement.

I: Okay, if you look at this statement...This statement (quote) is by Stephen Fry, one of the British Comedian. He said that architecture offers quite extraordinary to serve the community, refresh the environment and to advance mankind, so, the successful architect needs training to overcome any pitfall, however, and start earning some serious money. What do you think? Do you share his delightful remarks about the architect as a profession?

Z: Yeah, well I mean looking at the first part of the quote, I think... I mean, I don't think its true that the entire architectural profession by any mean. But, I do think that it does have opportunities to serve the community, refresh the environment...eh...eh...advance mankind...it sounds a bit altruistic. But, I think there are maybe other opportunities.

I: What about the final statement (referring to successful architects and training in the quote)?

Z: The successful architect needs training to overcome any pitfall, however, and start earning some serious money. Emm...I am not really sure...it's almost like...he's saying to become, I think...he's saying to become successful, architects need, kind of forget these kind of ambitions and emm...the need the training to work out how to earn money because that's not we're training for. I think that's what he's getting at.

I: Personally, what do you think about, you know, going for architectural study?

Z: Well, I think if I'm really honest to when I first started...it wasn't...I knew that it wasn't like big money like you would get if you were studying medicine or law or anything like that. But....emm, I have to say that it was important to me that it was a kind of a professional, a kind of discipline that I was studying. And, I guess like the alternatives that I thought about studying were art like fine arts or pure maths which are bothe very different. But....

I: Are you saying that these two are also part of your interest?

Z: Oh, they're definitely also part of my interest, yeah. But, I didn't really want to study fine art because I just didn't have any kind of faith and the security of what the outcome might be. And, in fact in my architectural like education, I have the opportunity to explore a lot of thing that I wouldn't have explored studying fine art. And, I think a lot more besides it, as well. And, I think, there's even been the scope to do a lot of mathematical studies, so I have been quite happy with.

I: So, when you first decide to pursue architectural study, do you think that your previous education like in the high school or secondary school ...does it play any impact to you...that motivates you...or other people like your parents or your educational background prior to higher education?

Z: I don't know really. I think, personally...I am not really sure to be honest, I don't know. I think, I chose architecture basically because I enjoy these subjects that kind of have a role in my architectural thinking like art and math. I mean although they're not the only component of an architectural work...being educated.

I: So, do you think that probably in secondary school, these two elements of art and mathematic... you find that there is a gap between those, that probably by taking architecture will probably closes the gap in your interest in these two?

Z: Emm...yeah. I think that's how I was in school.

I: So, is there any one in your family or anyone close to you that probably may have some influences on your motivation taking architectural study?

Z: Eh...Eh (feeling a little amused)...not really, my dad is a farmer. Emm...I mean my dad is quite practical, I supposed. Like, he's done a lot of building works himself, just you know...very kind of, you know....like rustic buildings on the farm. And, I think I kind of admire that kind of hands on attitude. But, in fact, I think, I thought maybe and architectural education might be more hands on. I think, it's one of the disappointment with architectural education is that you don't really learned how to put a building together....eh...eh (short laugh).

I: So, during those times (at the farm), do you help your parents...your father?

Z: Yeah, a bit, yeah.

I: Okay, now it's about the design studio, right. So, after having experiences for many years in the studio....Let's say, supposed that design studio is....you can call it like a zoo or to be more polite, it is like an animal kingdom....

Z: Laugh (amused)

I: What are the species that you might find in this environment?

Z: Oh...great (laugh). In the studio....what are the species that you might...

I: Can you find group of parrots? Can you find groups of chameleons? Lions?

Z: I don't know. What animal that you might find. Let me think. I have some features of these metaphors. Well, there are creatures that kind of that maybe appear like once every two or three months, you know they are those students who....yeah, work at home basically. And....eh....I guess they're maybe, I don't know....some animals coming out from hibernation, maybe like bears or something like that.

I: Laugh//

And then, in the studio, there are, I guess, there are....some solitary creatures, people who kind of go and take out their own corner of the studio and don't really mix with people. But, they're quite rare actually. I think, generally, the who were working in the studio are there because they want the kind of healthy interactions with other people. Emm....in fact....yeah....it's quite....I'm not actually sure that there are any solitary people in the studio, to be honest.

I: By the way, how many (students) are there in your studio?

Z: In the whole of the 5th year?

I: Yeah.

Z: In the 5th year, there are about 30 or 35 of us. But, actually, we have all our studio courses together with the 6th year. So, all together in the diploma school, I think, there are probably 80 or 90 of us.

I: Alright, plus the 6th years?

Z: That's including the 6th year. And then, we split the whole of diploma school. We split into six different kind of units or studios and each one of those has about 15 students.

I: So, these units or modules....are they interchangeable from one project to another project? Or just one project where you have fixed module? So, you did mention that there are 15 in each module, right. So, these 15(students) will stay in that module for the 5th year?

Z: Well not quite all the 5th year. We did a small project at the beginning of the year, where we're in a group of about 10 people and then we change groups. And for the rest of the year which almost, I guess, I don't know....6 or 8 months, we were in a group of about 15 and it's fixed, yes.

I: Let's say, you did mention this, probably, that there are a group that resembles the bears, coming out from hibernation. I'm quite sure there is a group of majority, so what does the majority group normally do in the studio, when they were in the studio?

Z: People who don't normally work in the studio....why do they come in?

I: I mean, you did mention about generally that there are the majority group that always hang around the studio.

Z: Oh, I see. What are they like?

I: Yeah.

Z: So, do you want me to kind of define different characteristics for the people who work in the studio?

I: Yeah.

Z: Okay. Well, I guess, there are some people working in the studio and it's for them it's quite a productive environment and I think, that's kind of how I feel as well because you kind of, you always subconsciously aware of a lot of or maybe not aware but you're always subconsciously having a lot of input because you over heard other people's conversations. And you see what other kind of influences people have on their work. And I guess, analogy for that maybe....maybe that's a bit like a parrot, I guess, because it's like you kind of hearing things and you're copying them in some ways or maybe....at least they're shaping the way you think, maybe a parrot is not a great analogy.

I: Yeah. Okay, normally in the studio, right. For example, let's say in the group discussion from time to time, what are the common conversations that you like to talk about?

Z: I think....emm, it's making....I think in the beginning, or well, it's kind of goes along all the time, I supposed. But certainly, it's making sure, it's almost like checking with people your ideas make sense. So, when you have an idea either at the beginning of the project or later on. If it's something that is quite important to your project, then discussing with people kind of making sure that it makes sense, really. And then, you know, there are presentation issues, so when you're are preparing presentation work, it's making, asking people to look at it, and say....you know....can you understand what I am trying to tell you with the presentation. And then, I think even one of the great thing about studio is that there are a lot of discussions

about thing that are unnecessary relevant to your own work but it does help. I mean it really, kind of almost rounds up your kind of education in a way.

I: For example?

Z: I don't know. Maybe like for example, I was working in the studio. I was working in this year was set in Africa so all the work that we were doing was very, kind of exotic or alien then the kind of architectural thinking that you kind of engage within the United Kingdom. And some discussions with people who were working with us in the studio, kind of help you draw comparison between the work that you're doing and the work that other people were doing in other areas. Emm....to help you remember issues because there are always so many issue that you have to bear in mind when you're studying architecture. So, I guess, it's just help you kind of tune in.

I: Okay, people outside the design studio, sometimes especially people outside the department of architecture, for example, they find it quite hard for them to understand what a studio is. So, how would you describe the studio to another person who is probably from a different department?

Z: Well, I guess it would kind of depend on who I was talking to maybe. But certainly, you know, on a very kind of objective level, the studio is a place because it's the nature of the discipline of architecture is, you kind of to work and kind of prepare drawing, prepare model and it's constantly, it seems like it feels like a process where there are a lot of activities going at the same time even when you're working on your own and not in a group. So, you do need a lot of space for that. And I think, that's the kind of objective....like the rational aspect of the studio. But then, on the other hand, it's kind of....it's a place where there are kind of, like a crowd of activities or a mass of activities.

I: Alright. Was it like a bazaar? Was it like a market place? Was it like an art gallery or social club? Or is it like a hive?

Z: I think, a bit like all of those things in different ways.

I: So, studio has a little bit of everything.

Z: Yeah, I think so.

I: So, was it helpful in your design? You know....studio as part of your design development and design process. Was it really helpful?

Z: Oh, definitely. Emm....I think in some ways, I think, it's kind of in term of design development.....(thinking)

I: Does it really help you by being in the studio, you know, in your design process...in your design development?

Z: Well, in some ways, I think my kind of idea about how human functions, I personally think it's quite important to have a place that you associated as I feel like home or places where you kind of can relax. I think, it's quite important to have a designated workplace. I don't like working in my bedroom, for example, because that's where I sleep. It's kind of like a conflict of day to day activities. And I think social interactions that take place in the studio, even when it's not like work related, even when it's nothing to do with developing your architectural ideas, I think it's very important. So, this is kind of more of a psychological aspect, I supposed. I think it's an important thing to have a work place and for most students maybe that's the library, but we (architectural students) need a different kind of workplace to develop architectural studies.

I: Anything that you find about the studio that is not helpful to you?

Z: Ehh....(light laugh). Well specifically, in our studio there's too much furniture.

I: Laugh//

Z: Emm....there's never any room to move. I think, sometimes you do need to have some space to think in the studio.

I: To contemplate?

Z: Yeah, to contemplate. So, sometimes I find, that you know, I'll just go down to the library, maybe just because I know, it's quite and I can think.

I: Yeah. So, if you're given the chance, right, what do you like it more like to be?...the studio.
Z: What would I like the studio to be like?

I: The studio, yeah.

Z: Emm....I would like....one of the practical sense, I think it would be better if the computer like the computer rooms in the studio were more integrated. And it's happening. There is this transition in the school but still, all the best computers are in separate rooms. And so, when you want to work on a computer, you go somewhere else. So, then the studio becomes a bit of a desert. I think there should be more space because I mean....it's not that there isn't a lot of space but there is a lot of furniture within that space. And that makes the space very difficult to use. There is a lot of rubbish. The studio is never cleaned.

I: But, every once in a while, you have the janitor coming over to clean, right.

Z: It seems that they didn't do anything.

I: Success in the design studio, right, could be rather seen as either luck or talent. Which do you think it is?

Z: Success in the design studio could be either....

I: Seems to be either luck or talent. What do you think?//

Z: Ha....ha....(laugh)

I: What are the characteristics of a successful project?

Z: The characteristics of a successful project?

I: But, first we go for ....either luck or talent.

Z: I am not really sure it's either luck or talent. I think, there's always an element of luck in it. Because I think, even the most....I guess you've used from the phrase, even the most talented people, you know, they have bad months or whatever you know. You have mental block. So, there is a little bit of luck involved. But, I don't think it's really luck at all. And I am not....I don't know...the word talent kind of to me sound like it's got quite a creative bias to it. And, I don't mean it's very important for architect to be creative but I think....I think rather that the successful project is one that kind of engage with all the issues that come out within the project and one that kind of insightful and inventive, I supposed with the problem that are proposed.

I: So, you did mention about inventive. So, that is part of the values or skills that you need to have to deal with design, right. So, any other values or knowledge or skills that you think are very beneficial in your design?

Z: Emm....what are the skills?

I: Or any particular values, for example, say you are looking toward regeneration of old buildings or skill like public speaking, for example.

Z: Be successful in design?

I: I mean that can be very beneficial in your design.

Z: Okay. Well, I think....I mean, I really think that the most important skills are to have an understanding the way people think, the way people operate because I think....what I think of what is bad architecture, is architecture that doesn't really engage with people or that people can't use or that people don't understand. Emm...so I think it's understanding people probably the best skill you could have as an architect. I didn't mean that....but certainly it's a very important skill that is understanding people. Emm....working in a team, and I think something that we do very little of it in architectural school. We do a lot project on our own, but in the real world successful design is the result of a successful team.

I: We'll get to that question later on.//

Z: Oh, okay(laugh).

I: Let's go back to the work of, for example, the signature architect. You did mention about Alvar Aalto, right. You can see that there are coherent set of ideas and principle in his design. Do you think that is a good way and very useful in design?

Z: To have a coherent set of ideas and principles?

I: Yeah.

Z: Emm....(thinking). I think it's important simply because....emm....we're only human and you can't, I think to be able to do things well. I think you have to, kind of, develop an understanding of the principles by which you're working. I don't think you can have different principles for each project because they would never be well developed.

I: So, are you saying that having such principles, it's quite important in developing yourself as an architect?

Z: Yeah, I mean, you have to be prepared for them(principles) to change because....well simply because the world is changing but also because you never can achieve....you can never know everything. So, you have to be aware that your principles are going to have to change. But, more than they're developed rather than going from one extreme to another and I think it's kind of a linear process. And, I don't mean aesthetic, I think some architects make a mistake of....expressing their principles maybe in a single aesthetic and I'm not always sure that is appropriate. So, I think that the design principles or maybe the kind of, the issues which the architect engaged with should have some sort of coherent.

I: So, do you have any particular guiding principles that you pretty much want to develop and ideas that you think that you can pursue in the future?

Z: I guess so. The thing that I'm most interested in are the way....well I've said before I'm really interested in phenomenology and kind of how building create an engagement with the natural element or even....

I: Engaging with people?//

Z: Yeah, absolutely. That's the other thing. And that kind of....even if it's not only about how people interact with the space but it's also about how people....(pause and thinking). I mean, it's funny and I'm quite aware that my thinking is kind of being shaped by the school. But, I'm....I mean....it has been an interest of mine in the way that you know, for example, consultation and participation (people and building).

I: You did mention about shaping by the school. Can you explain more about it?

Z: Oh, yeah. Well, I mean, I think it's inevitable really. When I came to architectural school (Sheffield University), I didn't know anything about architecture at all. And, I'm aware that you know a lot of the things that I think about architecture are because of the study in this school. And this school kind of very socially aware, you know, there's a lot of people, the academicians within the school are...emm...they taught us about....You know like Prof. Bryan Lawson, for example, about the way people think and the way that we think as designers and the way that people engaged with architecture. And, you know, tutors within the diploma school like Prue Chiles and Doina Petrescu, they have a lot of those strong kind of 'zeitgeist' ideas about the way that it's important to have the kind of almost like user involvement with the actual instigation of architecture. And, I do think that these things are important and I wouldn't have thought they were important, if I studied architecture at an architectural school where I just learn all about girder.
I: Ha...ha (laugh). It's beyond that, right.

Z: Yeah.

I: So, this is another that I would like to put it in an analogy. Let's assume that ths studio is like a karaoke lounge. You are singing individually but, at the same time you are imitating the person that you look in the TV screen. So, this is what we called a similar yet different. Do you find this similar yet different design situation in your studio? Where there are similarities, but at the same time there are also differences among the projects between you and your design peers in the studio.

Z: Oh, definitely.

I: So, how do you find about the situation? Is it unavoidable? Or is it something that is natural? Or is it because of the process of interactions between you and your peers?

Z: I do think it's natural. I don't really have a problem with it at all. I think, it's more from the teaching actually. And I think, our work is very shaped by our tutors....

I: Is it because most of you are within a tutor module developing the same process within your design? So, there is a big chance that....you know....the natural tendency of the design to be somehow similar in a way.

Z: Yes, I think so. I mean, it's not necessarily so much that the designs are similar. But certainly, that the process are similar.

I: So, it's the design that is not similar but the process is similar. Can you elaborate more about the process?....Like developing of concepts, for example.

Z: Emm.....(pause and thinking)

I: Going for the same resources, for example....or architects or any issues.

Z: Well, I think that basically the way that the studio is set up and certainly within the diploma school, but I think even throughout. I think, it's unavoidable, really. It's that as you're kind of presented with a project and that project is....(pause). I don't know what I've done in the past (still thinking). Well in the 2nd year, we had a project to design a local history library for Sheffield. And so, everybody within this kind of tutor group was designing and everybody have this kind of route. And everybody have the same tutor and the tutor has a kind of set of interest. So, when you talk to the tutor, the tutor say, 'Oh to arrive at your design, you should look at this thing or you should look at this architect. And maybe do some sketching of the area'. So everybody goes off and do the sketching of this area. And, I don't think that's the tutor, I don't think it's an ideal situation but I think it's kind of unavoidable because the tutor can't be kind of tailoring a course for every individual student. I don't think it creates a problem, really. And, as you move through the school, you're coming to contact with many

different tutors and learn different processes. And, I guess, kind of other time you get to.....in the diploma school, you kind of weaving those all together in some way.

I: So do you find that you're comfortable in that kind of situation? Probably, you might find somebody who likes to be very individual in their approach. Do you find that situation happens?

Z: I think, I guess, some people are very individualistic. I don't think that's necessarily a problem. But, I certainly think at this stage, it's important for a student to realize that we don't know everything and that we can still learn a lot from our tutor and at the same time, it's kind of expressing our own ideas and developing them.

I: Do you find that you talk differently about architecture in the studio as compared to when you talked to someone else outside the studio?

Z: Oh, definitely. Yeah.//

I: What aspect of the thing or can you give some examples.....for example, when you talk to your friend or to your mum?

Z: Well, for example, like I've already mentioned that I am quite interested in phenomenology, and even I think talking of relating ideas of philosophy with idea of architecture, it's quite a difficult thing to even imagine if you do not study architecture, I think. Well, for example, I was talking about my dad as well. He's quite a practical man and he finds it very difficult to understand that we do anything in architecture school rather than learn about bricks.

I: Laugh//

Z: So, it's very much that I kind of have to tailor the kind or the way I talk about architecture (to people outside architecture).

I: So in the studio, right, you've already talked about probably, you know, your interest in phenomenology. Is there any other terminology or any concepts that move around the studio? Or that you exchange within the studio? Some might go for sustainable, something like that.
Z: Oh, yeah. I mean and certainly there are a lot of others.

I: Other words, other terminology other than what you've said just now. Is there any other that you commonly hear in the studio?

Z: Oh, yeah. Definitely sustainability. Emm....what else? Well in our studio this year, I've been working with Doina Petrescu and we've talked about participation, feminism. I think every studio kind of has their buzz words, you know.

I: Any particular (buzz words) that remind you about any other group. Any particular words or buzz words?

Z: I don't remember the studio is.....Eamonn Canniffe studio, I think the buzz words are kind of decadent and .....I don't know....luxury maybe.

I: It's quite interesting that you come out with the idea..../// So this is quite important, right because it helps you to communicate faster if you have these buzz words.

Z: Yes, that's true.

I: Yeah, it's easier for them (friends) to understand. But, if you were to use these buzz words outside, probably you have to explain more.

Z: Oh yeah. You kind of have to start with the first principle.

I: Do you find it's any different from one year group to the other year group, for example, the 3rd year? Do they have any significant buzz words from one year to the other?

Z: I don't actually know because there's hardly any interaction between the year groups. And I think, that's something that could be changed. Remembering when I was in the 3rd year, the buzz words...I guess....phenomenology, for example, it isn't something that I had explored this year. It's more of a kind ongoing thing. And I guess that something that I was more looking at in the 3rd year. Emm...I don't really remember what the 3rd year buzz words.

I: Now, as the current situation takes place, is there any problem of communication between students of different years? Is there any kind of communication barrier? Let's say the 3rd year student happens to go the 5th year studio. Do they find it difficult for them to understand when they are communicating with the 5th year?

Z: I don't think so, really. The 3rd years are quite advanced really, in some ways. Sometimes this year as a 5th year I felt a little bit kindof, after practice in some ways because I was working for 2 years and there was never the same kind of academic discussion goes on in any of the working environment that I was working in. And so, your brain kind of becomes a little bit retarded, I supposed. When you're away and then you come back, for me I kind of came back and I thought, I saw that the 3rd year were all kind of tuned in and I kind of, was having to retune myself. So, I don't' think that the 3rd years are behind the 5th year. I think the only problem is in communication is that there's there're never any interaction. I think simply, it's kind of human nature that we're in the 5th year, we're also older than the 3rd year.

I: Maturity in a way?

Z: It's not that they are immature, at all. It's that they kind of not really afraid but like shy and so they don't want to approach us.

I: How do you feel about that?

Z: I think, it's really a shame. I think, it would be really, I mean, the school has done some kind of moves toward integrating the year group. But I don't think that like we should fully integrate but I think it would be very beneficial if, you know, if there was a bit more interaction.

I: Between years?

Z: Yeah.

I: Is design something that you can do as a group?

Z: Yes (sounds very definite).

I: You did mention about working with others, right. How important it is? So, can you express more about it?

Z: I think, personally that design can only really happen from a group. And I think, it kind of goes back to what a good design is something that kind of can engage with important issues. They have that kind of values for human and alike that work for the users. And I think, basically anybody who work on their own is wise or just not competent enough to do a successful building on their own. But also, kind of comes down to the fact that when you have two people, you have twice as many ideas and you can have kind of an editing facility. I think it's very difficult to edit your ideas when you're working on your own. Where else when you're working with somebody, the other people can respectfully tell you when you have a bad idea.

I: So, if you were to put a design team together, what do you need to make it work?

Z: I think you need to have trust, I think it's very important that you kind of feel that you can criticized one another and also you can receive criticism without being personal.

I: What about sharing similar references, values and design principles?

Z: Yeah, I think it's quite important that you share similar principles and I think in some ways that it's related to have your trust or kind of relationship being developed.

I: It's quite important sharing in some ways, similar values and principles.

Z: Yeah. But, I think it's also important that they are not all the same....

I: If you were given a choice, right, do you prefer those who have more values or principles that you can share, or less values and principles that you can share?
In other words, is it solidarity important to you or is it personalization important to you?

Z: Oh, I think solidarity.

I: If I were to ask this question again, is a loner a better designer or is a team better designer?

Z: Oh, definitely a team.

I: Finally, to sum up our discussion, in general how would you describe in short your relationship with your peers in the studio from year 1 until now?

Z: How would I describe my relationship with my studio peers? (Laugh). I'll get emotional. I think the relationship that I develop with some of my peers in the studio has resulted as some of the strongest friendship that I've ever had. And I think, it's partly to do with the shared interest and it's kind of touches on a lot of the issues that crop in our discussion....emm....on mutual interest and developing a trust that kind of, to be able to have kind of friendship that develops a relationship in which you can criticize one another.

I: So, this makes you a better person and architect at the same time.

Z: Oh, yes....I guess so.

End.

Pseudo name for Interviewee: Adam (A), Year 6, Male.
Name of Interviewer: Ismail (I)
Date of Interview: 7th June 2005
Time: 11.35am – 12.25pm
Location: P/Grad Room 15.5, 15th floor, Arts Tower

I: Alright, I start with the first question. So, (A) is your name. Do you have any favourite architect that you idealized?

A: I like Richard Murphy....the materiality and such as that. I like the new British architects that are around that really like to work stuff such as the.....I mean this year my main project is being very timber based construction and I love architect that really knows how to use material, touch and experience going through building, actually. And I think, I am a very much textural and artistic. I did Art College before I came here. So, I think I am a lot more about the experience going through building rather than being 'swish-slick'.

I: Ha....ha (laugh). Slick architecture.....hah.

A: With the introduction of computers coming along, things are getting more slicker. Even this year, I felt the pinch, to actually to turn to the darkside, to use computer a lot more. I used it in my own little way, like somehow that it (design work) doesn't look like water colour.

I: So, we get to that later on.

I: Okay, if you have a look at this quote, right, that is from Stephen Fry, a British comedian. He said, 'Architecture offers quite extraordinary to serve the community, refresh the environment and to advance mankind, so, the successful architect needs training to overcome any pitfall, however, and start earning some serious money'. What do you think about that?

A: I agree completely with the first half of it. This is part of the reason why I actually took architecture is that we've got the chance to do live project, things like that actually. I mean, I got a chance to help the cancer centre in temperamental and health centre. But, the thing that you're so cocooned within the community of architecture and you don't realized how much you should actually ask people. When you go out, something like a little drawing which you hanged out for five minutes and you chucked away. When you do this for something like, the people that we did the live project and we help to get fund, and the moments like that really make you feel....oh my gosh....you know. What we're doing actually is very beneficial. But, I mean successful architect needs training to overcome any pitfall and start earning some serious money and.....

I: But, it is true?

A: It's partially true. I kind of see architecture in two ways. When you do leave (graduated), it's the way you think that you have a degree that we're not trapped ourselves and we're not treat as though we had a degree. You go out into the work space, and there are people who have degree and other things earning twice, three times as much than you and I think the way I see it, I mean it's probably very naïve but just about to embark on my architectural career after 6th year. It's that either you sell your soul and earn a lot of money, and do sheds for industrial, something like that or you sacrifice your money, you're comfortable but you manage to do the stuff that actually gets you in the here(showing the heart) and you manage to get things done.

I: Are you in the junction between these two (money and idealism)?

A: After my first year out, the thing I would say about architecture education is absolutely no one has any idea of how much money it takes out from you, how much effort. It's because a lot of the tutors that have been through this, they don't seems to appreciate because they've

been through it a long time ago. And nowadays, money is a big issue. And I, in my first year, I kind of sold my sold my soul a bit. I went to a commercial architect down in London and I earned a good bit of money. But now, after I've done that and seen the other side of it. I think that it was good for me and it made me appreciate that they appreciate who I was before. I want to do more stuff. I want to go out and actually do stuff that makes me ....(satisfaction in career is more than just about money).

I: Good. It's long, long time ago, you know, and now you're going towards the end of your 6th year and moving on to your professional career. So when you first take architecture, what attracts you, actually?

A: I came from a background where we never knew any architect we never have any family and friends who are architects. I've always have a side of me that was, physics in A level. So, I have the side of me that was math and physics, wanted to fulfill that side where you're actually get answer from underneath. And you manage to double frost the entrance, or that is....that's it my answer. I had my side the art college the Art College background in art that I wanted to do stuff, that actually, you know, I could hands on and create space. And, I did 3D spatial design in Art College and the moment I went in there, and when math, physics, arts, they went....you want to be an architect aren't you? Because apparently, my parents say, even from an early age about 11, I was start talking about it, and they don't know where I get the idea from. And I think it's something that I want to balance math and physics and I wanted to have that academic side of my brain but I also want something that isn't marginalized, as well. And, I don't know there's time when you really hate architecture, because you know....but when you open up a book and you look at some of the way light shines on some (buildings). And, its just fulfill it again (the love for architecture). And, that's I want to start. I think architecture, doing architecture in degree and diploma is about the level of victories that you might not get in other courses when they go out and you know, drinks and have a good time. But we (architecture students) work that little victory that little moment when you do something (design) that you look at and you go have....and say I did that (architectural products).

I: Right. That sense of personal satisfaction.

A: And I think that something architecture that gives me a lot of, I mean that to get here, I work in window factory, supermarket to get the money to come here. And, you just feel the sense of when I go back home after this, I've achieve something I've always wanted. And, we never have anyone that went to the university, I am the first one. So, that sense of achievement and I think that's why I chose architecture, it gives you that.... (personal victory).

I: So, you did mention that you are the only one in your family who took up architecture. Is there anyone like your brother, your sister who is beginning to have interest in architecture?

A: I have a brother who is an incredible artist. He's a brilliant artist but he doesn't have the originality, he copies things and stuff like that. He is four years younger than me and he went to do graphic design. And, I seem to have the push in me and I seem to be stubborn enough to do architecture. But, he (younger brother) didn't have that assertion, he went to a subject like graphic design, very competitive. And he did about a year and a half at the University and he's packed it. He works in a cinema now. He has a lot of potential but he never ....(get the real success).

I: Alright, now about design studio. You did mention the studio is the centre of everything. So, if you were to look at the design studio like a zoo for example, or it's like an animal kingdom, for example, what are the species that you can find in this environment?

A: Amongst the people or amongst the tutors as well?

I: It doesn't matter.

A: In the middle of the studio, you have the predators, you have the ones that you know, that come in and want to set up the course and want to do their best and want almost. But, there

is a degree of us in the studio who get on with everyone and like to go around and I suppose were almost like a gazelle. We were flocking around.

I: What did you say just now?

A: The gazelle or monkeys, like we all kind of get along like we're herd, we're like little tribe. And it's even more down in the degree. Because the degree, it's wonderful at the moment, especially it's like it's such a good studio ethic. But the diploma, at the moment, it's weird in the studio because laptops and computers have destroyed it (studio atmosphere). And, there are about 9 of us that actually use the studio on a regular basis. And we kind of like the little herd that stick together. And then, you have your lions, your tigers that come in from time to time. They will come in and they appear and disappear again. Partly, it feels a little bit selfish because when we are all around and helping each other, you get to see everyone's work. And it's brilliant because you're all bounced each other. And then, there is another part, you get these lions and tigers that disappear for months and then come in....you're all like saying....Oh my god....look at what they've done....Jesus. It scares a hell out of you that they hold it in their little room. But, I can't work that way, I like to have people around me because the moment when you get down, it's always good to have someone there to know what you think.

I: So, you did mention about these tigers, how were they doing in their design?

A: They are very head strong and they have a definite agenda and quite often in their tutorial, they were often the ones that....

I: Out spoken?//

A: Not so much outspoken, they weren't outspoken because you feel very comfortable being around all the people all the time. They often the ones that come in and show their design and then, when someone finds criticism with it, they like, you know what I mean. And you did find that sometimes. And you find that because they have big agenda and they stick to it. Sometimes that's not the way they work from it. But, that's not to say they're all like that, you know, you have some of them brilliant. You have some of them come in and they're friendly. I think part of it, stress. People deal with it in different ways whereby some people like to halt themselves away at home, away from the stress. And others always like to hang around and you bounce off other people and you get ideas. But their design work is often emm....I found that a lot of their design work are that they don't change. It's like they come out with an idea and it gets to about Christmas and they have an idea and Easter they have that idea and they don't vary from the agenda. I mean some people are really....I mean, not to disrespect others work but some people when they come in, we have a great time and then they disappear again. But, you often find that some people if they are not surrounded by criticism from other people, they don't fall at their idea on a lot of the time. And they end up with an idea and they stick to it through the entire time.

I: So when that happens, what is the outcome?

A: Well, sometimes you've got people that were brilliant, and sometimes you've got one or two at the end that just, you know that hanging in there no matter what. They don't need criticism and they are all in the world of their own. And they come out with something that is brilliant and they do really well. At other time, they are defensive and react back and they're more in their design.

I: So, they got stuck?

A: Yeah, they got stuck and often they ended to be more stressed, to be honest. Where else the other in the studio....we're able to bounce each other and when one person got stressed, you kind of, help them out.

I: People outside the department of architecture, right, I'm sure you meet a lot of people, you know in your years and experiences in architecture....So people outside the department of architecture find it hard to understand what a studio is. How do you describe to them about the studio?

A: I think the thing that always taught me about the studio and architecture in architectural school is like a little community in itself. And through it, we get linked to other people. Even if you're just people who do work at home or even people from different year, you never....you only see them from time to time, you will know them. And in the street you can say 'hi' or 'hello' to them and.....you might normally bump with them passing in the street and you know everyone that is in architecture. And, it is a little community in itself. And I think, another courses and a lot walk of life, you don't get that. We were all in it together. Well, when I went into the computer room on the last morning and people have been working for two, three days and you're just start laughing with other people .....And it's not a lot of courses that are like us.

I: If some people, for example from the political science. How would you describe them, if they asked you about the studio? You did mention that it is like a community.

A: It is like a community. It's something to everyone, it's different to everyone because you can sit there and you can work in the studio and you can have a conversation, I mean some of them are rubbish. But one minute you can talk about what will be on TV tonight and the next minute you can talk about politics and it is a weird course such that you're meant to be Jack of all trade. It is a little community in itself and it encompasses everything. And it's kind of like you can....one minute be talking about showing way of an draughtsman and the next minute you can be talking about politics. For example, someone happens to see a medical journal when they're trying to look something for their project, something random because they're doing hospital, I suppose and we have the conversation about it. It's weird, it's weird mix and it is a community in itself.

I: So, do you find that's helpful to you, in a way?

A: It's incredibly helpful, it's incredibly helpful to have but I find it's quite depressing the works going at upstairs in the diploma. I mean, as I mentioned that technology is kind of drying me out. People work at home a lot now.

I: So, you did mention about degree and diploma. Degree....are you referring to those people who are taking.....?

A: 1st year to 3rd year degree downstairs.

I: Ah...right. The undergrads.

A: The undergrads, well....where they get the undergrads somehow? I don't know which is weird.

I: It is the degree, the 1st, 2nd and the 3rd year.

A: The degree was brilliant. And I mean, I don't know....if I am looking at it was....(trying to make comparison between the positive atmosphere in the degree studios and the declining atmosphere in the diploma studios).

I: Yeah, I remember reading your email that you did mention that the studio is getting empty. So, you're the one who wrote that, right.

A: It's getting emptier and emptier because I mean, even now in this technological era, it's weird thing in this technological era where the computer come in, is such as and even now that this degree studio has been packed this year. And, a lot of them are doing manual drawing. That's why it's pack because a lot of people are actually attached to their drawing table. But, they also did a lot of computer work and it's pack. And, downstairs, there is high

level of activity going on. And then, upstairs in the well, there has been 9 of us working at all the time. And it's empty and it's been good in a way because you've get a lot of degree students come up to our studio. So, you do start to get this cross colonization and everyone starts talking, I mean, like I said at the start, I have the chance to tutor some 1st years and 3rd years. I review them and that was through me being here in the studio. The tutors are me and my girlfriend. And they are incredibly clever. I mean, you, not talking down like we are any better. But, the amount of ideas that's going on downstairs are brilliant.

I: If they really use the studio to the full potential.

A: Yeah, to full potential//

I: They might really gain a lot.

A: And they didn't and that the degree does but the diploma didn't. And diploma is almost just become a storage. And in it, there are just model all over the places. And, I don't know, diploma tutors probably, won't likely to serve us because there is almost wall going on in the studio upstairs. But, at the moment all the diploma is being used....when someone come and bring model and just leave it there. And then, few of us who actually use the studio have to constantly move model around (to make ways and spaces). The studio, I suppose, and that it is dead up there. And you get certain groups that come in from time to time, used it for a while and then disappear. And then you get other people like there are these people in our course who can't afford to buy computer, I mean, I can't afford a lap top and the stuff like that. So, you ended up trying to use the computer facility here and the computers, they made us start (working using computer), they put some computers down in the studio. And even though, they are a lot slower than the one up here (computer room). I would rather work in studio because you get an atmosphere down there even with the 9 people.

I: Right. The right atmosphere really helps you.

A: Yeah. It helps you and helps you going.

I: So, what do you like it to be more like, if you were given the chance?

A: If I were given the chance, I would, I mean, I have to admit that the computer is taking over, you know, and we would never going to stop that. And at the moment, like I said, it is a just a model first. And I would think, it would work better if they split it down into studio computer and drawing tables, and computers that actually work, for a start and computers which can actually be used to a reason that fits. And I think if they did that you can bring more people in there. And there is a thing in diploma where you find people that you see them coming out of tutorial and disappear and you only see them in social events, stuff like that. And they pop in for few minutes and pop out. And I think, the studio is starting to lose its value completely and it is a shame. I like to see it become a lot more like it used to like hobbit used to be. It isn't a hobbit anymore. It's weird that you have that even often we've finished, I mean you still have the external but people migrate toward the studio, you don't what else to do. I mean we finished our internal and basically we finished our work but we still coming in because you left this 'garden', while that's it....and you left wondering and you do migrate towards the studio and walking past the Arts Tower in the night and you see the lights on in the studio.....

I: It really struck you, right.

A: Part of it, is really awful....

I: Ha....ha (laugh).

A: You see people walking....but it is reassuring that you know that there is community out there (inside the Arts Tower) that is going through the same time.

I: Yeah, just imagine after six years going through, you know, the studio experiences, going through the community and of course, you have a very strong memories about that.
A: I think, that's what makes the studio. It is the people. I think that what makes the school of architecture, to be honest....is that the tutors are great, the tutors are brilliant, but the tutors are never....they are not there always for you. And the people who are around you (in the studio), they are the people over there who makes the studio (atmosphere).

I: Right....right. Okay, success in design, in the studio could be rather seen as to be either luck or talent. What do you think about that?

A: What was the question again? Sorry.

I: Success in design, in the studio could be rather seen as either luck or talent.

A: Luck or talent in the studio? I think that the studio develops you a great deal. And I think like I said, you do get these people no matter where they work, in the studio or at home, on their own or with helps, they will achieve brilliant. And it doesn't matter about that because there's people, you know, bless them, you know they are going to be next Libeskind, next Calatrava then nothing going to change it (luck). But, I think the studio if you are on that stage of being good and have a lot of potential but, if you need that spark, I think the studio can give that. It is because I think being surrounded by people is one of the best thing, it is. I notice that there's a big difference in the 1st year in degree. The first two years, I didn't work that much in the studio. And it's almost you get the fear of coming to the tower for tutorial. And we even had that a few people in diploma that broken down and over year.....you've become afraid of tutorials because you think that you're going to get the kicking. Because no one has seen your work and you don't know what anyone else think and everyone ended up drawing like that. But, where else in the studio, you can't do that and then you constantly and there are a big jump of keeping it to yourself and then criticize and opening up to the world and criticize. And in the studio, it's always opening up to other people. When I start working then (in the studio) in the 3rd year a lot more, I notice my confidence grew because you have people coming up and ask you question all the time. And you constantly are evaluating what you're doing. And people who are talking to you and start asking you question, like, 'Why you've done that?' It's not like criticism you but it's just like they sit there and start saying, ' Ahh.... I like that and why do you do that?'

I: Right, right. All the sudden you start thinking.

A: Yeah, you start thinking. And, it makes you think about things. And these things like in the studio, you might have a building that part of it isn't quite working and you can't see it work for the trees because it's engrossing it. And then someone will come along who has seen the work come along but haven't and they go like, 'Why don't you do that?' and you like, 'Yeah, why didn't I do that and why you don't get that up on?'

I: In a way, success in design is not so much about luck. It's more about talent, developing your talent and developing your....learning from others.

A: Yeah, I think it's the developing of confidence and learning from others. And, I mean there is the moment of luck from time to time, when you do something and an accident happens, a happy accident. But you can't rely on that alone. And it's developing and it's being around other people and having them put their ideas and your ideas, your ideas and their ideas. And, it's kind of bar of exchange, that in the studio you are like, you've help someone else and you know that they're always help you out when you need them. And part of it, for me is the fact how I live. The brilliant thing this diploma is that I lived with non-architect (students). And away from the studio, I have my heaven and the non architect and the real world. Two people are actually working, and I can go back to them and it's the real world. There are things like the showers, plus other things something like that. And when you are coming to the studio, you have architecture so I can distance myself. But, I mean, I hang around with my friends from architecture but there is this distance and we often find it's that you can't switch off even if you sat in the pub and you're just kind of talking about architecture.

I: So, what kind of knowledge, values and skills that you think are important in architecture?

A: Knowledge....I would think management of your time, as I've landed over across this course especially in diploma. I think diploma is not necessarily harder than degree, I think it's more intensive. But, it's more a case that you have to learn how to manage yourself.

I: Your time, yourself.

A: Your time, your priorities and you start to learn what you should be doing. Instead of wasting time on a certain drawing or model, you should be doing this rather than the drawing or the model. I think by being around the other people, you can gauge that, where else you can't gauge it when you're not around other people. But, I think that one thing that I think for architecture, definitely. And another thing, I mean is that to open yourself up a lot. When I went to Art College.....I felt my first two years here is a setback. There are a lot of things I learn in Art College but I wasn't allow to apply myself. But not so much of allowing, I felt that architecture is a different thing, and then in 3rd year, my confidence level start to build up, and do scribble, that I would have done at home and chuck it away. But, I did it in the studio, someone turn around and reply, 'That is really nice' and you start to discover that actually what you're doing has worth and it's actually that some people are looking at that....you think, you just walked out and throw it away.

I: The thing that they appreciate and the way you appreciate.

A: Yeah and if I don't understand of what's happening in the studio, I wouldn't still being locked in to hiding myself away.

I: So, let's go back to the work of the signature architects. You did mention about Richard.....Murphy.

A: Richard Murphy, right//

I: You can see that there are coherent set of values and principles in his design. Do you think that is a good way and very useful in design?

A: I think when you're at educational age, you are experimenting a lot and you try every project to look different than the last one. And then, I think as you start develop and you get into the diploma, you realize that you have the style of your own. And you realize that is who you are. You might try to find it from time to time. Of course every building, can....as you develop does start to look different. But, these architects, you can look at like Libeskind who is an extreme and Murphy who loves model or rural studio, gorgeous stuff, absolutely brilliant and you can tell their attitude and their ethic behind everything they do. And I think that's really important and it makes who you are and you start to develop this ethic. And people like Murphy and Mockbee, you can see it's by truthful of materials and truthful to nature. And using material the way they meant to be. And you see Mockbee using material that you would never saw, would be impossible to use. And I think, that's important to architects and it makes everyone different.

I: So you are also developing these guiding principles and these particular ideas. Yeah, you need to try some other things but somehow rather thing develop slowly built in yourself, right.

A: I think, partly, we have this interesting thing in the diploma, that you are half of the studio is very....because you have the studio aesthetic to the different studio they're in place. And you have a different way of working. Half of the studio is like be who you are, you spent six years being in this work, we're going to harness that. Some other studios you almost, you will be similar in the studio. And a certain studio, you are just a member. And then, another studio where like you can be yourself and develop yourself and then, if you spend six years developing the way you are, coming up against, well anyway like, you can't be who you are that's something tough. But it's something that's....development of....the way I've started to, I've notice that every project that I've done in diploma is very community based. So even, I'm not a sensitive designer of style, almost my principles, I wouldn't want to do something that

was like....I suppose, it's reaction to do with commercial architecture.....anything that I've done has been very community.

I: Okay, let's put it this way, the studio is like a karaoke lounge where you're singing and you try to sing differently but at the same time you are imitating the person in the TV screen. Do you find this situation, you may call it the similar yet different in your design studio?

A: In my design studio, we've been in it, it's been interesting because we've been on interesting group this year, especially, after last year when the idea....everyone tend to hook this year, almost. With us being a very community based studio, that I've been in particular and it is strange, that everyone go with their own style, but you do, I suppose, because our overriding ethic was the site that we all ended up kind of....right at the beginning of the year, we all ended up looking at the same thing and you do, over the course of the year in the studio, you do move in and out that one minute you all coming in with this wide ranges of different styles, then suddenly, you find that you are actually the same, looking at the same thing. And then, as the year develops, you start to branch off again. And you start to branch off and you start see things your own way, you start to show things in your own way. So, there's always that overriding ethic of where you're actually looking at the same thing and you were actually....because I mean, the site was quite small, a little area of deprivation and you all do go in there, and you do want to help. So, you all do kind of come out with the same thing. We all do look at the same....well, the problem with it is health, the problem with the area is no one has any job, the problem with the area.....so you all ended looking at the same thing. And then, as you start to put you own spin on that, you do start to branch out and come up with different thing. But, there is the case of no matter what year you're in and no matter what you do, there is the case of architectural magpie, like you do see certain thing you do, kind....like that and you say.....'I like that'. You do that in the case of looking for your research. But, you're also seducing your friends and you do. And someone may say,' Ahh...that was interesting'. And they did that and you are not plagiarizing because that is like I said earlier on, almost like a partnership system, you do like to help each other out but, you do know that there are certain things that would be.....So, it's interesting that goes on.

I: Do you find that you talk differently about architecture in the studio, as compared to when you talk to your parent or someone else outside the studio?

A: I think, I try not to because I never wanted to be one of these architects that blind you with science. Because I often read some of the stuff, architect's stuff and you just read it and it's so impenetrable and I don't ever want to be that kind of architect. I don't want to be that type of architect that has one way of talking to one person and then one way of talking to another....'I am going to blind you with long words' and stuff like that. But, there is a definite, I mean, it was said this year, drawing for your peers and drawing for your community, and you do know that you do have two masters. And you do have....and around my friends you can talk about certain thing and stuff that you know, you take for granted because you all doing the same course and you're going into the same thing. And then, it's like with my parent, it's such as that I mean, my parent is pretty much wild by whatever I do. It's nice to have that but I mean, working in places like I work in ASDA supermarket and work in factory, and people do genuinely take an interest in what you're doing and they do ask you question. But, the first question, they always ask is....architecture is that like building? And I kind of said, 'Yeah'. You know I often, the way I explain to people when they ask. But, people have an idea about architecture....they say the man in black suit, they see people like Foster on TV and you get this idea of superstar architect and everyone think that you can earn a lot of money which is rubbish. But the way I explain that is, 'Well, the building you're in now, that's basically the type of thing that I do, where else you know, the wall you actually touch and some one like me would have design it, you know'. That's the way I often explain it to people.

I: But, when you go back to the studio will you do the same thing in explaining ideas, your design?

A: The way I like to design thing and the way I like to think through is what it feels like to be in that space.

I: More commonsense//

A: I think, I'm a lot commonsense than other peer. I often stood there when someone start to talk architectural rubbish, I often be like my eyes are rolling and I'll go, 'You could have say that in a sentence', you know what I mean.

I: Is design something that you can do as a group?
A: I think it is. I think that this group work is often the stressful thing you can actually do. But, I think that everyone brings it to the table a different thing and everyone has different strength. I think group work is brilliant however, it can like I said before, it's stressful thing even. If you go in there, I think you have to go in there with the right attitude. If you go in there with an attitude that this is going to be my masterpiece and it is going to be this way (negative attitude which creating problem in group work). But, I think, it's all about compromise.

I: So, if you were to put a design team together, right. So, what do you need to make it work?

A: For a start, everyone has to have trust. You have to trust each other. I think that's the most important thing. And one thing that sometimes make you....I use the word bitter, but that's a bit extreme, but everyone has to put in their fair share in a group. And, sometimes, when you see people and there is a bit of resentment....and I think trust is an important issue. You have to have people like, you know, have as much commitment as you have to the....(group project).

I: So, what about having strong common principles and design values?

A: I think strong common principles, definitely because you're not pulling different directions. I think, if you have a common principle and an agenda and you're out to strive for that. I mean, it's like, you know, it's like a football team, you have members that are brilliant. They're in their own right but everyone is striving for the same goal and ambition. And if, everyone is going for that same thing and so they're helping the group. But, I mean the two major group work that I've done in diploma....the two live projects. They were brilliant that we brought something in the forehand. The thing that gets me about the end of it is you don't think that you're have had actually done anything. You can't believe that what you've actually done, these people are always wild by it. People who are like the men of the health centre that we've helped. What we did, we just did it as a group. It was almost a stress but we did that and we handed it across. We were like....we did a presentation at the end of the year and you just think is part of the course and you look at it not part of the educational process and it's part of the course thing is that you know, that was you expected to do. And you do a little sketch of something and it's just the look on the people's face that aren't involve in architecture and they look at it and they will go, 'Wow'. And you go....we just did that in less than 5 minutes. And the group which we were in, were brilliant that there were no ego. That's been the thing with my studio this year, as well, there have been no ego.

I: Finally, in general how would you describe your relationship with your peers in the studio from year one until now?

A: Year 1 until now, I would say well, I mean, I've always been open to people and I've always been quite friendly and everyone else always know is that they can come and talk to me. But, I've said, people always know that if they want to talk someone and want to have....they know they can openly and just talk to me. And I've said throughout the course, the 6th year is developed a lot more and it's kind of branch out as well to the other years where I've come. I have gained the confidence that I can look at the degree and talk to degree (students) now and such as that. And....but, the degree is becoming a lot more open now, they don't seems as afraid as the diploma as we used to be.

I: So, how do you look in terms of your relationship with design peers?

A: Emm...it's interesting, as such this, this half of my studio, I've know since the 1st year. And then you get a lot of people who are coming from other schools that we've never met.

And I say I treat everyone equally. It's weird that in such that, in so much that you've known these people for six years but even, people who you've only knew for a year. It's the studio kind of breeds that as such you are in everyday. Even the people like I've said who work at home, if you're in everyday and they pop in, you've seen same people everyday, and it helps a lot. And my relationship with my peer is just growing. It is like friend for life.

I: Like what you've said, community//

A: Yeah, it is a complete community and it is friend for life. Partly the downside of it with us being a community, a small community is that you know everything that goes on. And if anything that did go on.....

I: There is no secrecy (laugh)//

A: There is no secrecy and everyone knows everything. And you are a lot more open. But, you do get people that are very much closed and don't say anything. But, you've got a lot others that are very open and tell you everything, normally when we're drunk. And then, the next time they turned around and they would say to you, 'Oh, God did I said that'. But, it is a community and that I've said that is the thing that is best on the studio. And the sad thing at the moment with.....

I: With....losing it's touch

A: Yeah, right (feeling quite emotional). And I hope over the next few years, it starts to come back again.

I: There are changes need to be done.

A: I think, changes, definitely, need to be done to the studio, especially the diploma.

I: So, thank you very much. I really appreciate our session. It has been very brilliant.

End.

APPENDIX C

Transcripts of focus group

Pseudo name for Interviewees: J, K, G, H
Name of Interviewer: Ismail (I)
Date of Interview: 5th May 2006
Time: 10.30am – 11.30pm
Location: Meeting Room, 15th floor, Arts Tower

I: Alright. ok well thank you very much now lets go about... I am going to open up so who ever wants to speak first go ahead, it doesn't matter you know. So the first thing is its about the environment itself right, so lets say if the studio in architecture, right and let's with the engineering you don't mind, if the studio is like a bazaar or a market place or an art gallery and you don't have to agree, how would you describe the lab itself ?

K: Well engineering department is a much more restrained environment where it is not about expressing yourself as such and its much about doing exercise and it's very, I mean this is just a way of doing things where else the architecture department which is therefore open there is no real right way everybody does something different you know

J: Yes, I agree with that but I think the tutors keep telling us that you can be a creative engineer and you can like creative engineering you know not all doom and gloom when you're an engineer and you're not going to be a slave to the architect and all of that and I think its more sort of to do with finding efficient cost effective ways where you start sort designing something rather than designing it in an aesthethic and you're actually designing the practicalities side so its more taxing than actually thinking but, its quite fun at the same time if you get used to it its quite fun

K: Yeah, I think in the lab it's far more ordered.

I: If you would like to describe the lab, what can you describe? Is it like a school or a mental institution or something like, what do you think?

K: It is set up like quite similar to a school like with groups of table....

I: What was that

G: You have group of tables...

I: You did mention about school... any particular school ?

G: The studio is more like a nursery is like messing about.

K: I've always thought that what is funny about the studio is when I've go there I feel like I am going back to the nursery because it kind of ok back to basics lets fool around with it with a bit of paper and a pen and see what happens kind of like I am three years old again and re learning the basics whereas when I'm in the other engineering departments I am here and I've got ten fifteen years of school behind me which I am using in like progressing with it. So, it's really like two different approaches.

I: Ok we are going to get that idea in a short while. So we're going to get back about the benefits, you know, the learning benefits and also how the benefits in term of sharing. H, do you want to say anything about this...?

H: Yes I agree I just think I don't think engineering is worst or better. It's just different. The thing I like is that I really sort of know my way around the department (engineering) but I don't know my way around in the Arts Tower but I just know where everything is and its sort of mix with other students and ....

I: You mean in engineering

H: Yeah. In architecture...

I: You know your way

H: You just like to ourselves and you don't know anyone like in the 2nd and 3rd year

I: You mean in engineering?

H: No, I mean in here (studio). I don't like...understand the structure of the school (architecture) that just what I want to say.

I: Oh right, ok. So its like lack of structure then... in a way

H: Yes

J: I think if we described them (lab) is like we actually have the tutorials in the work room you say lab sounds more clinical it sounds more like we experiment in ways its just a work room its like tables and chairs and get facts and figures to deal with and its there kind of find the most efficient things and if you try to describe that compared to the studio it's a lot more you're not being spoon-fed knowledge so much but you're being given knowledge to use how you want to use it

I: You mean in the lab?

J: In the lab, yes. But in the studio, they just give you a guiding principle or a guiding thing and which say alright.... follow this line of thought and if you're 'X' students, you will follow the line of thought turn it around do something else go on holiday you know.

I: Are people become your references?

More books...it's more book based you can do stuff like everything we've done this year so far there is only two ways of doing it one of them is British Standards the other is Europe code where as in architecture there's a hundred and one million ways of doing stuff. So, its different but its good in a way because I find it quite comforting knowing that there is a structure for doing something and actually getting an answer right rather than, you know, having a poke in the dark as it were and then maybe not getting it so right and you know, you're kind of hit it

I: Right... So, ok we'll get to that idea in a short while. So, I better write down about this things. So now we move on to the idea about the peer activities itself in the both environments. What is your experience about you know of course you did mention about the nursery of course in the studio because of that you may find students in the studio they are jumping on the tables do things like you know you aren't expected or least expected. What do you think about that? What do you think about these common behaviours?

J: In architecture because they're a year younger than us the like all freshers, they are all like a bit, you know, we're in university, we're bit free but the first two or three weeks were just mayhem where still sometimes like my side of the studios I don't like working there because there is so much noise and just so much like people I am actually doing work and tutors have actually complained about this people making stupid stuff like stools and stuff and people can't find anywhere to sit down because someone thought maybe it is a great idea to make a coat hanger out of some stools

I: What was that?

J: A coat hanger, it is like stuck upside down. And then I thought it was a great idea until I wanted to sit down and so I was like yes, that's great you know I want to sit down. They're not crazier than us, probably they're affectionate.

G: The studio it does seem very much a social space everyone talks about where they've been drinking and the night before and where they're going tonight. It seems like that they never actually doing work, sometimes.

K: That is because, I think, it's not to do with the fact that they're younger than us and stuff like that. It's just that the studio is a place where you spend loads of your time you spend twelve hours you can fill a full day in the studio so obviously its not just a place where you work its also a place where you live and to be interactive as well you...you write on the wall, you take furniture around and I think if someone's made a you know like he said a guy pull out of stools then its your right to stick it up so you can sit down kind of thing it's a bit like a kind of creative jungle where you can just come and do your own thing you know

H: I don't know. I don't think there so much difference. I think its kind of easy to complain in engineering and everyone knows its hard and you can just come there and sit down and be like I'm not doing this and I'm just like... no I can't be bothered. You must look at that it's nonsense. Where else in architecture you couldn't say that because someone like can say come on its easy. I better get on with my work

I: Any other things like, you know, things like they like to debate, criticise. Like in the studio, they just criticise and you know and they are very open.

Whatever you're saying about criticism like peer criticism if you're sat in the lab doing like structural reinforcement we'll look at each others work and help each other out or say oh you might to back this in or up or you might use this dimension or whatever in the studio I sometimes like go to one of the girls in the studio... she's not been helping me but she's like being that voice inside my head that I just don't hear and you sort of sit next to her and say I need some help with this and she'll go like this and that's the one, you go back and finish it and its really cool

I: Does that happen in the lab?

J: Yeah, sometimes.

G: Not as much. It happens a lot more in the studio like people wander round and you go and people were generally to start conversation, 'How is your project going?'

I: What about in term of the tendency for them to group...to have their own private place. Is there any?

K: I think that's pretty much exactly the same for both departments its not really to do with the activities. It's just a social thing that people would meet together and you'll find the same kind of little groups of friends.

H: But I think engineering is a bit more restrictive maybe its because we've been together for nearly two years its like, kind of set group and just would sit with another group.

J: High school

H: You're not with us

I: So when you refer to the high school are you referring to the lab?

J: No, just saying that if you like going to the lab session its just like being in a high school class really where groups of friends will sit around the tables if you go and sit around that table you might get dirty looks, you might get spat up or you know, get stuck or whatever. It's not that bad. They are a bit more mature about it now about but you know there's the whole...you know.

I: Ok. Do you talk differently with your peers in the studio as compared to your peers in the lab?

K: I don't think so. No.

H: I try not to mention what's engineering when I'm talking to architecture group because they go like, 'Go away from me'.

I: Why is that?

H: I don't know.

I: What kind of things that they say?

H: Obviously, they don't have much of a clue what you are talking about and when you start ... oh yes, like you know, I've been doing some engineering today, and I like to get on my steel project and I find it's really hard and I need to do sections and they go like... ok, alright. So, what you have been doing, where did you go last night. Change of topic.

I: Ok this is referring to the peers in the studio. Ok, any differences about you know, about catchphrases, buzzwords...I mean when we had this session, like the CAD Monkeys, it's a kind of buzzwords, catchphrases among the peers in the studio. The other thing is the photoshop rash... have you heard about that?

K: Photoshop rash?

I: But do you have that differences about you know key words, catch phrases that you know....

J: I found like peers in the studio come up to me and go, 'You are engineering student, right'. And then ask me something absolutely ridiculous about how something is going to stand up and like you sit there and think yes you can have that in the corner you can have a whole corner which is glass...slab reinforcement and they're like, 'You're an engineer I want to get this approved'. And he's got a model and everything and you just think you've already got the model you know you've got the conviction to do that have the conviction to let it stand up you know.

I: So in the lab what are the things that you know....the kind of verbal communications that you have. What are the materials of conversation that you have in the lab?

K: What do we talk, apart from our general lives it's just, its... I don't know the exercise we're doing its mainly exercise based unlike the architecture which is much more free and I think in engineering, you have a set number of tasks to achieve like and so therefore since we all we are kind of doing the same thing we kind of all progressing together whereas in the architecture studio its more like everybody is doing their own thing. So, obviously when you going to go to see someone else to talk about, its going to be to talk about your own project or their own project whereas in engineering department it's all common problem, everybody sees.

I: So like in the studio, right, do you think that the peers...the peers among you prefer to talk about concepts as compared to those in the lab?

K: Yes

G: Yes. We don't really deal with conceptual designs in engineering its more about the math and science.

I: So, why is it people don't talk about maths in the studio but if you talked about concept, they are more interested.

G: Yes

K: I think it's that it's just a definition about architecture and engineering is one of them is by definition more conceptual and the other one is, you know, more scientific.

I: More scientific. So, in terms of design how does this idea about concept benefits you when you're doing design?

J: I think in engineering, there is quite a lot of concepts as well, like the project we are doing now we had to design a structural reinforcement for a building and there was quite a lot of concept actually put in the members where you put them and columns and stuff and we were just given like a shape to make it stand up rather than given, we were given like limiting conditions as well like where you can't put beams and avoiding spaces where you can't have columns and stuff. But apart from that it was all up to you where you put everything. So it was quite conceptual, it was asking you to be creative about it.

K: So that's the thing that it's like two definitions of the concept in design. When you mean concept in engineering its logical and it's purely like you've said where you can't put the beams and concept in architecture can be much wider...it doesn't have to be, it can be philosophical, maybe.

I: So some of these concepts probably they talked about certain concepts about architecture in the studio...they talked about the works of architects, the concept by the architects. So, do you find that in the lab?

J: You find that...you'll have like....we'll have like... there's the thing is we discuss a lot of broader topics, quite broader on what we discuss things like roofs collapsing and snow loading and pressure and stuff and civil engineer have to patch it all in. That comes up quite a lot like catastrophes but we don't actually talk about other engineer's works because the engineers aren't renowned for being engineers, I guess, whereas architect is.

I: Do you think its got...this is quite interesting differences because where, you know, in the studio they like to talk about the architects but in the lab what do you think? What are the things that they like to talk?

K: I think we do refer sometimes to famous engineers for instance like I know we've been talking about Arup maybe last year or whatever its just that I think its much you realise that an engineer doesn't have any like we know engineer has his reference, for instance... we kind of ok whereas you find architecture are much more prone to know a lot more about famous architects. Its kind of ok to be an engineer and know nothing about famous engineers... architecture is much more about knowing this for architectural culture, I think.

J: Name dropping, I guess.

K: Yes it is.

J: It's sort of name dropping. It's like , like if you were to say that you'd got your conceptual design from looking at the works of Norman Foster, Frank Lloyd Wright ...stuff like... what they called the...you put all that in there and you actually reference it in your portfolio, you're flying because tutors like stuff like that. Whereas, if you were to go into engineering and say, 'Oh, I've got this design from Over, Arup and Co and they'd be like, 'Oh, it's a different building and that's plagiarism'.

H: That wasn't really made sense.

I: So what do you think ?

G: That's was basically what J was saying.

H: I think the engineers are sort of like they accept the fact that they are hardly ever going to be famous and they know they are not going to get any credit for the buildings they designed. It's just like you know, you do all this hard work and make the building stand up but no one ever knows our names so just get over it

G: It's strange because I think in architecture the engineers have more value than the architects do in engineering. It's like J was saying, it's like they come to you and say oh you're an engineer student and are thinking a little bit about how it works whereas in engineering I don't think it's how relevant what the architect is doing. And then they just want to make structure, make it stand up and want the rest of the building looks like they don't really consider.

I: Right. So, suppose right, you know, if you look at the studio or the lab...so the heart and soul, if these things are not in the studio, the drawing and the model. So, in the lab what is the heart and soul of the lab that live up the activities in the lab? I mean, what kind of materials are....

H: Calculator

K: Yes. Paper and pen, really.

I: Is it because the nature of the work?

K: I mean what is funny is that even though engineers might be the ones who might deal with actually building the structures and stuff when it's dealing materialistic thing we never actually very rarely deal with actual models and physical representations where we are working on. It's all on paper and our brains whereas in architecture which in the ends, the architect has no idea how the building works and stands up he still works with the space which is quite contradictory, I think.

J: The thing is that if an architect is working to scale, his scale is a straights so that it looks right for that scale but you can't actually scale the load and scale the beams or columns.

H: I don't know I still think that we learn a lot as engineers by modelling stuff and that is why the few lab sessions which we actually do are very helpful.

G: Its like our lecturer who says that you get a feel for the size of beams and what they should be but we don't because its all numbers. But, if we actually looked at the size of the beams you could see, 'Yeah, that looks like it would stand up in space'.

I: I mean so the studio benefits you in term of understanding more about the real thing.

G: Yes

I: Interesting. Ok, any other... that thing about the lab, you know, is there anything that people here(in the studio) can learn from the lab?

J: Making things stand up. I guess because some things you know... I was working on a model one of my models and I just didn't know how to make it stand up and I thought, 'Ok, rationalise it up get a bending moment diagrams going, why do you need this, why do you need that and by the end of it I had like a little truss thing'. It was wicked.

Ok now moving to the values. Success could be rather seen as either luck or talent. Right, so, I am going to follow up with another question, so based on that idea, what is the characteristic of a successful studio work and what is the characteristic of a successful lab work? What kind of values to help the inner strength?

K: I think good studio, one of the characteristic of good studio work is the ability to work with the medias like you want to use photos, you want to use drawing, you're going to use models, want to use whatever or computers. Lab work is not at all like this its more of one medium.

I: One medium

K: Yes

J: I think its like with architecture all you need to try to is represent an idea, put your idea across and say, 'This is what I want and the best way to do that is to model it, to draw it, to get renderings of it put it on back to work get 'Atlantis' which you use from inside outside underneath everywhere. And, it's just like with engineering, it's just the flip side of the coin, they just give you numbers.

I: So do you think that you need to be more courageous in the studio for design work as compared to lab work because you know, do you agree that design, probably there's a lot of things that you did mention about you know in the lab we have more of these numbers and you can work easily with numbers...

H: I don't know. Success, I think, it's strange that you're saying that success is luck and talent. I think, it's all hard work. Luck is 10%, maybe even less because if you don't work you don't have anything.

I: So, that's in general.

H: Yes

I: So, how do you compare between the two?

H: I think, it's the same, like maybe in architecture like, yes let's say if you've got some kind of special imagination and I don't know but if you've got ability but its all hard work, anyway.

I: Ok, G?

G: What was the question again?

I: Ok, just now I did mention about success could be rather seen as either luck or talent. So, to think this idea and you put that in the studio context and you put in the lab context, because you are experiencing these two, of course you have the different adjustment that you need to do, right. So can you discuss about the differences about the idea about the success both in the studio and the lab?

H: I think that luck lab can actually help you in the studio. Like, if you're lucky and your first conceptual design actually works and you can kind of move on and it's like it's really good. But in engineering, I don't know you're lucky if your calculator doesn't break. It's nice in a way because you know in a way that right nothing can really happen to you, you just work and get it right get it wrong but you know what you are doing.

G: Yes, you know what you've done whether its wrong or right like whereas in the studio you're not sure of the success and you have to and I think confidence comes with it as well. you have to be confident that what you're doing is right

I: You mean in the studio. You need to be more confident in the studio?

G: Yeah, and then that like inspires you to keep working with it.

I: So if you're not confident what do you do, because if you don't have formulas, you don't have the numbers, what do you do?

G: I think that's why there was so much feedback when talking to other people about your design and trying to get someone to say yes for going the right way and then you feel more encouraged to continue with it.

I: But....probably, we did mention about, you know, in the studio talks about concept in the lab, they talk about numbers, so it's much difficult to talk about concepts as compared to numbers, right.

J: Not really, because I think if you're talking to an engineer I think you're talking about numbers you're saying you can easily do blah blah blah, columns which is like this and all they'll understand exactly what you're on about and they will say to you, 'No. Look, you don't want to fixed stand, you want a pin ended, you want it continues'. So, they will tell you exactly what you're want to know.

I: In architecture, what kind of...

J: And in architecture they talk in riddles as well its like for the first three months four months I just didn't know where to go its like I want to do this and then you get a riddle back and you're just sat there thinking, 'Why, why god...why'. And then you figured out the riddling thing, 'Ok, maybe I need to do some work that's what the riddle said'. And then you go and do it and come back....

K: I think what G were saying about confidences. in engineering like you've said, 'Oh, its either a pin end or a wherever ends'. There is a limited number of things that anything can be. In architecture, its not the case, there is no limits and that's where your confidence comes in and that you are hearing, 'No, its either this or this or this and then forget about that, forget about this'. And then you need more personality to do architecture.

I: Is that true, H?

G: Yes

I: So, ok, after talking about these few things about you know, the way things, the way the peers interact, the ways the peers talk, the way the peers value, right...so personally...how does these benefit you in either way, I mean, so for example, in the studio what are the things that benefit you personally after having gone through these particular cultures?

K: One thing that benefits me a lot in architecture and that I can never get in engineering is the fact that in architecture, one of the big exercise I have to do is to constantly think as to how you are thinking and try to change that as much as possible I think. What we are taught in the studio is to be able to take a step back from our own processes and look at it and say, ' Ok, what am I doing exactly'. And that's I think is really interesting and as a person, just to be able to do this, you don't do that in engineering at all, I mean.

I: What do you don't do in engineering?

K: What do I not, what you're not do...you don't actually take a step back from whatever you're writing down and think what is that actually means, you don't know. It's just a straightforward process which you picked up from the book.

H: Yes, like you're right in away. But, like maybe yesterday I did exactly this thing in engineering I was designing something and I thought was right and then I took a step back and I realised it was all wrong and just started again and like maths wise and numbers wise it was everything fine but the concept was just totally wrong.

J: I think from architecture what I find that appeals to me is the fact that you can come into studio and I actually enjoy designing stuff I've done but I actually enjoy being given the challenge saying oh right here's your problem here is the brief this is what you have to do go away and do it and I'll go away and I'll think about it and I'll think out my thinking and I will draw something and I'll think ok how does that work and I'll draw something else and I'll draw and I'll draw and I'll draw and then eventually after like a week and a half or in this case four weeks of drawing and making models, six weeks of it I finally come to something I'm happy with and then you give it to the tutor and and he says no and that's when it really sort of that's the thing that I don't like about architecture with engineering you can go to all 3 of the tutors you have in the workshop and they'll all say ok that's right that's wrong and that you shouldn't do and then in architecture if you go to like four different tutors one of them will say he loved this part then another one will say he loves the whole thing one of them will say no scrap it go

back to the drawing board and the other one will just not care its just like one of them just refuse to understand.

K: That's what so good about it, though. It's exactly what is interesting because that's when your comes in and you choose to listen to that tutor and not the other one whereas in engineering it's so restrained, it's just like, yes, you've got it right good for you that's the end of it. And there's this line after that you just drop this paper, you go away and forget about it. In engineering, I mean, in architecture is never ending process nothing is right nothing is wrong it's all about whow.

J: And maybe like me, you get everything wrong and nothing even matter

G: The engineering, its like you do it and you get the answer and you are finished. In architecture you never ever finish, there is always, there is small scale detail that you can look at and you could change options. So, basically when you go to your review even though it's the end, we are still discussing things that you've changed and do differently.
I: So, ok now we go back to the behaviour, right. So do you think that you spend more of your time in the studio as compared to the lab?

K: Spend more time in the studio

G: Yes, we do now, yes

I: Why is that?

K: I mean, simply because I've seen the work you do in the lab can be done at home so maybe you spend more time at home doing your work in the studio you need space, materials so, if you want to do that work you better do it here.

I: What about the process of design itself?

H: I don't know I sometimes find it easier to do architectural work at home because I just need time and sort of, to like concentrate on my thoughts I just can't do it in the studio.

K: You get a lot of inspiration in the studio though sometimes just looking around what other people are doing.

I: But you still spend more hours then doing design especially working after hours. What do you think?

J: I think after hours, it's like with architecture the way I work is I to stick on a wall and I sit under it my desk is like in an alcove thing and you just look around and everything that is right pops out and then you just draw it. With engineering, it's like you can look at rim and rim of calculations that you've done and you have to this for a project we were handed in. And when you are writing up what you need. And you don't know what's right and what is wrong what is good and what's bad and then you have to logic it out which takes forever and then once you've logiced it out, you think, you take your step back and your process is all wrong....it's all in muddle.

I: So this is back to the behaviour do you think you see more students spend longer hours in the studio as compared to the lab?

J: Yes

K: Yes, because what you call the lab is just a room which like this one, it's kind of reserved at a certain time.

I: But are you given the freedom to go to the lab when ever you want?

J: Yes

G: It's book a lot.

K: They would say, 'Why would you go there when you could do your homework in the library for instance'. You know, the whole point of this room is the engineering work room is that its big enough for the whole year to get together and work with the tutors but otherwise its not the place, the space in itself, doesn't have any special characteristics that we can only do engineering, here you know.

J: Its very bland, its soulless almost its very utilitarian its like got no disperse of different years, handouts and great views, good breeze. Its really nice that way but apart from there there is nothing you can actually personalise it with. There is nothing you can say you know every time I come to use for the work room going to sit here with these people going to do this and the tables are all bland, it's all laid out, I suppose.

I: So do you learn better as a group in the studio or in the lab?

K: As a group?

J: I see it as different types of learning. One of them is like I don't know, more intuitive one of them is more sort of once you start doing the engineering and getting used to it. I find that sometimes I don't need to look at books to find like safety factors because you've done them so much its like drawn into your head

I: You mean in engineering?

J: Yes and sometimes sits like, like at the start of the year its or the start of last year even we didn't I didn't know much about the concrete and all of this. But by this year I am like firing up density of concrete every time we start to do it before you write it down intuitively whereas with architecture its more learning how to control what you are drawing and what you're thinking and how its going to work and putting in user in there and your client and getting it intuitive.

I: So, before we move before we go to that...hold that thought...so is design better as a team as compared to the engineering?

H: Yes, people in the studio they're kind of used to working together and that they're used to like telling you their ideas and so you can sort of, you have, you know what they are thinking and you know what the group is trying to do whereas in engineering its sometimes like ok well sometimes where to start first, we don't know, we just do ourselves. On the other hand the architects, you think they kind of discipline, they're like real offended if you try to criticise their ideas. They're like this architecture, this is the way I want it and you are saying it's wrong, it's not wrong and it's really hard....

K: Well, in groups we've done group projects in both departments and I find that it's a bit easier in the engineering department because the task that you have to do is more clearly understood by everyone whereas in the architecture group projects we do is very much harder to get everyone working together and I know maybe it's because we're working with the first year and perhaps this year, they do not have as much sense of organisation as we did but...

I: But, in terms of opportunity, do you learn more from...

K: Well, like the human group working relations within a group, I learn more from the architectural projects because it didn't work out too well and then because it was so hard... I just realised....

I: Why is it so hard?

K: You need, you know, call everyone, get everyone ready to meet at some points and places and everyone had to be explain the task. So, you know if it really doesn't work out you learn a lot from failing it of doing this.

J: The one project we are doing now, when we were doing the site analysis work. Everyone would be like in touch with me to make sure everyone was doing everything ok and it make me feel a bit project leaderish and I was like sat there thinking oh my god this is how because this person hasn't turned up and everyone was asking over it and then I have to go and like be nice to this person. It really does help you learn how to control working relationships and how to remain professional, keep your friends while you're sort of working with them so as architects you're going to work for long hours and that you know the people you're going to work with if you don't like you still have to work with them, if you do like them, you still have to work with them. So its about getting balance. With like the engineers working in groups with them is easy because you're doing the same thing and everyone has got the different skill which will contribute to that one thing and even if you don't get on well the fact that you've got a skill that you can contribute you know that's valid that is recognised by other people actually being acceptable to them because I was put in a group last year with people I didn't know and they in clique of their own and I was in a different clique, it was all a bit oh god I'm this group but it worked out really well. And with the architects you just get lots of head butting because people want to do their idea, people want to do this way and it's pretty primitive...

I: What do you think about the head butting?

G: Yes, strange architects are someone to start up about looking at all the different avenues where as when you work in an group one of them will get an idea oh right this is what we are doing lets talk about it for a bit and see what every one else thinks. I was just like no no no its fine, it will stand up it will look great.

I: What about working with your peers in the lab?

G: There is not so much competition, there isn't. You don't tend to get somebody going I'm alright and whatever, because you know, there's only one answer, you can't debate who is right, who is wrong.

H: H, do you want to add to that?

H: Yes, I just wanted to say that most of my engineering groups projects worked up fine or even good but last architecture was a disaster and it was all due to lack of communication and I like really blame myself that I didn't actually argue more with people in my group.

I: You mean in architecture, you don't...?

H: I was just concerned like in my after a while I fought for a long time I was saying, 'No, no we can't do, this is not going to work'. And then, I sort of gave up because it's just, it wasn't going anywhere and then we all got c minus.

J: It's like, if it doesn't fit in with their idea they wont have it and we have this in P5 with the structure there was this one guy who had this absolutely ridiculous idea which was it was like we have to lie under it, you know, it's a canopy we're going to lie under it and I was like ok you know you're going to have to make it 6 foot five long because I am that tall and he wanted it like a single spanning sort of a coloid shape thing six foot five long and I was saying you can't do that. it doesn't take a structural engineer to tell him that you can't do that and it's especially with paper. And he was just like just hell bent of doing that and then it took another structural engineer to tell him that he couldn't do that because we kind of ganged up on him

I: Ok, I think we've just about finish with our discussion, to sum up everything, is there anything that you want to add about the idea of the peer cultures, is there anything that you think probably we can discuss as additional areas?

J: It is interesting how like when we actually qualified as either engineers or architects within the professions are really seen as like it was a book I was reading where it said the engineers always subservient to the architect and without the architect the engineer doesn't have anything to design for but without its like a symbiotic thing where without one you can't have the other and it goes around and around. But the architect always gets a lot more respect for what he does, a lot more money for what he does and it's like the whole school people in the institute of civil engineers that are just hell bent on them getting that set straight because there will be a lot more work on it

G: I think, it's strange, I think you can have a building without an architect but you can't really have one without an engineer because you do like generic of ways of doing a building and just build like a domestic house. That is the way of doing it in certain ways

H: I think, there's a lot of buildings around that just didn't have any architects working around them a lot of them were horrible.

K: I used to work in 'Bar' and other peer cultures and we've been discussing the two different one, the engineering one there and architecture one. I am still wondering and I don't know whether we the dual student are developing one of our own or just kind of in-between I don't know, honestly we are spending half the time here doing one thing and half the time, there.

I: Does that happen...?

K: I don't know , we've never really done a cross, like the cross discipline thing.

I: So, you're like always...that one time, you're here and other time you're here, there's no real nature...the nature of yourself...

K: Simply because these two buildings is to even if we have this course which supposedly is to supposed to make engineers and architects love each other, that doesn't happen which is why you(session peers) shouldn't say bad things about architect.

J: I wasn't saying bad things about architects, I love architecture. I am just saying that in

in the professional world, it was just seen, there is like scaling interpretive because one like, its always the case isn't it, I think it was Brian Lawson that wrote in his book, it was like....(interruption)

I: What is the strength and weaknesses between these two environments, peer culture? Just to round up...what is the strength, what is helpful and unhelpful about these two?

K: Em, perhaps the engineering, the good side of engineering gives you good structure as to have to do things but with much less freedom whereas in architecture, gives you freedom, gives you opportunity to develop yourself.

J: I found that in peer culture, looking at it just people wise, architecture is lot easier to get to know people because everyone is 1st year right now and we were all making new friends and everyone interested in everyone's project. Like G said, you start with conversation and just saying, so it's your project about, how it's going, you know, sell it to me. And I found that I've made a lot more friends in architecture in the first like 2, 3 weeks when we start at P2 then, I did like engineering like in first 2,3 weeks because it's just like cliques form really quickly in Engineering and that set about who to hang out with whereas in architecture, you can just, you know, I think it's by nature that the fact that the creative inquisitive makes more open to new relationship and stuff.

I: G? What do you think about the helpful and unhelpful about these two?

G: Emm...(speechless)

I: H?

H: Yes, I agree with J that architecture people are kind of more open to new people. I remember last year in engineering I had some strange feelings that you know, if you come out to someone and you ask them something like look, 'I don't know what to do this, can you just help me'. And then, they just give me a weird look like you are bothering me. Some people will help you but some people just be like, 'I haven't got a clue, ask some else', and they clearly do know and they're just can't be bother to help you, basically.

I: Ok, because K did mention, right. So, how do you response to these two different...the differences about these two cultures?...Because you are the dual students, how do you response? How do you manage to make your adjustments?

J: In engineering building, I would normally sit with these guys, when I am in engineering and keeps my head down, work, chat, laugh and go whereas we don't stand around talking to everyone as we would do in architecture.

I: So, in a way, you are yourself with your own culture.

J: Yes.

K: I guess, it's maybe we're not realising that we've have our own particular of doing it because we're not given the opportunity to do either one or the other. Or, maybe we're given the opportunity we should have both architecture and engineering, we would do our own practice.
I: So, talking about that, would it be more like, you know, would be have a more of a pulling factor by the studio or would be more like pulling factor by the lab? How do you think your culture is setting up?

J: It is in the middle.

I: Right in the middle...smack in the middle.

J: Something like that big roundabout, like we got stuck on the dot, really don't know where we are. We're actually there because we haven't done like the first year architecture do like cool structure project that actually make it bit, a bit like engineer. But, we never have the chance in the first year (engineer), we haven't actually thought of structure properly until second year. When you start doing, they just throw you straight to hardcore theories in math. And that's quite good in a way but we haven't played around with the basics and the structure, whereas in architecture, we're playing around the basic first which feels like nursery isn't it.

I: So, just to sum up everything...so looking at these, right...these particular cultures between the engineering and the studio culture...so, if we look that the culture as a peer..., so what are the general benefits that these peers get in the studio or the lab? What is the general peer benefit, sharing benefit about these things that we have discussed about?

J: I think, it works out to be the same, sort of benefits because I feel that the benefits the peer I have in architecture that I am gaining from them and that I am learning to work with different people very quickly and very sort of efficiently because there's always going to be dispute and stuff or over ideas. And with architecture, you learn to deal with them a lot quicker because you have a lot shorter time period to do so, whereas in engineering, you don't really have those disputes and you have to learn how to deal with people on a more technical level and if somebody got a different technical mindset to yours, whether you are using the British standards and you're using Euro codes and ask him for help, you just...the easy answer is, 'I am doing Euro codes and you are doing British standards, and I am really sorry but I don't know what is going on'.

I: H?

H: I have nothing to add.

I: Anything you want to add, you know, about the peer benefits between these two cultures. We've talked about the differences, right, like J have said. What do you think?

K: As if you've seen the benefits of both.

I: Yes, both. If you cannot describe both, probably, you can describe either one, it doesn't matter.

K: There's so much emulation in the studio that I think we're drawn to trying to better our work, just by looking like what you've have said, looking at others...and you can go, 'He's doing much better than me, I should, I should, you know, I should do better'. You don't get to see that much of the other people's work in the lab, because it's obviously on paper. So, it's only few people who you have an idea what they are actually doing it and how they are doing it.

I: Final thoughts...getting tired?

G: I think in many ways to me, the cultures are very similar because we're so picky. It's just, I see the same people whether I am in studio, whether in work lab.

H: I think overall it's really, really good. It's like, you know, when you're getting annoyed by architecture or you're getting annoyed by engineering, you just go and you do your work in the studio and you just have to do something else for a bit, something totally different about like the same thing, anyway because it is always like about building. Then you actually, is really good in architecture when you designing something which you have some background. You know like I knew I've got to learn this thing and I really know, I can do it if I wanted to, I can design all the members and I could make it stand up and it's really a good feeling.

K: I just think, I just want you to think that architects and structural engineers, both deals with the same thing which is building, and yet they have such two totally different ways of doing it. And I still don't understand, how come, there is not more people like us who look at the both side of it because they did the same thing, you know, same activities and yet, these two clowns and they don't even like each other, you know.

H: Then, then you have like you have like to be or the other group. So, when you're in engineering and then just like feeling use some data that you don't even need. You just like, 'Oh, yes, I know, I don't have to listen to you'.

J: I guess, that the engineering lectures are not helping us with the situation because quite a lot of them, you see them like slugging off architects and slacking of, 'Oh, this is the architect's fault that the swimming pool doesn't work' or you know, 'We had to tell the architects to open this because the architect are just stupid'. But, it's not that, it's like if you worked, I don't know, if I was still building where I was in charge of it from conception to build, it's like all the architecture and I am engineering, then I wouldn't see any problem with it because it's just one building. In fact, that you're giving it to two different people to do it, the fact that they hate each other, it's just, I see, it's just futile.

I: Okay, so I just would like to summarise our discussion. So, if you disagree, it's ok...so I would like to summarise that so far we can find that there are differences and you can generalise, of course, there are differences between the 2 cultures. So, the differences, probably, we can say in term of the way what they're doing in the studio, in terms of their behaviour but we are not pretty much sure about the way they talk, right...or are you sure about that they talk differently?

J: I think, it's like context-based because in the studio, if you're doing your architecture and you're talking about architecture and then you know, this people who can be humble about their architecture and there are some people who can say, look up to design fantastic building and showed sketches at everyone's face and look at this, I did this and yet the same time that whereas in engineering, you don't get that, you talk differently. It's like you don't go to

someone and say, look at this calculation, there's number in the end and it's wicked, looks strange, you know, it's different.

K: Because in the end, architecture is much more personal and it's your own work which you put on us perhaps like, showing you personality there. There's not the case in engineering.

I: So, going back, alright. So we've talked about the behaviour, we've talked about the way they talk, we've talked about what they values, we've talked....okay basically...if anything, what we've been discussed, is very, very interesting. But, unfortunately, I agree with you, it's hard to talk about how you experience yourself because there is no room which I might have to point up this in my discussion with my colleagues and supervisor. So far, people talked about the two cultures, but it's not about you, yourself, you know. And you, yourself said that you cannot just have your own culture in this way because everything you need to this area or this culture and there is no such thing as you have your own culture...you don't have the opportunity, right.

J: I think we have our own culture is the fact that we can actually go to both and not actually, you know, we go to architecture and we don't dispute with them, we learn to mould that where is the thing so that it actually suit our design, you know what I mean, rather than you know let them run havoc in design something like insidious.

I: Well, okay, I think people are waiting but I think we have a good conversation.

End.

Pseudo name for Interviewees: T, B, S, L
Name of Interviewer: Ismail (I)
Date of Interview: 9th May 2006
Time: 11.30am – 12.20pm
Location: Meeting Room, 15th floor, Arts Tower

I: So we go to the learning environment itself....The general learning environment between the lab and the studio. Okay, can you describe the differences between these two environments? So, let's say, ok...from my previous discussion...they(participants) describe the studio is like a nursery and the lab is like a school. What do you think?

T: I think you have a lot more freedom to do what you want to do in the studio and build up your own pace, where else in the lab, as I suppose is more like a school and you're just know what to do and when. That's from my experience.

B: Yeah, studio is much laid back.

L: It is partly and likely you spend the whole day, every day in the studio. In the lab, it is much controlled. If you're doing experiment then there are very different times that you need to spend to do it.

T: I suppose, lab could be more dangerous as well. Says....its like the structural lab...there are heavy weights or concrete lab, you've got big machines and which in the studios, the worst you could do is to cut yourself with your knife.

S: I was just thinking the things that you are learning in these studios or places are different and therefore the way...it tries to absorb the information seem to be different isn't it.

I: So, based on that differences, how do you describe those two environments?

S: I think, the lab...it's very kind of....it's sound quite clinical isn't it really and that way ...how you kind of ordered and you're watching somebody else do something else and you repeat it and that sort of thing. And, I think the equivalent to the lab and that sort of thing and makes it kind of as opposed to the studio which inherently more kind of cosy as the lounge. It is sort of got more room for social thing. Do you see what I mean?....whereas in the lab there are none or whatsoever.

I: I like the word that you use...the 'clinical'. How do you define or how do you describe this 'clinical'?

L: Something there that doesn't need to be.

S: I used that word because it sounds like a hospital areas where is clean and busy with people fixing stuff. In hospital people, obviously....where in lab obviously, you're doing experiment.

B: It is more organized.

S: We're all like 'academic' places here, where in engineering, it's pure academic, I supposed. I suppose over here(studio)...it's entirely creative.

I: So, what is pure then? You did mention about 'pure' in the lab....What is about the idea about 'pure' in the lab?

B: I didn't say that. I suppose, it's more well organized and I didn't think it's pure, especially.

T: Emm...what kind of word clinical...I say clinical means sort of...if you can imagine like a pub or bar...you describe a bit that the lab has less atmosphere and the studio has atmosphere. In your lab it's quite clinical. It doesn't have social atmosphere and you just do your work.

B: Because it has the definite benefit in the studio to such interaction, you gain something from other people whereas in the laboratory because work can be so objective. You already know what is you need to do. Sosialising is just slowing you down and it interferes you're your work.

I: So, when you talk about sosialising, right...So, now...we go to the idea about the behaviour of the peers in these two environments. What are the differences that you can find?

S: I think, you will find that if you behave as you would in the studio in the lab, you kind of get asked by your tutor....

I: What kind of behaviours in the studio that you can do and cannot do in the lab?

L: Sitting on the desk

T: Standing aloof or blocking

L: Standing over someone's shoulder and asking what they are doing and it's infuriating

S: Alright, you kind of have a space to stop for a minute and reflect in the studio which is required to a certain extent to the work that you're doing. And which, you might do in the lab but in the different manner. When we do our lab classes which we haven't done for a little while, we get to stop to have a cup of tea or anything...do you?

T: You can come down to that in the studio, you can sit there and eat your sandwiches or your food. You can never do that in the lab.

B: Because....you're in the studio for longer part of it and also I think you need more social support in the studio, probably because you're there much longer. And you're more likely to be more stressed where in the lab for 2 hours or something, you're not going really need someone else to talk about that.

L: You have less of idea of what you suppose to do and you need some kind of reassurance far more in the studio.

I: So, how does it influences the way you do things in the studio based on these differences of behaviours? For example, you did mention that people sitting on the desk....they do most of their things on the desk, like in the lab you can't do it. So, How these might influence the way you work between these two environments?

B: I suppose the work rate is less intense in the studio probably work slower in some ways but for longer...

T: No...I was just thinking that if you want to make comparison, I would say the studio is more like your sort of a home and how you treat that....where the lab is how you treat someone else's home...if you know what I mean.

I: Can you elaborate that? It is quite interesting point.

T: You just sort of sit down, you might have a doze, eat your food, whatever. Where else in the lab, you wouldn't do those sort of things.

L: I wouldn't compare the lab with someone else's home. I wouldn't compare to a home at all. I would compare it to someone else's office. Emm...because it's hasn't got any base on the quality...

I: So, do you find them interacting...I mean among the peers...How do they interact among themselves?

S: For the architectural students who don't do any of the engineering. I think if you were to ask them to maybe do experiment in the engineering lab, I think they would know how to behave in there...or be it...how would behave in here(studio). So, it's not too much of skin apart to just behave different way in these two places because we just know how we should go about doing this.

I: But, I remember in the previous discussion, they said that in the lab there a kind of grouping that people have the tendency to have this 'dirty look' to this type of grouping whereby in the studio it's not so much happening in that way. What do you think?

S: I don't know what you think, but I can say it's opposite, we work together more

L: I think, we're more likely to work in definite group in the lab because you're all doing one thing at one time and certain apparatus. One group will be doing one thing and the other lab group will be doing another thing. And in the studio, it's far more free....yeah.

B: I would say, in the lab you're all trying to get the same result. Where else in the studio you are all trying for different results.

I: So, how does that change the way you interact, then? Do you find that is awkward in a way? How do you deal with that?

L: I think the environment just kind of dictate and we conform without really considering it.

B: It's not something new. It's something that everybody does in school, you know...going to a science lesson and you do the science and you go to art lesson afterward and you do art and then you go to do something else. It's not suddenly like you've got the union....

L: In a sense, it's more natural than focusing on a single subject when you need it. It's just what you've always done. And it's like doing different subjects in school a more logical progression.

I: How do you adapt or do you adjust?

T: I suppose, in the lab you just get on it. In the studio, you just....you go with what happen there is.

I: Okay, now we go to the ideas about how peer communicate among them between the two environments. So, how do you find the way they communicate? Do you think they talk differently between the two environments?

T: I would say the engineers possibly not formal but a lot more formal the way they speak.

B: A lot more distance

T: Like in the studio, perhaps really friendly. They have jokes and laughs...

I: Any particular jokes?

T: Where in the lab, I am sure you get dirty looks for time wasting.

I: So, B what do you think?

B: Sorry, what was the question?

I: This is about, you know, do they talk differently between the two peers?

B: We're not really...we don't tend to talk to the engineers about what we're doing. We sit in the lecture. It's more to do with the fact that we do some group work with the architects...

T: We have done group work with the engineers as well.

L: Not a great deal

B: We tend to pick our own group and then we tend to pick each other...

S: I was just thinking that B mentioned about lecture and we talk about lab and studio but we are neglecting lecture on either side of the road. You've just said about communication stuff and language use basically. Engineers are exposed to sort of solely lectures going on about perhaps more technical, mathematical and science. And so, I don't know if you agree...and when I go home and talk to my parents over the past 3 years, I've noticed that they begin to understand less and less of what I'm saying because I'm using longer words and they don't know what they are. And I suppose, it's very easy to talk freely over here between architects because kind of generally relax and you don't feel the pressure of having to explain yourself and to say what you mean. It is less technical which it is technical over in the engineering, you see.

I: So apart of...for example apart of discussing general life like movies, like shopping or whatever it is...So, what are the things that these peers talk about...in the studio...?

B: They tend to talk about architecture.

I: So, you know...architecture....what?

B: I wouldn't talk about shopping.

I: So when you talk about architecture, any specific things like concepts, architects?

S: I think, it's much more fun to talk about architecture in architecture then it is to talk about engineering in engineering. Because it's lot less cool to be like an engineer than it is an architect, I think, you know what I mean. So, like you can't talk about...oh...did you see that this grand design in the TV last night. Did you like what there were going about that's entirely architecture whereas you wouldn't go on about to see mega structure on discovery channel...you just don't do that (in engineering).

I: I mean for example, let say in the lab, probably, most of your time, you talk about British Standards or Euro Codes and so on. In the studio, what are the things that you think that...?

L: Conversations tend to be shortened to a point in engineering.

I: Shortened to a point?

L: In engineering, you just kind of, you say your information. Your imagination doesn't cope by...you're not trying to get your idea across and discussing things. In architecture, you know, you ask people's advice and it's subjective, kind of...oh, will you think that this will work and what if I do this?

I: Any particular conceptual words or reference words that you commonly used in the studio? You know, you used the conceptual ideas about communication, whereby in the lab, you know, it is very straight forward, kind of, just get things through ahead very fast. So in the studio, you did mention, you know, very conceptual and then how to get the whole idea across and so on, right. So what are the things that you know, probably...is it, for example...let say when you talk about....you did mention about Calatrava, right....Do you find that in architecture when you talk about the idea....about name dropping or buzz words?

B: I don't think, it's a series of conversation of that. You don't say and you said...do you like the way I imitated so and so. And maybe, it's more like...do you think it will work if I put a toilet right here. It's not some really conceptual debating stuff that you're having with person next to you. It's just how tall it is...you know.

T: I agree with that and going back to what you've said a few minutes ago, the topics, talking about shopping or whatever...B said that we talk generally saying...we talk about architecture or architects. I think that comes down on how well we know other people. I wouldn't say or change what I've talked about to the architects or the engineers. If I knew them, I just them everything but because of the environment, you have a lot more freedom in the studio to talk more about those things whereas it's not in the lab.

L: Having said that, we know each other a lot better even the architects or the engineers because we spent so much time together and it's quite mark in lectures. In engineering, one side you have the course HK21, the other side you've got the engineers. And then, in architecture lectures, quite often there is a couple of rows upfront where we sit and then the architecture, kind of spread out and we move around.

I: Any particular buzzwords that you can find in the lab? Or...any particular catchphrases that you can find in the studio?

B: Emm...technical words (in the lab)

I: You mean in the lab?

B: Yeah.

I: Such as?

B: Force, stress...kind of.

T: You might say to some else, 'Put on the safety goggle on' or something like that in the lab, you know whereas in the studio you won't normally say that.

B: And the way you ask for help, I guess, is different. In the lab, you would say, you know, I don't understand this...can you help me. Whereas in the studio, you probably won't go to an architecture tutor and say, 'I don't understand how'. It will be more like asking for advice and explanation.

I: So, when you asked for them for advice, what are the things that you discussed with them and what kind of materials and what kind of conversation materials?

B: In engineering?

I: In the studio.

B: It maybe about materials because it depends on what stage of your project...you are.

I: So, what are the common references that you use? I mean the differences of references that the students in the lab differ from the students in the studio that concern about their learning?

S: Do you mean like to help studying?

I: Yeah.

S: Well, I mean, I've only been to the library about once since Christmas. And I mean, I should really go more often. Engineering course have their own library down there and I go there even less. I don't think I've been in there since the first year. It's quite worrying isn't it. We've got our computer up here(studio). It's strange actually because that we've used later works or which we kind of being encouraged to used later works and we have tutorial on that over here(studio). And yet we were given...well we were given tutorial on AutoCad in engineering. And that sort of, obviously... quite important and not so much of references. It's just a resource.

I: In the studio, what the student refer for their work?....Because in the lab, you've said you have these manuals and codes and so on....

B: We use the internet quite a lot.

I: In the internet....what do they...?

S: Wikipedia....

I: Any specific interest that they are looking for?

T: When I am in the studio, you are often enjoying the tutorials. Tutor says of your work and you're doing certain building and look at the work of this architect in the library or something and at the same time the book.

I: Does this also happen between the peers?

B: Yeah, sometimes.

I: So, how does it work?

B: Well, you might be in tutorial with other students as well as your tutor and they might say that looks a bit like so and so works. So then you might look it up.

S: To be honest, most recently some of the most valuable comments that I've had with regard to my work have come from my peers as opposed to tutors. In my review on Friday afternoon, this major project we've sort of improving portfolio. I am...my building was themed on a certain topic as opposed to inform by a certain topic. I can do something very constructive with that. And as result, it improve my building, my design quite a lot and that sort of thing. The thing...as a result of having got used to my building, having been just doing nothing...but my design for the past few weeks, you ignore the most basic things. And having a review by someone else not a tutor instead of the student comments on your work can make you think about something so easy and basic. So, I find that the review (with peers) quite useful.

I: So, in the studio, right...you can say that the drawing and model become the heart and soul of the peer in the studio. So, what are the heart and soul in the lab then?

L: Perhaps, that what we meant by saying the lab is bit more clinical. It is not really equivalent.

B: You ask about the lab but really the lab makes a tiny proportion of what we do. We have not have any lab classes at all this year. And perhaps, in the past we have only spend probably...4 or 5 afternoons in the lab.

L: I think we have spent a lot more in the first year.

B: But, it's just a tiny part of what we are doing. So, there is no really lab culture because you have to be there longer than that.

I: Probably, you know...just describe what the things in the lab that reminds you?

S: In the first year in the lab, there is this chap down there (Lab) called Paul Reynold who we've done a couple of works with mechanic and stuff and definition of materials. I think it would have been...so you've got your eyeball on T-Beams and just how the works of it.

L: See it (T-Beams) how it behaves.

S: Yeah, it was a bit of tension and compression that I was referring at. And then, we went on to more definition of things and looking at bending moment diagram with beam and bridges last year. So these things only take an hour and a half....Oh I am ignoring...

L: Classification of soils.

S: Geo-technique has been the most boring subject in the world for me. I just don't think it's really interesting.

T: When we're doing that last year have that geo-technique thing, as well, is the case very sort of pressure. It's just like do this now and gets your result in five minutes time and it's done.

B: Everything is on the time table.

T: It's very unenjoyable, I would say. And you just want to get these out of the way.

S: I could have appreciated why I did that as a result. You have to learn it and so on. We were into this like a restrain to get it through to you. You're right, it's not enjoyable and if you haven't got it....what you suppose to learn by the end of it, possibility that you are not going to get it.

T: And also halfway through you will fall slightly behind.

I: If you fall behind during the time table, you know....

S: This is what I mean by the academic area of things which very much down there(lab) and this creative development over here(studio).

I: So, going back about the idea drawing and models...how does it helps you and among your peers? If there are no models and drawings, what happen to the studio?

S: The drawing that I am doing at the moment...I've just on this Friday review. For example, I've showed that I've got 4 story building, I've got 4 plans and I've 2 elevations and that sort of things. But I mean that is the showcase of my idea to that point of...Thursday night about 4 o'clock in the morning. And so, it's not necessary the final thing, it had to go. Because of this review, obviously, I've been given certainly more ideas I would think about or really rethink about and to develop future. So, my drawing is one level that it is just a drawing of your ideas after a certain point of which you can show to somebody else and get it approve first.

I: L, you just seems to sit back...

L: I was just thinking.

I: What do you think? Can you share with us?

L: I was just trying to make what the equivalent with being an engineer. We do use drawing in engineering in design. We do conceptual design of roof structure

T: The way we're doing is almost completely different.

L: It is very different. It is less focus on people. I think more on cost and average...architecture...obviously...

T: Structure

L: More focus on cost but due to stages are at. Engineering is to do with economy of materials and...

I: B, L did mention about that the engineers are doing things about the economy and materials. What about the studio? They are using the drawings, right, models. In the lab...for the economy and materials (engineering)

B: They(engineering) are not using models so much.

I: What do you think about drawings and models in the studio? How does it help you?

B: I suppose, it is partly the way to communicate your idea to other people and you can discuss them. Emm...as usual sort of...if you're designing something 3 dimensional especially with model, if you design something 3 dimensional and you kind of need to model it 3 dimensionally to help find it and help it to work out potential problem.....Do you mean how does it contribute to the studio?

I: Yeah, the studio...among you and the peers. Because you have all these drawings and models all around the studio, right.

B: I guess, it (drawing and models in the studio) makes the studio untidy.

L: Besides, it's for communication and inspiration, you know, you kind of look at each other drawings and models and take ideas from that whether its techniques of drawing or modeling or ideas about to arrange your space or whatever it is that you're trying to think about materials or others. Emm...we did one project this year P3 where we look at an existing building. We have to create a model of the structure and materials and things which became very useful because building a model you have to look carefully at the drawings and you get hold of which then not only help us on how to build own model throughout design but also how to draw accurate technical drawing.

I: So, T what do you think?

T: I can't remember what was the question was...?

I: The question is about the drawing and model, right....So in the engineering, right, they don't use so much model and drawing.

T: We do make model and drawing in engineering but generally we make them structurally to test them for loads or bending moment whereas you make your models in architecture in the studio, you will be looking at aesthetically and function of the space.

I: What do you think B, taking the point from T?

B: Yeah, I agree.

I: Any differences between the success in architectural work in the studio...any differences in success in the engineering? What kind of values, what kind of things that you considered important in the studio and what are the things that are important in the lab to make either one a success?

B: I think, it's something interesting the way things are marked. Probably, we kind of...we've got both because in engineering says, exam paper it would possible to get 100 percent. And probably, quite high proportion, a much higher proportion people in engineering get first at the end of their degree, but whereas in architecture, very small percentage get first and to get 100 percent would be completely impossible.

T: I suppose, you can put down to a fact that engineering there is always have right answer whereas in architecture, it is not. There is many possible solutions which someone will likely better than someone else.

I: L, what do you think about fortune favours the brave? Where this thing fits?

L: I don't know. Fortune favours the brave?

I: Where this phrase fit between these two cultures?

L: I don't think...it doesn't really in engineering. I think the more conservative you are, the safer you are and less likely things are to fail whereas in architecture, certainly, the students, they are encouraged to push boundaries and there's the sense where if you are brave then you would probably be rewarded. What it is very much that realize whatever you're trying to do properly then values do attach to the intent. If you're conservative in architecture, it's not really appreciated even if you realize it, completely. In engineering, if you get the right answer in any context that's fantastic. And in architecture, if you get an answer it's not good enough.

S: I totally agree with L. It's true that fortune favours the brave is not really a description that you can apply to engineering at all. Where else it really, it really is to architecture, I think. It's all about this development of ideas in certain ways and describe it as being brave is an adequate word, I suppose. And of course, it could give you better marks of course. Yeah, I agree with that.

I: Now, it's about working as a group, right. What kind of differences that you can find or experience between working in a group in the studio and working in a group in the engineering. What are the differences that you might find? Do you think that you benefit more when you are working in the studio as the way around?

S: Of course, when you are working in architecture in a group...I am thinking about this and talking so you have to excuse me. You're more likely to get into concept of ideas because it has potential for more ideas to be about whereas in engineering, there is more likely of going to be our sort of idea and so only one way of doing it or getting it. So, anyway, L mentioned about this P3 thing with this model most recently and I found it really difficult to...I was being in engineering in my group of 6 and four or five architects wanted to invest more time and more money than I was willing to do. And we came out with a most fantastic model which came about the cost we put in this kind of money. And I did it in the end only a slightly less than others because I have to go to engineering on Monday and this sort of thing. But, I am reasonable would be able to come with a same quality of model for mainly same amount of money but with less time it take...had they listen to me to what I was saying.

T: I disagree with what you're saying about there is only one idea in engineering therefore there is one solution. I suppose there are a lot of ideas but it is a lot easier to go. There is an idea but there is going to be expensive. At this point, there is only a solution going to be economical and efficient. And you gradually...it may be easy to put it down to that stage whereas in architecture you're not supposed put your merits there, the way of doing things.

S: I see what you mean. I just want to rebut what T just said because I was about not necessarily about design but with experiment but whereas if you're doing experiment in the lab than surely there is only one way to go about doing, that is what I meant. I agree with what you've said that if you talked about design.

L: I think people tend to be less precious about ideas in engineering.

S: It's because it's not their own isn't it.

L: You know, you're not going to get emotionally involved with concrete frame as well the steel ones.

B: You tend to spend less time with people in engineering with group project as well because it is less time to kind of maybe you in the studio you get really tired and longer time to get information about it whereas in engineering you tend to segregate and go away to do separate bits and come back together in later project but whereas in architecture, you've been in the whole week where you do need consultation more regularly.

I: So, you did mention about spending long hours, what is the idea behind that spending long hours in the studio in comparison to spending more time in the engineering or the lab?

T: Maybe it's because you've got so attach to your scheme like the work of mine, the P4 major project which I really got involved with it and I want to put even more time because I like it and I want to make it even better. Maybe, you don't get as emotionally involved with your scheme in engineering.

I: B, you did mention about spending a lot of time in the studio.

B: Yeah, I don't know whether...I suppose it...I just know that we spend more time together in group work in architecture. Often like, we might spend long time on engineering project but I suppose, it's more because like T has said that how long it takes whereas in architecture, you can produce something that took a lot less time that you could hand in. But, you tend to be more concerned that what you hand in is really good. In architecture, you're not only want to pass.

T: You're could probably always do more and more in architecture.

I: What do you think about head butting when working in a group?

L: Head butting?

B: I try not to head butting.

I: Can you tell or describe about the situation?

L: Confrontation?

I: Yeah. Is that good? Is that really necessary?

L: Emm...I think debate can help as long as people are prepared to compromise

T: Some people are open-minded

L: Yeah.

T: Some people get stubborn and stick on it on stupid things

I: Does it help, actually, as part of the group work?

B: No, I don't think it does. It's just sort of the group dynamic....

I: Yeah, just like the group dynamic thing.

L: I think, it can result in a solution that is more defensible because you have already defended it once against the member of your own group. And then, if you have convinced then and that's even better.

T: I think, I think group work is beneficial because it brings in new ideas, things that you would necessarily build on which you think might used in the later project or later design.

I: In engineering, how do these differences of working in the group?

L: It's(engineering) about sharing workload then exchanging ideas in group.

B: Yeah, that's true.

S: I was just agreeing with what L said about you know, that there are some...emm...in engineering you going about....because you want to agree about which bits of the project you

APPENDIX D

Survey questionnaire

Study of Peer Culture in the Studio-Format Environment

The main purpose of this study is to investigate peer culture among student peers within the learning environment, particularly in the design studio. This is by using 'constructs' based on the Theory of Personal Constructs. According to this theory, a construct is a form of abstraction that a person virtually created from the experiences of events that shape the meaningful representation of reality about the surrounding world. The constructs in this study were developed based on previous data gathered from focus group sessions with students. They discussed their experiences of events related to their learning situations, process and peer interactions.
The constructs are divided into 3 interrelated areas of events which are as follows:

- About situations within the design studio environment
- About learning within the design studio environment
- About socialising within the design studio environment

In taking this test for the study, please make your judgments on the basis of which constructs are meaningful to you based on your experiences of the events in your learning environment. On the following pages, you will find a series of bi-polar constructs to be judged and between each pair is a set of scales. Rate each pair of bi-polar constructs by using the scales based on *very, quite and slightly*. Use the whole scale without saving the end points for extreme situations. Here are examples of how to use the scale according to your judgment about a particular construct.

- If you feel that your experience is *very closely related* to one end of the scale, place a *tick* as follows:

	very	quite	slightly	neither	slightly	quite	very		
'Constructs'	1	2	3	4	5	6	7	'Constructs'	
warm 'People are friendly'	√							**quiet** 'People are shy'	☐ Do not understand ☐ Unsure ☐ Not relevant

- If you feel that you *do not understand* or are *unsure* or if the construct is *not relevant*, place a *tick* as follows:

	very	quite	slightly	neither	slightly	quite	very		
'Constructs'	1	2	3	4	5	6	7	'Constructs'	
warm 'People are friendly'								**quiet** 'People are shy'	☑ Do not understand ☐ Unsure ☐ Not relevant

(continued)

1.0 About <u>situations</u> within design studio environment

'Constructs'	very 1	quite 2	slightly 3	neither 4	slightly 5	quite 6	very 7	'Constructs'	
Student-led 'Learning activities are mainly student-led'								**Tutor-led** 'Learning activities are mainly tutor-led'	☐ Do not understand ☐ Unsure ☐ Not relevant
Ordered 'Students have their learning activities ordered for them'								**Free** 'Students have freedom to organize learning activities'	☐ Do not understand ☐ Unsure ☐ Not relevant
Casual 'Learning situations are more casual'								**Formal** 'Learning situations are more formal'	☐ Do not understand ☐ Unsure ☐ Not relevant
Social 'Learning activities are done through social interactions'								**Individual** 'Learning activities are done through individual study'	☐ Do not understand ☐ Unsure ☐ Not relevant

2.0 About <u>learning</u> within design studio environment

'Constructs'	very 1	quite 2	slightly 3	neither 4	slightly 5	quite 6	very 7	'Constructs'	
Aimed at exploring 'Exploring ideas'								**Aimed at achieving** 'Demonstrating ability'	☐ Do not understand ☐ Unsure ☐ Not relevant
Solution-based 'Emphasis on getting answers'								**Problem-based** 'Emphasis on exploring problems'	☐ Do not understand ☐ Unsure ☐ Not relevant
Semantic 'Knowledge of facts, numbers and formulae'								**Episodic** 'Memories of places, events and objects'	☐ Do not understand ☐ Unsure ☐ Not relevant

(continued)

2.0 About learning within design studio environment *(continuation from previous page)*

'Constructs'	very 1	quite 2	slightly 3	neither 4	slightly 5	quite 6	very 7	'Constructs'	
Realistic 'Based on real world situations'								**Abstract** 'Based on abstractions'	☐ Do not understand ☐ Unsure ☐ Not relevant
Tacit 'Uses everyday, unconscious knowledge'								**Explicit** 'Uses specialized, conscious knowledge'	☐ Do not understand ☐ Unsure ☐ Not relevant
Focused 'Work with specific domain of ideas'								**Broad** 'Work with wide domain of ideas'	☐ Do not understand ☐ Unsure ☐ Not relevant
Original 'Value is placed on quality and distinctiveness'								**Accurate** 'Value is placed on accuracy and precision'	☐ Do not understand ☐ Unsure ☐ Not relevant
Discrete 'Subjects are studied separately'								**Integrative** 'Brings many ideas together'	☐ Do not understand ☐ Unsure ☐ Not relevant

3.0 About socialising within design studio environment

'Constructs'	very 1	quite 2	slightly 3	neither 4	slightly 5	quite 6	very 7	'Constructs'	
Evocative								**Direct**	☐ Do not understand ☐ Unsure ☐ Not relevant
Literal								**Metaphorical**	☐ Do not understand ☐ Unsure ☐ Not relevant
Extrovert								**Introvert**	☐ Do not understand ☐ Unsure ☐ Not relevant

(continued)

Please give your educational background

1. **Name:**.....
2. **University:**.....
3. **Year of Study:**.....
4. **Course:**.....
5. **Department:**.....

Finally, if you have any comments or suggestions with regard to this study, please use the space below to write.

All information given is confidential.
Thank you for the participation and cooperation.

Ismail Samsuddin
PhD Student

Study of Peer Culture in the Learning Environment

The main purpose of this study is to investigate peer culture among student peers within the learning environment. This is by using 'constructs' based on the Theory of Personal Constructs. According to this theory, a construct is a form of abstraction that a person virtually created from the experiences of events that shape the meaningful representation of reality about the surrounding world. The constructs in this study were developed based on previous data gathered from focus group sessions with students. They discussed their experiences of events related to their learning situations, process and peer interactions. The constructs are divided into 3 interrelated areas of events which are as follows:

- About situations within the learning environment
- About learning within the learning environment
- About socialising within the learning environment

In taking this test for the study, please make your judgments on the basis of which constructs are meaningful to you based on your experiences of the events in the design studio and lab environment. On the following pages, you will find a series of bi-polar constructs to be judged and between each pair is a set of scales. Rate each pair of bi-polar constructs by using the scales based on *very, quite and slightly*. Use the whole scale without saving the end points for extreme situations. Here are examples of how to use the scale according to your judgment about a particular construct.

- If you feel that your experience is *very closely related* to one end of the scale, place a *tick* as follows:

	very	quite	slightly	neither	slightly	quite	very		
'Constructs'	1	2	3	4	5	6	7	'Constructs'	
warm 'People are friendly'	√							**quiet** 'People are shy'	☐ Do not understand ☐ Unsure ☐ Not relevant

- If you feel that you *do not understand* or are *unsure* or if the construct is *not relevant*, place a *tick* as follows:

	very	quite	slightly	neither	slightly	quite	very		
'Constructs'	1	2	3	4	5	6	7	'Constructs'	
warm 'People are friendly'								**quiet** 'People are shy'	☑ Do not understand ☐ Unsure ☐ Not relevant

THERE ARE TWO (2) SECTIONS. PLEASE ANSWER BOTH SECTIONS.

- SECTION A – DESIGN STUDIO ENVIRONMENT
- SECTION B – ENGINEERING LAB ENVIRONMENT

(continued)

SECTION A – DESIGN STUDIO

A.1 About <u>situations</u> within design studio environment

	very	quite	slightly	neither	slightly	quite	very		
'Constructs'	1	2	3	4	5	6	7	'Constructs'	
Student-led 'Learning activities are mainly student-led'								**Tutor-led** 'Learning activities are mainly tutor-led'	☐ Do not understand ☐ Unsure ☐ Not relevant
Ordered 'Students have their learning activities ordered for them'								**Free** 'Students have freedom to organize learning activities'	☐ Do not understand ☐ Unsure ☐ Not relevant
Casual 'Learning situations are more casual'								**Formal** 'Learning situations are more formal'	☐ Do not understand ☐ Unsure ☐ Not relevant
Social 'Learning activities are done through social interactions'								**Individual** 'Learning activities are done through individual study'	☐ Do not understand ☐ Unsure ☐ Not relevant

A.2 About <u>learning</u> within design studio environment

	very	quite	slightly	neither	slightly	quite	very		
'Constructs'	1	2	3	4	5	6	7	'Constructs'	
Aimed at exploring 'Exploring ideas'								**Aimed at achieving** 'Demonstrating ability'	☐ Do not understand ☐ Unsure ☐ Not relevant
Solution-based 'Emphasis on getting answers'								**Problem-based** 'Emphasis on exploring problems'	☐ Do not understand ☐ Unsure ☐ Not relevant
Semantic 'Knowledge of facts, numbers and formulae'								**Episodic** 'Memories of places, events and objects'	☐ Do not understand ☐ Unsure ☐ Not relevant

(continued)

A.2 About learning within design studio environment *(continuation from previous page)*

'Constructs'	very 1	quite 2	slightly 3	neither 4	slightly 5	quite 6	very 7	'Constructs'	
Realistic 'Based on real world situations'								**Abstract** 'Based on abstractions'	☐ Do not understand ☐ Unsure ☐ Not relevant
Tacit 'Uses everyday, unconscious knowledge'								**Explicit** 'Uses specialized, conscious knowledge'	☐ Do not understand ☐ Unsure ☐ Not relevant
Focused 'Work with specific domain of ideas'								**Broad** 'Work with wide domain of ideas'	☐ Do not understand ☐ Unsure ☐ Not relevant
Original 'Value is placed on quality and distinctiveness'								**Accurate** 'Value is placed on accuracy and precision'	☐ Do not understand ☐ Unsure ☐ Not relevant
Discrete 'Subjects are studied separately'								**Integrative** 'Brings many ideas together'	☐ Do not understand ☐ Unsure ☐ Not relevant

A.3 About socialising within design studio environment

'Constructs'	very 1	quite 2	slightly 3	neither 4	slightly 5	quite 6	very 7	'Constructs'	
Evocative								**Direct**	☐ Do not understand ☐ Unsure ☐ Not relevant
Literal								**Metaphorical**	☐ Do not understand ☐ Unsure ☐ Not relevant
Extrovert								**Introvert**	☐ Do not understand ☐ Unsure ☐ Not relevant

(continued)

SECTION B – ENGINEERING LAB

B.1 About <u>situations</u> within the lab environment

'Constructs'	very 1	quite 2	slightly 3	neither 4	slightly 5	quite 6	very 7	'Constructs'	
Student-led 'Learning activities are mainly student-led'								**Tutor-led** 'Learning activities are mainly tutor-led'	☐ Do not understand ☐ Unsure ☐ Not relevant
Ordered 'Students have their learning activities ordered for them'								**Free** 'Students have freedom to organize learning activities'	☐ Do not understand ☐ Unsure ☐ Not relevant
Casual 'Learning situations are more casual'								**Formal** 'Learning situations are more formal'	☐ Do not understand ☐ Unsure ☐ Not relevant
Social 'Learning activities are done through social interactions'								**Individual** 'Learning activities are done through individual study'	☐ Do not understand ☐ Unsure ☐ Not relevant

B.2 About <u>learning</u> within the lab environment

'Constructs'	very 1	quite 2	slightly 3	neither 4	slightly 5	quite 6	very 7	'Constructs'	
Aimed at exploring 'Exploring ideas'								**Aimed at achieving** 'Demonstrating ability'	☐ Do not understand ☐ Unsure ☐ Not relevant
Solution-based 'Emphasis on getting answers'								**Problem-based** 'Emphasis on exploring problems'	☐ Do not understand ☐ Unsure ☐ Not relevant
Semantic 'Knowledge of facts, numbers and formulae'								**Episodic** 'Memories of places, events and objects'	☐ Do not understand ☐ Unsure ☐ Not relevant

(continued)

B.2 About learning within the lab environment *(continuation from previous page)*

'Constructs'	very 1	quite 2	slightly 3	neither 4	slightly 5	quite 6	very 7	'Constructs'	
Realistic 'Based on real world situations'								**Abstract** 'Based on abstractions'	☐ Do not understand ☐ Unsure ☐ Not relevant
Tacit 'Uses everyday, unconscious knowledge'								**Explicit** 'Uses specialized, conscious knowledge'	☐ Do not understand ☐ Unsure ☐ Not relevant
Focused 'Work with specific domain of ideas'								**Broad** 'Work with wide domain of ideas'	☐ Do not understand ☐ Unsure ☐ Not relevant
Original 'Value is placed on quality and distinctiveness'								**Accurate** 'Value is placed on accuracy and precision'	☐ Do not understand ☐ Unsure ☐ Not relevant
Discrete 'Subjects are studied separately'								**Integrative** 'Brings many ideas together'	☐ Do not understand ☐ Unsure ☐ Not relevant

B.3 About socialising within the lab environment

'Constructs'	very 1	quite 2	slightly 3	neither 4	slightly 5	quite 6	very 7	'Constructs'	
Evocative								**Direct**	☐ Do not understand ☐ Unsure ☐ Not relevant
Literal								**Metaphorical**	☐ Do not understand ☐ Unsure ☐ Not relevant
Extrovert								**Introvert**	☐ Do not understand ☐ Unsure ☐ Not relevant

(continued)

Please give your educational background

1. **Name:**.....
2. **University:**.....
3. **Year of Study:**.....
4. **Course:**.....
5. **Department:**.....

Finally, if you have any comments or suggestions with regard to this study, please use the space below to write.

All information given is confidential.
Thank you for the participation and cooperation.

Ismail Samsuddin
PhD Student

APPENDIX E

Rating distributions of survey participants

student-tutor

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	3	2.7	1.0	2.4	0.0	0.0	0.0	0.0
2	20	17.7	5.0	11.9	1.0	8.3	0.0	0.0
3	20	17.7	5.0	11.9	3.0	25.0	0.0	0.0
4	12	10.6	2.0	4.8	1.0	8.3	0.0	0.0
5	28	24.8	9.0	21.4	7.0	58.3	0.0	0.0
6	28	24.8	16.0	38.1	0.0	0.0	4.0	33.3
7	2	1.8	3.0	7.1	0.0	0.0	8.0	66.7
x	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
y	0	0.0	1.0	2.4	0.0	0.0	0.0	0.0
z	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

free-ordered

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	12	10.6	1.0	2.4	0.0	0.0	0.0	0.0
2	44	38.9	7.0	16.7	5.0	41.7	1.0	8.3
3	19	16.8	3.0	7.1	4.0	33.3	1.0	8.3
4	4	3.5	1.0	2.4	0.0	0.0	0.0	0.0
5	17	15.0	6.0	14.3	2.0	16.7	0.0	0.0
6	13	11.5	15.0	35.7	1.0	8.3	4.0	33.3
7	2	1.8	8.0	19.0	0.0	0.0	6.0	50.0
x	1	0.9	0.0	0.0	0.0	0.0	0.0	0.0
y	1	0.9	0.0	0.0	0.0	0.0	0.0	0.0
z	0	0.0	1.0	2.4	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

casual-formal

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	18	15.9	1.0	2.4	5.0	41.7	0.0	0.0
2	36	31.9	15.0	35.7	6.0	50.0	0.0	0.0
3	35	31.0	11.0	26.2	0.0	0.0	0.0	0.0
4	9	8.0	2.0	4.8	0.0	0.0	0.0	0.0
5	9	8.0	5.0	11.9	0.0	0.0	6.0	50.0
6	5	4.4	6.0	14.3	1.0	8.3	3.0	25.0
7	0	0.0	1.0	2.4	0.0	0.0	3.0	25.0
x	1	0.9	0.0	0.0	0.0	0.0	0.0	0.0
y	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
z	0	0.0	1.0	2.4	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

social-individual

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	15	**13.3**	5.0	**11.9**	3.0	**25.0**	0.0	**0.0**
2	39	**34.5**	13.0	**31.0**	5.0	**41.7**	1.0	**8.3**
3	32	**28.3**	10.0	**23.8**	3.0	**25.0**	2.0	**16.7**
4	11	**9.7**	3.0	**7.1**	1.0	**8.3**	1.0	**8.3**
5	8	**7.1**	6.0	**14.3**	0.0	**0.0**	5.0	**41.7**
6	5	**4.4**	5.0	**11.9**	0.0	**0.0**	2.0	**16.7**
7	1	**0.9**	0.0	**0.0**	0.0	**0.0**	1.0	**8.3**
x	1	0.9	0.0	0.0	0.0	0.0	0.0	0.0
y	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
z	1	0.9	0.0	0.0	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

exploring-achieving

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	26	**23.0**	0.0	**0.0**	2.0	**16.7**	0.0	**0.0**
2	43	**38.1**	6.0	**14.3**	3.0	**25.0**	1.0	**8.3**
3	21	**18.6**	9.0	**21.4**	3.0	**25.0**	0.0	**0.0**
4	9	**8.0**	1.0	**2.4**	1.0	**8.3**	0.0	**0.0**
5	10	**8.8**	9.0	**21.4**	2.0	**16.7**	2.0	**16.7**
6	4	**3.5**	10.0	**23.8**	0.0	**0.0**	6.0	**50.0**
7	0	**0.0**	5.0	**11.9**	1.0	**8.3**	3.0	**25.0**
x	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
y	0	0.0	2.0	4.8	0.0	0.0	0.0	0.0
z	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

solution-problem

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	2	**1.8**	6.0	**14.3**	1.0	**8.3**	5.0	**41.7**
2	9	**8.0**	14.0	**33.3**	0.0	**0.0**	3.0	**25.0**
3	7	**6.2**	7.0	**16.7**	0.0	**0.0**	2.0	**16.7**
4	9	**8.0**	1.0	**2.4**	1.0	**8.3**	1.0	**8.3**
5	29	**25.7**	7.0	**16.7**	1.0	**8.3**	1.0	**8.3**
6	36	**31.9**	7.0	**16.7**	6.0	**50.0**	0.0	**0.0**
7	21	**18.6**	0.0	**0.0**	3.0	**25.0**	0.0	**0.0**
x	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
y	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
z	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

episodic-semantic

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	21	**18.6**	0.0	**0.0**	4.0	**33.3**	0.0	**0.0**
2	48	**42.5**	2.0	**4.8**	6.0	**50.0**	0.0	**0.0**
3	22	**19.5**	1.0	**2.4**	2.0	**16.7**	0.0	**0.0**
4	12	**10.6**	1.0	**2.4**	0.0	**0.0**	0.0	**0.0**
5	1	**0.9**	3.0	**7.1**	0.0	**0.0**	3.0	**25.0**
6	4	**3.5**	16.0	**38.1**	0.0	**0.0**	4.0	**33.3**
7	0	**0.0**	15.0	**35.7**	0.0	**0.0**	5.0	**41.7**
x	2	1.8	0.0	0.0	0.0	0.0	0.0	0.0
y	2	1.8	3.0	7.1	0.0	0.0	0.0	0.0
z	1	0.9	1.0	2.4	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

realistic-abstract

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	11.0	**9.7**	11.0	**26.2**	1.0	**8.3**	7.0	**58.3**
2	32.0	**28.3**	13.0	**31.0**	5.0	**41.7**	3.0	**25.0**
3	29.0	**25.7**	9.0	**21.4**	0.0	**0.0**	0.0	**0.0**
4	12.0	**10.6**	5.0	**11.9**	2.0	**16.7**	0.0	**0.0**
5	17.0	**15.0**	0.0	**0.0**	1.0	**8.3**	1.0	**8.3**
6	10.0	**8.8**	1.0	**2.4**	2.0	**16.7**	0.0	**0.0**
7	2.0	**1.8**	1.0	**2.4**	0.0	**0.0**	1.0	**8.3**
x	0.0	0.0	1.0	2.4	0.0	0.0	0.0	0.0
y	0.0	0.0	1.0	2.4	1.0	8.3	0.0	0.0
z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

tacit-explicit

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	2.0	**1.8**	0.0	**0.0**	1.0	**8.3**	1.0	**8.3**
2	19.0	**16.8**	1.0	**2.4**	4.0	**33.3**	0.0	**0.0**
3	20.0	**17.7**	1.0	**2.4**	3.0	**25.0**	0.0	**0.0**
4	26.0	**23.0**	0.0	**0.0**	3.0	**25.0**	0.0	**0.0**
5	22.0	**19.5**	10.0	**23.8**	0.0	**0.0**	1.0	**8.3**
6	13.0	**11.5**	13.0	**31.0**	0.0	**0.0**	5.0	**41.7**
7	1.0	**0.9**	11.0	**26.2**	0.0	**0.0**	5.0	**41.7**
x	2.0	1.8	1.0	2.4	0.0	0.0	0.0	0.0
y	8.0	7.1	5.0	11.9	1.0	8.3	0.0	0.0
z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

broad-focused

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	10.0	**8.8**	1.0	**2.4**	1.0	**8.3**	0.0	**0.0**
2	41.0	**36.3**	2.0	**4.8**	3.0	**25.0**	0.0	**0.0**
3	32.0	**28.3**	1.0	**2.4**	4.0	**33.3**	0.0	**0.0**
4	15.0	**13.3**	2.0	**4.8**	2.0	**16.7**	1.0	**8.3**
5	7.0	**6.2**	7.0	**16.7**	0.0	**0.0**	1.0	**8.3**
6	4.0	**3.5**	17.0	**40.5**	0.0	**0.0**	5.0	**41.7**
7	1.0	**0.9**	8.0	**19.0**	1.0	**8.3**	5.0	**41.7**
x	3.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0
y	0.0	0.0	4.0	9.5	0.0	0.0	0.0	0.0
z	0.0	0.0	0.0	0.0	1.0	8.3	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

original-accurate

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	10.0	**8.8**	0.0	**0.0**	1.0	**8.3**	0.0	**0.0**
2	43.0	**38.1**	4.0	**9.5**	6.0	**50.0**	1.0	**8.3**
3	28.0	**24.8**	1.0	**2.4**	1.0	**8.3**	0.0	**0.0**
4	18.0	**15.9**	7.0	**16.7**	4.0	**33.3**	0.0	**0.0**
5	7.0	**6.2**	7.0	**16.7**	0.0	**0.0**	0.0	**0.0**
6	3.0	**2.7**	11.0	**26.2**	0.0	**0.0**	6.0	**50.0**
7	0.0	**0.0**	7.0	**16.7**	0.0	**0.0**	5.0	**41.7**
x	3.0	2.7	2.0	4.8	0.0	0.0	0.0	0.0
y	0.0	0.0	3.0	7.1	0.0	0.0	0.0	0.0
z	1.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

integrative-discrete

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	27.0	**23.9**	1.0	**2.4**	6.0	**50.0**	0.0	**0.0**
2	55.0	**48.7**	3.0	**7.1**	5.0	**41.7**	0.0	**0.0**
3	15.0	**13.3**	7.0	**16.7**	0.0	**0.0**	0.0	**0.0**
4	5.0	**4.4**	3.0	**7.1**	0.0	**0.0**	1.0	**8.3**
5	7.0	**6.2**	9.0	**21.4**	1.0	**8.3**	4.0	**33.3**
6	0.0	**0.0**	16.0	**38.1**	0.0	**0.0**	4.0	**33.3**
7	0.0	**0.0**	1.0	**2.4**	0.0	**0.0**	3.0	**25.0**
x	3.0	2.7	1.0	2.4	0.0	0.0	0.0	0.0
y	1.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0
z	0.0	0.0	1.0	2.4	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

evocative-direct

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	1.0	**0.9**	0.0	**0.0**	0.0	**0.0**	1.0	**8.3**
2	19.0	**16.8**	2.0	**4.8**	2.0	**16.7**	0.0	**0.0**
3	21.0	**18.6**	3.0	**7.1**	1.0	**8.3**	0.0	**0.0**
4	15.0	**13.3**	1.0	**2.4**	0.0	**0.0**	2.0	**16.7**
5	10.0	**8.8**	14.0	**33.3**	3.0	**25.0**	1.0	**8.3**
6	8.0	**7.1**	11.0	**26.2**	3.0	**25.0**	4.0	**33.3**
7	1.0	**0.9**	1.0	**2.4**	0.0	**0.0**	1.0	**8.3**
x	27.0	23.9	10.0	23.8	2.0	16.7	2.0	16.7
y	10.0	8.8	0.0	0.0	1.0	8.3	1.0	8.3
z	1.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

metaphorical-direct

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	2.0	**1.8**	0.0	**0.0**	0.0	**0.0**	0.0	**0.0**
2	14.0	**12.4**	1.0	**2.4**	1.0	**8.3**	0.0	**0.0**
3	21.0	**18.6**	0.0	**0.0**	1.0	**8.3**	1.0	**8.3**
4	12.0	**10.6**	1.0	**2.4**	1.0	**8.3**	0.0	**0.0**
5	18.0	**15.9**	9.0	**21.4**	3.0	**25.0**	2.0	**16.7**
6	13.0	**11.5**	11.0	**26.2**	0.0	**0.0**	0.0	**0.0**
7	2.0	**1.8**	6.0	**14.3**	0.0	**0.0**	4.0	**33.3**
x	22.0	19.5	12.0	28.6	5.0	41.7	4.0	33.3
y	8.0	7.1	2.0	4.8	1.0	8.3	1.0	8.3
z	1.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

extrovert-introvert

rate	Architecture		Mechanical		Dual 'studio'		Dual 'lab'	
	fre	%	fre	%	fre	%	fre	%
1	7.0	**6.2**	1.0	**2.4**	4.0	**33.3**	0.0	**0.0**
2	47.0	**41.6**	9.0	**21.4**	2.0	**16.7**	1.0	**8.3**
3	28.0	**24.8**	7.0	**16.7**	0.0	**0.0**	0.0	**0.0**
4	11.0	**9.7**	6.0	**14.3**	3.0	**25.0**	1.0	**8.3**
5	4.0	**3.5**	4.0	**9.5**	2.0	**16.7**	2.0	**16.7**
6	4.0	**3.5**	5.0	**11.9**	0.0	**0.0**	4.0	**33.3**
7	1.0	**0.9**	1.0	**2.4**	0.0	**0.0**	2.0	**16.7**
x	7.0	6.2	7.0	16.7	1.0	8.3	1.0	8.3
y	4.0	3.5	2.0	4.8	0.0	0.0	1.0	8.3
z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ttl	113	100.0	42.0	100.0	12.0	100.0	12.0	100.0

APPENDIX F

Course descriptions of the research participants from the University of Sheffield, United Kingdom

Architecture
School of Architecture

A-level Requirements: AAA
Qualification: BA
UCAS Code: K100

Course description

This course is designed to provide a balanced education involving a theoretical base, design work and professional experience. Our design studio acts as a laboratory for testing creative and critical ideas, and developing fundamental architectural skills. Lectures and design teaching are delivered by people at the forefront of their field.

All three years of this degree course are divided approximately equally between lecture courses and studio based courses. The first year studio course acts as a foundation year which aims to bring together students from a range of academic backgrounds.

Projects develop in scale and complexity, until the major design project at the end of third year which addresses the full range of cultural, technological, conceptual and representational ideas.

This course has an option at Undergraduate and MArch level that leads to membership of both the RIBA and the Royal Town Planning Institute (RTPI).

As one of the UK's leading centres for the study of architecture, we have established an international reputation for providing a student-centred, inclusive, architectural education. You are encouraged to develop your own responses to the social, physical and environmental contexts presented by projects and coursework.

We aim to develop graduates who are self-critical, confident enough to make appropriate decisions, and aware of the wider responsibilities of the architect.

Entry requirements

- GCE/VCE A Levels - AAA
- Two GCE A Levels plus two GCE AS Levels - AA+AA
- Scottish Highers - AAAA or AAA Advanced Highers
- Irish Leaving Cert. - AAABB
- BTEC Level N - 3 Distinctions
- International Baccalaureate - 35 points
- Core Requirements - No specific subjects are required, but evidence of art or design ability is necessary. We are moving towards implementing a selection process that is more portfolio based. You will be asked to submit a portfolio, in which we will be looking at your observation, criticality, invention and representation skills.
- We will contact you following your application, providing details of the requirements at this time.
- For candidates with exceptional portfolios, a lower grade offer may be made.

Structural Engineering and Architecture
Department of Civil and Structural Engineering

A-level Requirements: AAB
Qualification: MEng
UCAS Code: HK21

Course description

This four-year dual honours course combines the essentials of an architecture course with a structural engineering course, principally focussed on buildings and structures. The course is designed to prepare you for working in the multi-disciplinary design teams increasingly found in the construction industry.

It is jointly accredited by the Royal Institute of British Architects, the Institution of Structural Engineers and the Institution of Civil Engineers, so you can choose whether to become an architect, an engineer, or both.

Each year of this course includes a mix of architectural and engineering subjects.

We offer a comprehensive range of four-year MEng courses, and a three-year BEng course in Civil Engineering. The MEng degrees fulfil all the educational requirements to become a Chartered Engineer, whereas BEng students will need to complete a period of further learning, such as an approved MSc course or a programme of structured learning devised by an employer.

Dual honours and Major/Minor degrees

This degree involves the study of two subjects to Honours degree level

Entry requirements

- GCE/VCE A levels - AAB
- BTEC National Diploma - 3 Distinctions
- Two GCE A Levels plus two GCE AS Levels - AA+BB
- Scottish Highers - AAB
- Irish Leaving Cert. - AAABB
- International Baccalaureate - 33 points
- Core Requirements - GCE A Level Maths plus another science A Level. VCE A Level Double Award Science or Engineering considered. Artistic creativity in the form of GCSE Grade B in Art or presentation of portfolio giving evidence of artistic ability.

Architectural Engineering Design
Department of Civil and Structural Engineering

A-level Requirements: AAB
Qualification: MEng
UCAS Code: HK2D

Course description

This is a four-year MEng course taught jointly by the department Civil and Structural Engineering and the School of Architecture.

There is an increasing demand for engineers who can provide multi-disciplinary skills at the interface of engineering and architecture. This course combines subjects from all of the engineering disciplines associated with buildings and their infrastructure, as well as providing you with an understanding of architectural thinking and practice.

Working with the wider Engineering Faculty, the School of Architecture and industry for teaching, project work and vacation placements, we aim to develop your understanding, appreciation and application of the core disciplines and boost your team-working and communication skills.

All of our Civil Engineering courses are accredited by the Institution of Civil Engineers, the Institution of Highways and Transportation and the Institution of Structural Engineers.

We offer a comprehensive range of four-year MEng courses, and a three-year BEng course in Civil Engineering. The MEng degrees fulfil all the educational requirements to become a Chartered Engineer, whereas BEng students will need to complete a period of further learning, such as an approved MSc course or a programme of structured learning devised by an employer.

Entry requirements

- GCE/VCE A levels - AAB
- BTEC National Diploma - 3 Distinctions
- Two GCE A Levels plus two GCE AS Levels - AA+BB
- Scottish Highers - AAB
- Irish Leaving Cert. - AAABB
- International Baccalaureate - 33 points
- Core Requirements - GCE A Level Maths plus another science A Level. VCE A Level Double Award Science or Engineering considered.

Mechanical Engineering
Department of Mechanical Engineering

A-level Requirements: ABB (320 points from 3 A Levels, or 2A Levels and 2 AS Levels)
Qualification: BEng
UCAS Code: H302

Course description

The BEng in Mechanical Engineering is an excellent three-year alternative to the four-year Masters course (H300). You will be provided with a good grounding in mechanical engineering and you will become a highly numerate graduate with excellent problem solving and analytical skills.

During the first two years you will follow a core syllabus aimed at developing the essential skills and knowledge in the fundamentals of mechanical engineering, mathematics and management required of a mechanical engineer. These are integrated through laboratory sessions, design projects, group work and tutorials.

In the final year you will undertake an individual project as well as being able to choose a number of optional modules. This enables you to follow the areas of your interest and to prepare for your initial career.

This three-year course is accredited by the Institution of Mechanical Engineers (IMechE). You will require further study and experience working as a graduate engineer to meet Engineering Council standards for Chartered Engineer (CEng) status.

Entry requirements

- An individual tailored offer may be made dependent on achievement, potential and motivation evident in UCAS application and interview.
- GCE/VCE A Levels - 320 points (ABB) from 3 A Levels, or 2A Levels and 2 AS Levels.
- Scottish Highers - 320 points from 3 AH or 2 AH & 2 H, incl. AH Maths and laboratory-based science
- Irish Leaving Cert. - 320 points from 5 Highers incl. 77 in Maths and laboratory-based science HL
- BTEC Level N - 280 points from 18 units including distinction in Further Maths
- International Baccalaureate - 32 points incl. 6 HL in Maths and Physics
- Core Requirements - GCE A Level Mathematics, plus GCE A Level in Design and Technology, or a laboratory-based science, or a grade B in GCE AS Level Physics.