# ICT INTEGRATION IN HOME ECONOMICS CLASSROOMS:

# A STUDY USING AN ONLINE COMMUNITY OF PRACTICE

by

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## ABSTRACT

The aim of this study was to explore the use of an online community of practice that would support Home Economics teachers in gaining the experience and knowledge necessary in order to integrate ICT effectively in their classroom practice. The project, which was conducted on a virtual learning environment, provided a channel and opportunity for teachers to acquire the knowledge and skills required to encourage ICT use. Rogers' (2003) diffusion of innovation process was the principal framework utilised and structured the process on the online community of practice. The participants, who were teachers and student-teachers of Home Economics, were led systematically from one phase to another of the framework in order to implement and confirm this innovation in the Home Economics class. The effectiveness of the online community of practice for the dissemination of knowledge, for improving classroom practice and hence as a professional development medium were researched in this study.

A mixed-method approach was used in the methodology of this case study. In this study I undertook a reflective process into my own pedagogical practices and Rogers' (2003) framework and through this method I tried to offer support and confidence to Home Economics teachers to expose them to effective technology integration. Analysis and evaluation were obtained from data collected through both quantitative and qualitative methods. A questionnaire was used to map out main responses whilst interviews and the forum discussions were used to draw out more in depth findings in order to answer the research questions. The data were analysed both inductively and deductively drawing from Rogers' (2003) theoretical model view and a content analysis method was utilised for the discussion forums and interactions on the online community of practice. The applicability of Rogers' model for this professional development exercise was also analysed as a result of the effectiveness of the community of practice and its implications for the educational community.

The findings show that through this online activity teachers' knowledge relating to the positive use of ICT in education can be confirmed. Teachers also gained confidence in

use through the sharing of ideas, through online feedback and through exposure to a community which brought teachers together in an asynchronous learning environment. The findings show that what teachers need most is the 'how-to' knowledge when an innovation is being diffused into set practice and this online community seems to have been an effective medium to deliver this. However, there were barriers which hindered more active participation, which greatly affected the knowledge construction on the online community of practice.

In conclusion one can say that support for technology integration should be provided for teachers from more formal policy driven and monitored professional development settings. An online community of practice can be the ideal medium to offer this even if not exclusive and over a long span of time, to provide the ongoing support which is necessary for technology integration. Teachers must also take up the challenge to make a significant paradigm shift in practice but also in training in order to maintain a more flexible and autonomous approach to professional development in technology and pedagogic practices.

# DEDICATION

**To my husband Jesmond**

**Whose unwavering moral and intellectual support
and constant encouragement made it possible for me to write this thesis.
I could not have done it without him.**

**To my three precious children**

**Andrea, Katrina and Luigi**

**Their co-operation and understanding throughout
this tough process helped me more than they can ever imagine.**

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# CHAPTER 1

# INTRODUCTION

## 1.1 INTRODUCTION

This research was undertaken because of a personal concern regarding the management of change in the take up of ICT[1] as a pedagogic practice in the local context, with a particular reference to the Home Economics[2] classroom. My hypothesis is that teacher training, current classroom practices and continuous professional development have not evolved enough to maximise on the potential of this innovative pedagogy. The growing importance of ICT in education brought about a personal quest to develop my own skills in computer literacy and eventually gain more knowledge and understanding of how ICT can be used effectively in HE teaching and learning since support agencies such as BECTA[3] provide subject specific support, but not in HE[4]. An online community can provide the space to build such resources in collaborative ways. I attempted to share a number of practical examples of teaching and learning HE using ICT, whilst addressing issues of technology integration. The aim is to give HE teachers more knowledge and pedagogic skills in ICT in order to support integration.

## 1.2 SETTING THE SCENE

My interests lie in pedagogy and in the improvement of teaching for better learning experiences which would help pupils understand better, build their own knowledge and enjoy themselves regardless of their ability or background. During my visits to student-teachers on teaching practice field placements[5], I have often been disturbed by the passivity of some learners and lack of fun and hands-on experiences in classroom practice. I am a firm believer that with creativity and knowledge of the appropriate ICT tools, student participation through productivity and performance in class could be improved.

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[1] Information and Communication Technology
[2] Home Economics will hereafter be written as HE
[3] British Education Communications and Technology Agency
[4] BECTA is a British agency and since HE is no longer a curriculum subject in the English system, then no support is provided for HE teachers.
[5] As a lecturer in HE at the Faculty of Education, I am a tutor and examiner for student-teachers who would be undergoing a six week period of teaching practice and therefore have to visit them in schools.

I wanted to explore ways of how ICT can be utilised in HE to improve pedagogies and how to challenge teachers to take on new ways of teaching. This led me to link ICT to HE pedagogies in this study, particularly because these were also years when schools were investing heavily in technology and the target action on classroom resources and infrastructure has progressed very rapidly, yet teachers' skills development and support were evolving at a much slower pace (Murchu & Freeman, 2003).

> *'The Information Age challenges teachers to embrace change. Computer literacy is an essential skill requirement for students in the modern world and teachers must accept and welcome this.'* (Murchu & Freeman, 2003, p. 1)

Technology is not a simple innovation. Many teachers have had to gain skills and confidence in using the computer for personal use and then attempt to include technology in class. As will be seen in this study, most teachers use technology more as an add-on rather than as pedagogy. Whilst teachers are coping with the day to day running of the classroom and attempting to use some low level technologies[6] such as using Microsoft PowerPoint[7], internet searches and video clips, they are expected to integrate technology as a pedagogic practice even though most as Ertmer (2005) states, feel ill-prepared to do so. Due to a lack of software in HE (Murchu and Freeman, 2003) or the high expense of multimedia development, it may be argued that teachers need more exposure to simple and appropriate technology for HE in ways which would enhance learning. In this thesis my intention was to make the teachers who participated aware of a variety of possibilities of different technological uses applicable to HE and make them aware of effective ways of using technology in class as a constructivist pedagogic practice. The process requires sensitivity to the teachers' pace of engaging with technology and their existing practices. Technology is daunting for a non-technical teacher and without the necessary support and appropriate training, teachers may easily reject the innovation.

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[6] Low level technologies are mostly associated with teacher centred pedagogies whereas high level use of technology is associated with student-centred approaches.(Becker and Riel, 1999)

[7] Hereafter PowerPoint.

## 1.3 HE IN MALTA

HE is a school subject in Malta that has been offered since early on in the twentieth century. Courses in HE are currently offered at secondary, post-secondary and tertiary level. The HE syllabus is divided into three main areas[8]. In state secondary schools HE is an optional subject in Form 1 and can then be chosen again for further specialisation in Form 3. A very high proportion of both male and female students from state schools in the Form 1 cohort generally choose HE as their optional subject for a period of two years (Piscopo, 2006). HE is also offered in church and independent schools from Form 1 until Form 5.

The HE syllabus in Malta is designed to equip students with a useful range of skills and follows an integrated approach where inter-relationships between diet, health, family, resources and home are addressed in both practical and theoretical contexts. HE aims to give the students skills in decision-making, practical and investigative skills and critical thinking.

The HE syllabus is conducive to constructive learning theory as emphasis is made on active learning through problem-solving and decision-making experiences. It seeks to provide personal growth through experiential hands-on learning and practical experiences, which in turn support students in developing knowledge and attitudes towards the use of resources, including technology. This practical approach offers opportunities to use active methodologies which can prepare students to think about problems that need to be solved, to seek information, think critically, investigate a range of choices, manage their resources, express themselves with confidence, make judgements and decisions and evaluate their results. (HE state school syllabus, 2008). The subject can lend itself to the integration of ICT and teachers need to support such a potential.

[8] The three main areas are Food, Nutrition and Health; Home and Family Living and Choice and Management of Resources.

The main approach should therefore be constructivist, although from personal experience and observations it seems teachers may not be conscious of the approach or are not permitting pupils to take on an active role in the classroom especially during the theoretical component of the subject. Learning experiences which increase the students' motivation and activity and are student-driven are not necessarily part of the process in some HE classrooms. If HE teachers are supported into making a shift towards using ICT effectively in class, the teaching of HE may become more constructivist. In a constructivist class learning is socially constructed, active, reflective and collaborative (Mc Cloat, 2008). I believe that ICT has a role to play in the practice of active methodologies which would enhance the teaching of HE. ICT can reach students of different abilities (NCET, 1994) by presenting information or activities in a graded and varied manner.

Teachers of HE may think that the subject has enough hands-on experiences because of the practical and investigative component and therefore ICT may not be seen as a necessary pedagogic practice to take up. Whilst technology is not an education panacea, it can support and extend teaching and learning through activities which offer new and interesting ways of developing skills (Dorner, Field and Sparrowhawk, 2000). ICT *'encourages the creative use of modern information technologies to construct learning environments which are rich, varied and facilitate the development of student-centred learning practices'* (Murchu & Freeman, 2003, p. 2). The relationship between ICT and HE offers challenges and opportunities with implications on education officers[9], curriculum developers and teachers. There is very little research in the area of HE and ICT and in this project I have tried to build a bridge between ICT and HE whilst remaining sensitive to the context of our schools and the curriculum. The research will attempt to provide a background as to how one can support teachers in integrating ICT effectively and give appropriate examples of how the HE subject methodologies can contribute to improved classroom practice. ICT was used with the teachers involved in the study in order to support them in actively constructing knowledge and reflections on their practice with new pedagogies. McCloat, (2008) suggests that, *'ICT facilitates*

[9] In Malta education officers are the subject co-ordinators responsible for one specific subject

*learners to actively construct their own knowledge and promotes autonomy and critical reflection.'* (p. 11).

### 1.3.1 The Need for research in ICT integration and HE

The use of ICT in education has brought about numerous studies from many parts of the world highlighting the benefits and opportunities as well as the challenges for integration. Lack of software for HE is a barrier to effective integration (Mc Cloat, 2008). Urdzina-Deruma and Selvaha (2007) found that teachers in Latvia are using ICT as an information provider, in the preparation of tests and teaching aids, to upload photos on computer, to deliver PowerPoint presentations and to use the Education Informatization System of Latvia[10]. This finding echoes similar findings in Europe (European Commission report, 2006). Cuban (2000) has argued that computers as a medium for instruction for student learning are largely incompatible with the requirements of teaching, particularly because of the large number of students to teach, too many topics to cover and increased accountability. He argues it is very challenging for teachers to incorporate technology as a regular part of their instructional practice. Prensky (2005) states that until recently schools have been dabbling with technology and teachers mostly continue to do things with technology in ways which fit in with their present practices. He states that children are adopting technology in new ways, often inventing innovations and adopting them as their preferred method of behaviour, but this practice has not made its way into schools yet.

In the light of all these challenges and deficiencies in ICT for HE, I decided to take on this research project and become proactive in the promotion of effective integration of ICT in HE. I am in favour of subject specific ICT integration training, as is also suggested by Mc Cloat (2008), and in building a team of eager HE teachers who can share good practice and collaborate to create ICT teaching material together.

[10] A nation-wide project which covers the whole education grid: content,management, information services, infrastructure and user training. Teaching aids including interactive software and training on the personal computer and internet are provided to teachers and students as part of this project.

## 1.4 ICT AS A PEDAGOGIC PRACTICE

According to a report (European Commission report, 2006) following a European-wide survey of head teachers and classroom teachers in twenty-seven different countries, computers and the internet have arrived in European schools and are widely used in class in most countries[11] (Korte and Husing, 2006). The computer is seen as a means for the preparation of lessons, with many teachers showing confident usage of word processors and fewer showing confidence in developing electronic presentations. The report shows a high level of computer use by teachers, a figure reaching an average of 74% across Europe, however, there are large variations across countries with just 35% in Latvia, 36% in Greece and a high of 96% in the UK and 95% in Denmark[12]. (European Commission report, 2006). According to this report, the materials used for teaching with ICT include the internet, material available on the school's computer network and other offline material such as the CD-Rom. When these figures are compared to teachers' attitudes, questions arise as to how effectively technology was being used in class. The report shows that the vast majority of European teachers see the benefits of using ICT in school and especially for letting pupils do exercises and practice. However, this varies extensively across the EU countries, showing that these averages are not giving a true picture of what is happening inside the different schools and classrooms across Europe, particularly showing that teachers may not have access to internet in their classrooms.

## 1.5 ICT IN EDUCATION IN THE LOCAL CONTEXT

Malta's interest in ICT in education dates back to the late eighties when the island was going through a wave of investment in telephony as a result of developments in computing in the international context. By 1989, the Education Division was working on a first phase of a National Strategy in IT (Darmanin, 2005) and since then more investments were made in all state schools to ensure that children from every background are introduced to the use of computers as early in their lives as possible. Almost twenty

[11] This includes use of computers for work and personal productivity.
[12] EU report published in August 2006 and available online at http://europa.eu.int/information_society/eeurope/i2010/docs/studies/final_report_3.pdf

years on, the 2008-2010 national strategy for ICT shows that our policy makers want to push our country forward to make it a vibrant ICT-led economy and hub (National ICT Strategy for Malta 2008 – 2010).

Darmanin (2005) gives an overview of how technology has infiltrated local state schools since 1989 and started in three Junior Lyceum schools[13]. This was started with teachers of social studies who were taught how to use computers through an introduction to basic Maltese language software which was made available in all schools. This proved to be a challenging task[14]. Through the National Strategy in IT of the time, it was planned that secondary school teachers would be trained to teach three subjects[15]. Students only had one lesson a week in the computer lab in these subjects and Darmanin (2005) indicates that the planning of ICT across the curriculum was flawed. This failed due to several reasons, the main one being that an ICT teacher was assigned to teach these different subjects and the co-ordination between the ICT teachers and the subject teachers was inadequate (Zammit, 2005). The infrastructure in secondary schools according to Zammit (2005) may allow subject teachers to teach with the use of ICT, however, he states, few teachers make use of it. In 1996, a gradual phasing in of ICT equipment in all primary classrooms starting from year 1 was initiated and state school teachers were given laptops and four multimedia PCs in order to overcome the lack of access to ICT when home computers were not the norm. A special support team of specially trained ICT peripatetic teachers went around primary schools to assist teachers in the classroom use of ICT. In addition, the Department of Technology in Education within the Education Division[16] has contributed to this area by providing a large number of initiatives and evening courses in order to enable teachers to use ICT effectively in the classroom[17]. Such courses became available when schools were not adequately equipped with ICT infrastructure. The fact

[13] Junior Lyceum schools are secondary schools which can be described as grammar schools and which host students who would have passed what is known as the Junior Lyceum examinations sat for at the end of primary schooling.
[14] Due to a lack of software developers at the time.
[15] Namely English, Maths and Social Studies to forms 1 and 2 through ICT.
[16] This is the name that was given to the local department which hosts the education state sector, a name which has since been changed to Education Directorates as two directorates administer the whole education sector.
[17] Most commonly these courses were focused on basic computer skills and handling certain types of software though and not as much on technology and how to effectively teach with it.

that these courses were not onsite within the school and were carried out in the evening may have hindered teachers from following them. Teachers may not be taking up these opportunities, despite them being free of charge.

Another plan to introduce ICT across the secondary curriculum was required and this meant intense investment in hardware, software and teacher training (Darmanin, 2005). By 1995, the ratio of PCs to secondary school students was 1:27 and by 2005 this rose to 1:13 (Darmanin, 2005). This does not mean that students were leaving school with good IT literacy skills. The Department of Technology in Education within the Education Division has been trying to minimise this negative effect by offering a programme in all schools whereby all state school students from Form 1 to Form 5 began to sit for lessons leading up to ECDL[18]. Students in church and private schools were also prepared for this programme since the ECDL even became a requisite for some University courses and jobs.

Despite much investment, the reality is different. A survey held in primary schools in the first year of implementation of the plan for primary schools found that only 54.6% of the sampled teachers had access to a computer and only 15.8% stated they knew how to use a computer (Borg Conti and Sciberras, 1996). In this same study 90% stated they were not capable of using a computer in the classroom for teaching and learning and 94.8% stated that they required more training in order to implement the policy.

Over the past two decades a substantial number of families have equipped their households with computers and internet access. New generations are more exposed to computers at home than at school. In Malta's National ICT Strategy (2008 - 2010), it is stated: *'our IT-related educational set-up must be made to grow exponentially, in primary, secondary and tertiary education.'* (p. 28). The thrust is focused on making people IT literate and giving them skills in ICT which can in turn generate a demand for more advanced technological training. *'The days of IT generalists are gone. The demand now is for highly specific skills.'* (National ICT Strategy for Malta 2008, p. 30) In order

[18] European Computer Driving Licence

to make the nation more computer literate, more than 6,800 ECDL programmes have been provided over three years to the general public. The interest in ICT programmes at post-secondary level grew enormously as large numbers are being attracted to tertiary institutions for training courses in ICT. Educationally the strategy is all directed at preparing students for development of ICT skills, aptitudes and capabilities for enhanced technical training at vocational or post-secondary levels (National ICT Strategy for Malta, 2008). E-learning is mentioned in the document as being an educational driver, yet once again the focus is on it being the primary vehicle for ICT education across all sectors and levels. In the policy-makers' introductory statement to the document on Malta's National e-Learning Strategy 2008 – 2010, it is stated, *'.....we must invest in our teachers, who need to transform our pedagogies into self-directing learning activities and problem-solving strategies, where creativity and collaboration feature prominently and regularly in our classrooms.'* (p. 5). The vision is positive; the practice is still to come.

The Lisbon Objectives,[19] to which Malta is bound, clearly state that education systems should be modernised to make Europe a world leader in the quality of its education and training systems (Zammit, 2005)[20]. In local primary schools, ICT is meant to be integrated across the curriculum and used to teach different subjects, while in the secondary sector it is regarded as a different subject and geared towards a skills-based exam. However, in Maths, teachers are encouraged to use ICT for teaching and learning and have one lesson per week allotted to them in a computer lab with each class they teach.

Although EU and local studies, as shown earlier, indicate that the internet is available in schools, many teachers have shown that the internet is only available in a limited area in schools and therefore it is insufficient to use across the school in different subject rooms. To this effect the National ICT strategy (2008) indicates that the installation of portable devices and wireless networking in the scholastic year 2008-09 will ease many difficulties faced so far by teachers and which have impeded technology integration.

[19] The Lisbon objectives emerged from the Lisbon Council in March 2000.
[20] Zammit was the Head of the Department of Technology in Education within the Education Division during this period.

Thus problems of accessibility will be surmounted also because in the summer of 2008 all secondary school teachers in state schools were given a laptop.

### 1.5.1 ICT Training for Teachers

The deployment of equipment and infrastructure has been accompanied by some elements of professional training in basic computer skills or productivity software. In line with the focus of this thesis, Zammit (2005) points out that the type of training being offered in basic skills is necessary, although it does not fully prepare teachers to successfully integrate ICT into the curriculum in ways which will actively contribute to the teaching and learning. To date, HE teachers have not been provided with a specific ICT in-service training. In an unpublished postgraduate study, Vassallo (2004) claimed that teachers did not feel that the induction courses given prior to the introduction of computers in primary classrooms were adequate. The reasons given strengthen the argument I will be pursuing in this thesis that teachers require ongoing support and onsite technical help. A one-off course is not sufficient to make teachers comfortable with technology and make them feel confident to use this resource in class effectively. The teachers in the Vassallo (2004) study claimed that the training they undertook was not successful due to time restrictions and a lack of documentation.

### 1.5.2 ICT in Initial Teacher Training

The strategy for ICT knowledge and skills within the Faculty of Education at the University of Malta, which is the main institution providing teacher training, has so far been two-pronged: (a) general courses are offered, aimed at helping student-teachers increase personal and professional productivity and (b) courses within the separate subject areas aimed at helping student-teachers learn how to use ICT within their subject area. Although the provision of these two distinct courses helps avoid overlap, the distinction is at times blurred and not every subject is dedicating units to show students how the respective subject methodologies can benefit from integration of ICT. In the absence of a faculty wide ICT policy, there sometimes are disagreements on the principles of who should be

teaching student-teachers about ICT knowledge and not enough focus on clear examples in the different subjects.

HE student-teachers are offered one fourteen hour unit in ICT integration and most lecturers do not teach with technology. Thus student-teachers are leaving their ITE[21] programme competent in the use of the computer for personal and productivity purposes but not equipped with the right mentality or pedagogic knowledge to teach with ICT effectively.

The relationship between a specific subject and ICT is complex and raises issues for training institutions, as is identified by Burnett, Merchant and Myers (2007), for English and ICT. These authors not only show that ICT may be taught separately to the subject of specialisation but that difficulties may arise for those who wish to integrate digital technologies within their sessions. Close collaboration with colleagues, they indicate, may be an effective way to overcome this. In line with Burnett et al's (2007) thinking, the online community of practice which I ran aimed not only to create collaboration amongst same subject teachers but also reduce the isolation of university lecturers from classroom practice through the interaction between these HE lecturers and teachers from secondary schools.

## 1.6 THE HE TEACHERS' COMMUNITY OF PRACTICE

Communities of practice can be online or face-to-face, although in this thesis the type of community being studied was an online community of practice[22]. The communities of practice being referred to in this study are mostly online. Prior to this study, I was influenced by research on collective support and constructivist classrooms by Becker and Riel (2000), which shows that teachers who regularly participate in professional interactions and activities with other peers will teach in different ways to those who are isolated. The study also indicates that the more extensive the professional interaction, the

[21] Initial Teacher Education
[22] Hereafter CoP signifying the online CoP involved in this study.

more compatible teachers' practice will be with a constructivist learning theory. Clustering teachers of HE together to collaborate and share ideas on technology integration into their teaching and learning is a positive step. Kirschner & Lai, (2007) claim that there is a growing recognition of the importance of using online communities of practice as a model for professional development of teachers. As Wenger (1998) states, learning is a part of human nature, but is not an individual phenomenon. Learning is the movement from peripheral to full participation in communities and not merely the acquisition of knowledge within the mind of an individual (Kelly, Gale, Wheeler & Tucker, 2007). This project was designed in a way that would make professional development more social through the online facility and interactions between the participants.

Throughout the numerous weeks on the CoP, the participants would be learners when being exposed to knowledge and would be teachers when asked to implement ICT activities in class, when asked to contribute good practice and when asked to comment professionally. The ultimate goal of this project was to encourage teachers to enhance their teaching with effective ways of using ICT as a pedagogic practice as well as build favourable attitudes and get accustomed to the technologies which suit the HE subject methodologies. As Prensky (2005, p.7) states:

*'A lot of work?*
*Absolutely!*
*But our kids deserve no less'*

## 1.7 CONCLUSION

This thesis attempts to evaluate how this first ever online CoP for Maltese teachers of HE brought together fifty-one teachers on a voluntary basis and the online processes and the ensuing outcomes that went on during the implementation of this project. The main research question will be to explore how online interaction and collaboration can provide professional development to help teachers share good practice of their current ICT use

and promote the use of new pedagogies effectively in the HE curriculum. The aim was to help teachers recognise that using ICT can enhance learning only if new pedagogic skills are applied and they move away from using technology just to enhance the lesson. Thus the research question has been broken down into further sub-questions which have then been used to help me structure the HE teachers' online CoP, and then analyse this medium as a potential tool for professional development. The following questions have been used to explore the above research question in different ways and stages:

1. How effective is an online CoP in developing teachers' and student-teachers' knowledge about ICT in the curriculum?
2. How effective do teachers and student-teachers feel an online CoP has been in improving their classroom practice?
3. How effective was the medium itself (the CoP) in contributing to professional development in ICT?

Thus the literature review will focus on research that offers insights into the area of ICT in education and includes areas such as online environments for educational settings, constructivist learning theory, technology integration in teacher education, communities of practice theory, ICT and professional development and the diffusion of innovation model. Chapter three describes the methodological methods used for the design and implementation of this CoP, the data collection methods and the analysis methods used to draw out results which will give insights into how the model chosen for the diffusion of innovation worked. In chapter four, I describe, analyse and interpret the discussions and interactions on the CoP, whilst chapter five answers the above mentioned research questions and where the interpretation of the results gave insights into the use of online communities of practice as professional development tools for HE teachers in our local context. The final chapter focuses on a summation of the nature of online communities of practice as used in this thesis and offers recommendations and suggestions for further studies.

In the light of a lack of suitable software available for HE (Mc Cloat, 2008), it is hoped that through this whole process I will help in disseminating knowledge, confidence and awareness of a variety of appropriate ICTs which are appropriate for HE methodologies in order to enhance teaching and learning. As Burnet et al, (2007) suggest in relation to the subject of English:

> *'By supporting them in gaining the knowledge, confidence and critical awareness to recognise the potential of ICT, we may enable them to provide a vibrant and dynamic (English) curriculum and embrace further change in the future.'* (p. 14)

This is also my hope for the HE curriculum.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1 INTRODUCTION

The National Council for Accreditation of Teacher Education (NCATE, 2002) noted the importance of technology integration for teachers and students, since this provides a considerable amount of support in education, particularly in higher-order thinking and active learning (Carney, 1998). Change in classroom practice, however, may only take place if teachers are comfortable and willing to change and are supported in mastering technical and instructional skills (Carney, 1998). Teachers who are regular users of ICT are normally confident in using computers and technology in class (Cox, Preston & Cox, 1999). This chapter examines the core literature associated with technology integration for teachers. Focus will also dwell on the value of educational online environments and online communities of practice as a medium for professional development in ICT. The literature review will expose constructivist learning theory as effective technology integration stems from constructivist learning approaches. The diffusion of innovation model according to Rogers (2003) will be discussed as this was the main theoretical framework used throughout this study in the design and implementation of the online community of practice as well as in the analysis of the data.

ICT can have positive and influential benefits on learning (Sandholtz, Ringstaff and Dwyer, 1991, Watson, 1993, NCET, 1994, EU Schoolnet, 2008), yet the majority of teachers still feel ill-prepared to teach with technology (Whittier, 2004 [online]; Candace Chou, (undated [online]), Ertmer, 2005). In transforming teacher training and professional development programmes we need to ensure that new graduates and experienced teachers will be trained appropriately to enter tomorrow's classrooms skilfully prepared to teach with technology (Ertmer, 2003). I believe that this project is only just the beginning phase of technology integration amongst HE teachers in Malta.

> *'It is up to us to transform the opportunity into reality'*
>
> (Ertmer, 2003, p. 5)

## 2.2 USE OF ONLINE ENVIRONMENTS IN EDUCATIONAL SETTINGS

E-learning[23] is an umbrella term for an array of technologies involved in the process of design, delivery and management of instruction or training using computers (Driscoll, 2002). E-learning is generally understood to mean educational methods[24] which incorporate a structured educational experience, involving both teaching and learning[25] (Schkudlara, 2008) and which, according to the European Commission[26] (2001), can improve the quality of learning through access to resources and services as well as remote exchanges and collaboration. Different aspects of ICT can support effective learning and teaching (Hill, 2008). Garrison and Anderson (2003) suggest that e-learning is not just about access to information, but more about using online network technologies to build on the potential for communication and interaction. As stated by Merchant (2006), new technologies are providing us with alternatives to face-to-face communication which enable us '*to interact in different ways within diverse and dispersed networks much more than previously imaginable*'. (p. 235)

E-learning is growing at a rapid rate (Driscoll, 2002). Different countries have invested heavily in ICT resources and equipment. Pertinent questions to evaluate would be to see whether ICT, which is absorbing ever increasing proportions of the education budget is being successfully delivered in programmes of initial teacher education and whether this is being used effectively in schools. A further area of investigation would be to see if it has become the 21st century tool for learning and if the training for teachers is not cutting edge then are we training yesterday's teachers for tomorrow's schools? Finally, effectiveness must also be evaluated across the curriculum in all sectors of the education systems. Research identifies inequalities in the utilisation of technology, horizontally across subjects or vertically across age groups (Watson, 1993). The main objective of this thesis, however, is aimed at contributing to the professional development of HE

[23] This was known previously as web-based learning.
[24] Where the computer is used as the instructional medium
[25] New multimedia technologies and the internet
[26] Through the E-learning Action Plan of 2001.

teachers in Malta through an online community of practice[27] and assists them in transforming their classroom practice and pedagogies through the use of technology. The EU Schoolnet Impact Report on ICT (2008) indicates that impacting on teachers' practice has proven to be a difficult endeavour.

The technological revolution taking place in higher education with the growth of e-learning being described as explosive (Garrison and Anderson, 2003) and has implications for e-learning in all educational sectors, whether technological, pedagogical or organisational. The online environment, particularly heralded by the internet as the catalyst, (Pincas, 2006) has transformative implications for education if it manages to reconceptualise teaching and learning. Garrison and Anderson (2003) acknowledge the impact e-learning can have on education systems, yet emphasise that it would make little sense to simulate traditional forms of teaching in this new form of learning. If teachers and learners are to experience a new learning environment, using past practices would be an injustice to the potential of e-learning and the effect it can have on learning. Pincas (2006) argues that despite the potential of transformation in teaching and learning, it is possible for teachers to continue teaching their existing curricula with the benefits of new technology, but without making any fundamental changes in their practice. The internet is giving us an opportunity to exploit its potential and revolutionise education through the reconstruction of the meaning of teaching and learning (McConnell, 2006). McConnell remarks that we are in a postmodern world dealing with the postmodern learner who, according to Wood and Zurcher (1988), seeks immediate gratification rather than delayed responses; prefers fun rather than suffering; wants education that is meaningful and relevant to real life and would much rather have social relations and interactivity than isolation. These concepts must set us thinking and reflecting on the way we teach.

Garrison and Anderson (2003) indicate that the influence of e-learning on current teaching and learning practices has been weak, thus implying that a better understanding of its potential and strengths must be sought. The online community chosen as a medium

[27] It is important to state here that the community of practice utilised in this research was an online community and referred to in this study as CoP.

for this study is an attempt to share and discuss the challenges and opportunities of ICT integration with the local HE teachers amidst a collaborative environment. Glazer and Hannafin (2006) suggest a collaborative apprenticeship to help teachers learn and implement new teaching skills and strategies.

### 2.2.1 Effective Online Environments for Educational Settings

*'The aim of teaching is simple: it is to make student learning possible.'*

(Ramsden, 1992: p. 5)

Effective educational online environments should address the needs of learners and therefore it is appropriate to establish what students need from learning technologies (Laurillard, 2002). *'One of the greatest untested assumptions of current educational practices is that students learn through discussion.'* (Laurillard, 2002, p. 158). She adds that there is increasing research on collaboration between students using computers although this work is only just beginning to look at the nature of student to student discussion and how much this supports the learning process. From my personal experience, I would add that online or informal learning as encountered through the media, reading and social learning could be more effective than traditional learning, particularly for adults, whereby the active engagement of the learner, particularly situated in real-world activity, makes the learning more meaningful. In my personal learning experiences I have found that didactic processes and traditional forms of teaching offer what is sometimes referred to as 'surface learning'[28] (Ashcroft and Foreman-Peck, 1994) rather than 'deep learning'. I have often observed that when knowledge is imparted without opportunities for consolidation or time for reflection, a high proportion of students end up in a chaotic journey of confusion where the only means of gaining success is through rote studying. This is one of the reasons why I have turned to learning technologies and have tried to explore ways of how these can contribute to giving learners opportunities to interact and articulate individualised responses. Online learning

[28] Surface learning is about remembering whereas deep learning is about understanding and making sense of the subject, hence the latter being more effective (Hill, 2008).

brings about opportunities which can support lifelong learning, self directed and autonomous learning or informal learning beyond the classroom walls.

Learning technologies can provide alternative sources of knowledge which may reduce teacher dependency whilst enhancing the learner's repertoire of learning skills with greater student autonomy (Davis, Desforges, Jessel, Somekh, Taylor and Vaughan, 2004). In addition, this would allow learners to maximise their active role in learning and help to prevent didactic teaching. Ironically, as stated by Davis et al, (2004) *'classrooms are not the ideal learning environments; they are working compromises in mass education systems.'* (p. 21) as a teacher is always compromised by the shortage of resources[29] and a large number of learners with different abilities.

E-learning supports both synchronous and asynchronous communications and both can be convenient for educational settings, bringing teachers and learners together on virtual environments despite geographical locations. Researchers tend to agree that asynchronous discussion and learning networks offer more educational benefits (Teo and Webster, 2008) as they offer opportunities for the participants to communicate, collaborate, and work in groups on projects and share experiences. Online communities are often seen as virtual spaces for social networking but they also represent forums which can have an impact on different levels of quality of sharing and knowledge building (Preston, 2007).

New learning technologies provide the architecture required to support groups and communities in cyberspace (Mc Connell, 2006). Teachers may find face-to-face traditional methods to be more popular. Lebec and Luft (2007) indicated that even learners may show a preference towards social skills offered in face-to-face interactions. Hammond and Wiriyapinit (2005), in a study carried out into online discussion, found that student-teachers expected to find the learning environment more enjoyable, collaborative and convenient. These students claimed that they felt comfortable posting messages and enjoyed the flexibility of asynchronous participation whilst claiming that

[29] Space, time, books and equipment

the strongest constraint of online participation was the lack of time available. Online settings provide for a different type of interaction. Participants can manage their own learning and interactions, be it with the material, the tutor or other learners and take on different roles to their usual self. Personal traits and qualities may change in the virtual environment. Participants who may normally be reserved or less eloquent verbally may find it easier to communicate when writing in an online environment. Extroverts tend to be less comfortable in virtual situations, but can also value learning with a larger number of participants (Lebec & Luft, 2007). In addition, Merchant (2006) indicates that online environments are offering new challenges for self-presentation and diverse identities, changing patterns and practices of interaction on social networks.

I would now like to examine the role of online environments for effective learning. Throughout this study I have come to appreciate the value of collaborative learning as an outcome of virtual learning environments. Networked collaborative e-learning offers an opportunity to students to reflect on their learning as it occurs in the groups and communities, whilst developing new skills in knowledge building and deeper approaches to learning as well as the opportunity to learn from other learners (McConnell, 2006). This author states that because of the possibility to view and review discussions, learners find this highly beneficial in understanding discussions and the written record allows them to develop deeper knowledge due to the social learning and discursive environment. E-learning can build many opportunities for digesting and clarifying ideas, constructing questions, taking part in simulations, choosing between options, problem-solving whilst receiving more frequent individualised feedback (Hill, 2008) and encourage reflection, provide control, direct attention and add dimension to content (Driscoll, 2002). In agreement with Hill (2008), I feel that in face-to-face discussion learners are often not given enough time or opportunities to express their opinions and articulate their understanding of a concept. Discussion can also span more breadth and depth online, unlike the time-constrained classroom where students are required to offer spontaneous responses (Teo and Webster, 2008). In online environments, learners have a chance to think and thus be given the opportunity to respond which may have not be given in a face-to-face situation. Online discussion affords more participation due to reduced

problems of shyness, language, gender difference or power relationships (Teo and Webster, 2008).

### 2.2.2 Learners in Online Learning Environments

In a study by Lebec & Luft (2007), students showed that there are a myriad of reactions to online forms of learning which reflect diverse inclinations such as preference towards face-to-face interaction or self-directed learning with flexible arrangements. Other factors emerged, such as the lack of motivation especially tangible forms of motivation[30] or a *deprioritisation* of the course. Typing was seen as time consuming and the lack of bulletin postings by most of the participants then discouraged others to become more involved. An informal feeling failed to give a sense of responsibility or commitment to contribute further. Teo and Webster (2008) indentify a number of obstacles impeding asynchronous discussion, which include: 1) decisions whether to participate; 2) unmotivated by the discussion topic; 3) not knowing what issues to discuss and 4) not knowing how to discuss. In many cases, researchers such as Teo and Webster (2008) have made participation an assessment criterion so that this would encourage active and responsible participation. In order to support participants, Teo and Webster (2008) utilised a scaffolding technique which would assist the participants in the discussion process. The topic was broken down into sub-sections and they provided a step-by-step critique procedure. Data from this study suggested that the cognitive conflict created as a result of the scaffolding techniques utilised was beneficial to knowledge construction and meaning making.

McCrory, Putnam and Jansen (2008) argue that three aspects of the online courses impact the way students enter into discussions online: (a) the subject matter itself; (b) the representations and media through which the subject matter is engaged, and (c) the tasks students are asked to carry out online, and hence the opportunity to learn. In addition, they claim that students' disposition to engage in constructive discourse (or not) is an important and only partly controllable factor in what happens in online discussion. As stated by Annetta, Murray, Laird, Bohr and Park (2008) the implications of technology

[30] Such as assessment or grades.

integration for the educational setting, particularly for teacher education suggest positive avenues and this meets the growing demand for engaging students in all content areas. It is difficult for educators to ignore technology and online environments due to the fact that students at all levels are arriving in schools with greater technological abilities, particularly in online communities through social networking[31] on the internet and have brains that have been shaped by very visual, rapid and virtual environments (Annetta et al, 2008).

### 2.2.3 Challenges of Online Environments for Professional Development

Online professional development has been found to produce consistent opportunities for reflection and sharing, this being a significant advantage over traditional modes of learning (Lebec & Luft, 2007). With reference to the adoption of computer communications in society Garrison and Anderson (2003, p. 1) state: *'We have yet to fully experience the transformative effects of this medium, particularly its effect on e-learning.'* For an online environment to sustain high quality ongoing professional development, it must be *'carefully planned and well supported if it is to provide a forum for teachers to be active and long-term members of these communities.'* (Lock, 2006, p. 5) Often learners who show an inclination or curiosity towards the online environment would have higher self efficacy (Wang and Newlin 2002). These authors concluded that online collaboration can contribute to higher performance in the virtual classroom, yet more research is needed to assess the role of online environments for learning purposes.

There is still a fear of the unknown towards ICT and online learning environments. Teachers may be hesitant about virtual learning environments because not enough is known or fear that they may take over traditional forms of teaching, demand more time and change existing learning cultures or skills like reading and writing.

[31] For example through chat forums and Voice over IP (VoIP)

## 2.3 CONSTRUCTIVIST LEARNING THEORY

In this thesis I will be focusing on constructivism for three reasons: 1) because ICT pedagogies can be compatible with constructivist learning approaches, 2) a constructivist approach – scaffolding was used in this research and 3) communities of practice which foster collaboration and knowledge construction as well as the negotiation of meaning can offer the social medium required for these constructive purposes.

ICT in education can lend itself to a constructivist approach to learning, shifting the importance from teaching to learning, where learning involves thought processes and active methodologies which will engage learners in effective and appropriate ways to construct their own knowledge and make meaning. Fosnot (2005) states that constructivism is about how one *'comes to know'* and states that this is a psychological theory where learning is seen as an *'interpretive, recursive, nonlinear building process by active learners interacting with their surround - the physical and social world'* (p. 34). In a constructivist theory approach, the learner's cognitive abilities and the way he/she constructs meanings are the focus. Fosnot, (2005) states that:

> *'a constructivist view of learning suggests an approach to teaching that gives learners the opportunity for concrete, contextually meaningful experience through which they can search for patterns; raise questions; and model, interpret, and defend their strategies and ideas.'* (p. ix)

It is argued that learners are active participants in the learning process (Gatt & Vella, 2003). There are various strands of constructivism, ranging from Piaget's psychological constructivism, Bruner's theory of instruction, Kelly's personal construct theory, Von Glaserfeld's social constructivism to Vygotsky's zone of proximal development[32], which gave rise to the notion of scaffolding[33]. ZPD is defined by Vygotsky (1978) as the distance between the actual developmental level and the level of potential development as

[32] ZPD or 'zo-ped'. This reflects the ability of the learner to understand the logic of a scientific concept which may be coming from the 'teacher'. The zone can vary from learner to learner.
[33] A step by step process for learners whilst they are trying to understand the logic of concepts.

determined through problem-solving under adult guidance and with collaboration with peers. He emphasises that it is more important to look at the progress of concept formation rather than the end results of a problem-solving exercise.

Having selected the scaffolding approach as a support for the teachers on the CoP, I will focus on Vygotsky who pays great attention to dialogue and the social context in which learning takes place and holds that social constructivism brings forward the concept of collaborative learning (Fosnot & Perry, 2005). The potential for better interaction between teacher to students or students to students is greatly increased and thus this supports the scaffolding process through discussion and sharing of ideas (Scrimshaw, 2004). In a social constructivist environment, collaborative group work is a good activity (Borg, 2003).

### 2.3.1 Constructivism in Education

Constructivism is not a teaching method but an approach to making learning more meaningful and constructed. Fosnot & Perry, (2005) identify a set of principles which could help in the rethinking and remodelling of educational practices. They state that learning is not a result of development but *is development,* where the learner is at the forefront of the process and is involved in invention and self-organisation. Communities of practice and the internet[34] become important vessels for discussion, questioning, generation of hypotheses, defending and discussing issues which the learners will be able to raise. The second principle stated by Fosnot & Perry (2005) is that disequilibrium facilitates learning where errors become an integral part of the learning process. Therefore learners need to be exposed to challenges, investigations, different routes and possibilities and contradictions which can offer exploration and discussions.

Another principle is the need to offer time for reflective abstraction where learners are given time to organise thoughts and representations, through journal writing and discussion of experiences. The virtual environment offers such opportunities to discuss

[34] Web 2.0 is now taking internet users on another level of computer usage where social networking and interaction is becoming part of one's daily lives in this century.

issues because these are very different to the classroom environment where immediate answers are often required.

The final principle by Fosnot & Perry (2005) is the need for dialogue, which in a community can encourage further thinking and thoughts[35], where learners engage in a series of processes which encourage the formation of concepts and ideas. They will therefore be going through processes of self-organisation of thoughts and meaning, at times undoing earlier concepts to make way for more advanced ideas.

### 2.3.2 Scaffolding

One of the ways in which constructivist learning theory can be applied to education is through scaffolding. Vygotsky, like Piaget, claims that children create their own concepts through active use of memorised facts (Ornberg, 2003). The controversial ZPD has been extended by some constructivists to the notion of *'scaffolding'*[36]. Scaffolding is a temporary structure that is placed as a support during the learning process. It contributes to learning and development if available in the moment that it is needed. Without a structure and clearly stated expectations, learners may fail to realise the meaning they are meant to be forming. Under structured guidance such as conscious propping, clear simple directions, opportunities for observation and imitation and key questions by the teacher, a higher attainment level is reached (Gatt, 2003). The teacher can use the scaffolding approach which could involve: challenges and open-ended investigations, discussions and interaction, experiencing errors, reflective abstraction and dialogue. This would eventually help the students construct their own learning approaches when engaging with technology. When the learners gain more understanding, the guidance is reduced and suggestions and encouragement are given.

[35] This is in line with the qualities of an online community of practice which should encourage thinking and reflections.

[36] A word coined by Wood (1998) which describes how teachers provide support to students by helping them focus their attention on relevant aspects and support them on task.

Doering, Hughes and Huffman, (2003) envisage that when pre-service teachers receive scaffolded connections in a learning framework throughout their ITE[37] programme, the use of technology within their future classrooms is probable. Learners still need to be monitored and performance is discussed (Hobsbaum, Peters & Sylva, 1996). In the CoP which I hosted, I utilised McKenzie's (1999) eight steps of educational scaffolding. The participants in the CoP were aware of the scaffolding structure that was being utilised and were also given information on this concept and encouraged to use it with their own students.

Fosnot (2005 p. ix) states that *'the classroom needs to be seen as a community of discourse engaged in activity, reflection and conversation'*. Scaffolding, dialogue, self-expression, sharing of experiences, collaboration, reflection and articulation of thoughts are processes that can occur in an online community and provide a medium for learning.

### 2.3.3 ICT in Constructivist Learning Theory

The introduction of ICT in the classroom has brought about a number of challenges for teachers (Dawes, 2001) who are faced with three problematic issues based on a personal, technical and pedagogic level (Borg, 2003). It is hoped that the efforts and investments made in schools for ICT will be key to fostering the important educational reform that ICT-based teaching can have on students by turning them into active knowledge constructors, (Demetriadis, Barbas, Molohides, Palaigerorgiou, Psillos, Vlahavas, Tsoukalas and Pombortsis, 2003). Teachers need to understand the pedagogic issues related to the integration of ICT, particularly, the how and why of ICT usage in class (Borg, 2003). Computers are used in ways similar to existing traditional practices in teaching (Ornberg, 2003). In the planning guide for 'Information and Communication Technologies in Teacher Education' (UNESCO, 2002), it is stated that teachers will move through stages in the adoption of ICT, primarily adopting technology as simply a substitute for existing practices where for example teachers use technology for presentation purposes and students use the word processor to present text-based work.

[37] Initial Teacher Education programme

The guide indicates that ICT should in fact challenge existing practice, through changes in teachers' pedagogic practices with new technologies.

Technology is often used for drill-and-practice exercises (Jonassen, Peck & Wilson, 1999), and teachers are not necessarily embracing ICT as a new pedagogy in line with constructivist elements. Computers are often used in schools as productivity tools,[38] not as cognitive learning tools (Chan, 2006). Computers can be used as intellectual partners to enhance the learner's ability to think through enhancing, extending and restructuring the way learners think about the content (Chan, 2006). Until now they have been unexploited as with the internet, which is often used for basic searching for information, which will not always lead to meaningful learning. Learning is not necessarily improved, especially if the internet is used without the support of other computer-based tools which facilitate the construction of knowledge (Chan, 2006). The internet can be used constructively if used in ways in which learners can construct or represent their own meanings of the different perspectives of knowledge they might be coming into contact with.

Jonassen, Howland, Moore and Marra, (2003) identify ways of using technology in constructivist ways in order to foster learning:

[38] This means that computers are used for word processing, spreadsheets, computer-aided design and presentations.

**Table 1**

**Roles for Technology in Learning**

| Role of Technology | Examples |
|---|---|
| To support knowledge construction | • representing learners' ideas, understandings and beliefs<br>• producing organised, multimedia knowledge bases by learners |
| To explore knowledge to support learning through construction | • accessing needed information<br>• comparing perspectives, beliefs and global views |
| To support learning by doing | • representing meaningful real-world contexts<br>• representing beliefs, views and perspectives of others<br>• providing space and time for student thinking |
| To support learning by conversing | • collaboration with others<br>• discussing, arguing and building a consensus among members of a community<br>• support discourse among knowledge-building communities |
| As an intellectual partner to learn through reflection | • to give learners opportunity to represent what they know through articulation and reflect how they have acquired it<br>• to support learners' meaning making and the personal representations of meaning<br>• to support mindful thinking |
| To help learners solve problems | • by helping learners access information, model problems and make decisions. |

(adapted from Jonassen et al, 2003 p. 12)

Teachers can remain unaware of the new technologies and their constructivist pedagogic applications if not shown how to embrace all of this as a new pedagogy in the subject content. They need to develop an understanding of the potential of technology for teaching and learning and to apply this knowledge to new curricular approaches. Constructivist learning will not take place if technology is utilised in a traditional context in which the teacher has full control of the knowledge (Jonassen et al., 2003). These authors indicate that when students search for a predetermined assignment, they will only be after one answer which would suit the teacher's understanding. On the contrary when information searching is utilised effectively, the process of planning what to search for, the use of different strategies to search the internet, the evaluation and triangulation will form better meanings (Jonassen & Colaric, 2001). The internet or creative software can be used as an opportunity to create a co-operative environment where individuals look up different constructions and work on different tasks to build a single project (Borg, 2003).

Cognitive ICT tools and computer-supported collaborative or co-operative learning are seen as one of the carriers of the new constructivist philosophy of learning (Kirschner & Davis, 2003). Constructivist learning can take place when using ICT in: pairs or group work, problem-solving activities, team project work, online discussions and in whole class collaborative approaches. The focus in a constructivist approach is to have the students actively involved and constructing knowledge themselves. Students need to be given autonomy to learn with ICT and from ICT through mindtools[39]. Multimedia and hypertext can give the students access to new ways of learning through dynamic images, simulations and models (Kirschner & Davis, 2003). Technology can also be used constructively by teachers for alternative forms of assessment[40] which can assess higher-order educational goals that would involve a deeper understanding and active use of knowledge (Kirschner & Davis, 2003).

[39] Mindtools are computer applications which can engage users into critical thinking about the content they are in contact with. They scaffold different forms of reasoning about content they are in contact with and require users to think in different and meaningful ways: communicating, collaborating and co-operating.
[40] For example Electronic portfolios, digital net portfolios, self-assessment rubics, web-logging software like *Blogging*, peer-to-peer assessment, and group assessment competencies assessment.

In a study with Greek secondary education teachers for the introduction of ICT into classroom practice, Demetriadis et al., (2003) indicated that teachers expressed an interest in learning how to use technology in class but need consistent support and extensive training in order to integrate it effectively into their instructional practice. Further adoption and understanding of the constructivist elements of ICT could provide the teachers with appropriate ideas on how to use ICT in constructivist ways. Knowledge on how to use ICT for one's own subject in a constructivist method is therefore important.

One of the ways through which technology can be used in constructive ways to foster learning and knowledge-building is through the formation of communities or virtual learning environments. ICT and, in particular, the internet, are media through which technology-supported learning communities can be built into social learning networks.

ICT can be both social and constructivist. Vygotsky (1978) emphasised that the cultural and social context can influence learning. Constructivism according to Vygotsky involves a social constructivist approach which emphasises that the interaction between people is critical to learning. Social constructivist approaches can also be explored with the use of ICT. Social constructivism holds that learning is most effective when situated in challenging real-life contexts (Kirschner & Davis, 2003). Collaboration and co-operation through synchronous and asynchronous learning networks can provide ideal spaces for knowledge construction. Learning management systems such as Moodle as used in this study can be used to host these synchronous or asynchronous environments for the use of ICT in learning. With these pedagogical applications, learning is experienced when individuals join up to socially construct meanings and learn through the sharing of ideas and multiple perspectives (Kirschner & Davis, 2003).

### 2.3.4 Risks of ICT in education

Technology is not the silver bullet for education woes (Henriques, 2002). It is a relatively new opportunity to improve teaching and learning. Yet, the question as to whether this innovation is effective is a valuable consideration. Recognising the value of technological innovation implies that the learners become aware of their own learning

processes and hence make the connection between the goals and the learning opportunity (Flick, 2002). Teachers may run the risk of misusing technology by using it out of context. As stated by Flick (2002), technologies need to be utilised in the context of the subject content and not as an application for its own sake.

Despite various assertions stated throughout, Cordes and Miller (2000) state that thirty years of research on educational technology seem to have produced only one clear link on learning with respect to ICT and young children and state that *'drill-and-practice appear to improve scores modestly'* (p. 3). Cuban (2001) claims that there is no clear evidence that computer aided instruction has any impact on academic achievement.

However, what might be inappropriate for young children is not necessarily so for youngsters or adult learning (Cordes and Miller, 2000). Flick (2002) suggests that there should be a set of criteria to consider for the evaluation of the technologies used in instruction which would show teachers how to evaluate the potential of ICT for enhanced learning. However, it is felt that a true picture can only be assessed once technology is utilised effectively. Until now it is apparent that ICT is underutilised and therefore claims as to whether or not this enriches learning are pre-mature. One could therefore suggest that an evaluation exercise for each technological innovation utilised would come into effect in order to try to establish a link with the pedagogy and learning.

## 2.4 ONLINE COMMUNITIES OF PRACTICE AS A MEDIUM FOR THE PROFESSIONAL DEVELOPMENT OF TEACHERS

The notion of online communities is expanding to become more of a global concept where the internet provides the medium for networks of like-minded people who come together despite the geographical boundaries. There is a growing recognition of the importance of using online communities of practice as a model for teacher professional development (Kirschner and Lai, 2007). Learning occurs in formal and informal, physical and virtual communities (Wenger, 1998). Virtual learning communities are receiving considerable attention (Daniel, Schwier and Ross, 2005) with research focusing

on building, supporting and sustaining these communities (Daniel, Schwier and Ross, 2007). Virtual communities are composed of people interacting together to share expertise (professional development), to get support (peer help), to acquire current information and ideas and socialise and to extend education to isolated learners (Daniel et al., 2007). Becker and Riel (2000) talk of bringing teachers together as these often work in isolation within their schools. Teachers experience very little exchange of ideas with colleagues and are rarely seen working in teams (Wubbels, 2007). Collaboration in front of students or team teaching is still an extraordinary phenomenon (Wubbels, 2007).

As Vygotsky (1978) states, individuals feel the need to communicate with others about common interests. Wenger (1998) argues that a central aspect of learning is that we are social beings and that knowledge is not only a matter of competence but a matter of participating through active engagement with the world. He adds that meaning making is the result of the learning that has taken place. Participation here means the active process of being active participants in the practices of social communities (Wenger, 1998).

The internet and networking technologies have created a climate for online learning communities linking learners together in coherent learning communities (Jonassen et al., 2003), with discourse and dialogue being at the heart of the learning within a series of different relationships that form between all types of participants[41] (Kirschner and Lai, 2007). With the advanced use of the internet through Web 2.0, the internet and communities of practice have become enhanced social networking virtual entities, yet little research has been undertaken on how these communities work in practice (McConnell, 2006) or in the field of education (Kirschner and Lai, 2007). In this study I will try to give some insights into the process and practice of one particular online community for teachers.

### 2.4.1 Communities of Practice Theory

In their book *Situated Learning: Legitimate Peripheral Participation,* Lave and Wenger (1991) adopted the term *Communities of Practice* to describe how individuals come

[41] Participants could be 'old', 'new', expert or novice.

together through a common interest and learn through collaboration and social interactions. The concept of the community of practice, often misused or mistaken, is not new, yet can be used in a more systematic way for learning and engaging in purposeful knowledge building and sharing. Lave and Wenger (1991) challenged traditional epistemology and proposed a social theory of learning based on their observations of professional learning in work-based contexts. Communities of practice are an integral part of our daily lives and are informal, familiar and pervasive (Wenger, 1998). Families, schools and classrooms are communities of practice in the daily lives, routines, habits and histories. Lewis and Allan (2005 p.7) identify the characteristics of communities of practice:

- common purpose identified by the participants
- shared membership and leadership
- participants likely to be at different stages in their professional life
- development of professional practice through apprenticeship
- acceptance of low levels of participation by new members
- development, creation and management of knowledge within organisations
- open-ended not time bound
- importance of dialogue, interaction and shared narratives.

Communities of practice and learning communities are often thought to be the same thing and the terms are used interchangeably, even though they are distinct. Lewis and Allan (2005) use the term 'learning community' to encompass all the formal and informal collaborative learning groups within many professions and organisations. According to Lewis and Allan (2005), they are opportunities for individuals to communicate with others for support, guidance, strategies and new insights. In their words, *'a learning community is a supportive group of people who come together to collaborate and learn together, they are usually facilitated or guided to achieve a specific outcome or agreed learning objectives'* (p. 8). *'A learning community is a cohesive community that embodies a culture of learning. Members are involved in a collective effort of understanding.'* (McConnell, 2006 p.19)

I have modelled this study on the notion of a community of practice because in agreement with Kirschner and Lai, (2007) I interpret a community of practice as a process in which social learning occurs because the participants have a common interest and are willing to collaborate with others with similar interests over an extended period of time and simultaneously building a repository of new knowledge and expertise (Kirschner and Lai, 2007). Online communities of practice are being developed as innovative solutions to problems associated with professional development, yet there is still the potential of using communities to a greater extent (Moore and Chae, 2007). Barab, MaKinster and Scheckler, (2004) state that an ideal community of practice is *'a persistent sustained social network of individuals, who share and develop overlapping knowledge base, set of beliefs, values, history and experiences focused on common practice and/or mutual enterprises'* (p.55).

### 2.4.2 Social Learning Theory and Communities of Practice

Social learning theory focuses on learning within a social context, where people learn through observation or modelling. Communities of practice are environments which encourage modelling and imitation over a span of time. Wenger (1998) sees informal communities as critically important for social learning. Social learning theorists say that learning can take place through observation and yet not manifest itself in a behavioural change (Ormrod, 1999). Lave & Wenger (1991) argue that learning has a social character and propose that in a community of practice, learning takes place as part of a process of participation. They propose that learning takes place with increasing engagement in the community of practice, where participants move from a legitimate peripheral position and evolve to a more central position or full participation. Participation is a dynamic concept within a community where newcomers are connected to participants who have been active longer. Within the community of practice, a social milieu is built amongst the participants, where those who are the "masters", facilitators or leaders build a relationship with newcomers or as Lave & Wenger (1991) state "the apprentices". Lave & Wenger (1991) state that in shaping the relations between master and apprentices, the issue of conferring legitimacy gains importance over the issue of providing teaching. Internal relations form the history of the community of practice and

participants change as they move from novice to a more active person and then to veterans. Apprentices or participants build relationships between themselves too. The critical issue which arises here is the opportunity to learn and the way in which these opportunities are established either between master and apprentices or participants or between the participants themselves. Lave & Wenger (1991) state that in communities of practice, there could be very little teaching going on. It is the learning which is a more basic phenomenon, hence the importance of the community's learning resources. The curriculum and the work practice are set by the learners with legitimate peripheral access (Lave & Wenger, 1991).

The engagement within this social practice makes learning an integral constituent of all activity. Despite the dire need for interaction, the literature indicates that passivity in communities of practice is a reality and passive learners or 'lurkers' are part of the practice.

### 2.4.3 Lurking as a passive activity on communities of practice

Lurkers or 'browsers' are members of virtual communities who do not comment or actively engage themselves in activities or discussions (Lewis and Allan, 2005). The Open University carried out a research on communities of practice and indicated that in any online group, it is likely that thirty per cent of the participants will be active, thirty per cent will lurk or browse and another thirty per cent will drop out (Salmon, 2002). Research on lurkers indicates that active learning may still take place despite minimal activity and participation. Lewis and Allan (2005) state that the number of lurkers they experienced was not as low as that quoted by the Open University in any community. Takahashi, Fujimoto and Yamasaki (2003) investigated that there are a considerable number of lurkers who have a strong and wide influence outside online communities. Thus the effects of active lurking cannot be ignored. Nonnecke, (2000) showed that lurking is just one of the many participation styles on an online community of practice. Wenger (1998) noted that in effective communities members engage in different ways at different times occupying different positions. He acknowledged that low participation levels do not mean low learning levels. Through his concept of legitimate peripheral

participation, Wenger (1998) made comparisons between lurkers and apprentices and states it is important for communities to have space for low participation levels. In a relationship between the traditional master and his or her apprentice, there is very little an apprentice can offer in the initial stages whilst he or she is learning the trade. Similarly, in an online environment, new participants and lurkers may be observing practices, discussions and activities.

Interaction is an essential element of web-based instruction (Waltonen-Moore, Stuart, Newton, Oswald and Varonis, 2006) as this is critical to community experience and knowledge building. Isolation and disconnectedness of learners in a learning community may give rise to high attrition rates (Waltonen-Moore et al, 2006). Discussions and postings are vital in a community of practice and without elaboration of the threaded discussions the potential of the community as a knowledge building medium will be limited. Thus although lurkers may be gaining they may be disrupting the overall development of knowledge in an online community and thus limit the learning potential.

### 2.4.4 Recommendations for Communities of Practice

As a platform for professional development, communities of practice offer opportunities for multiple levels and needs. Evans and Powell (2007) state that communities of practice have a social purpose of supporting colleagues by sharing knowledge and artefacts that serve authentic practice and therefore can support teacher training and professional development in education. In fact, they argue that pre-service teacher training is an ideal place to build this enculturation of communities of practice. Motivation is crucial for participation and social learning. Evans and Powell, (2007) state that before standards (such as those of the National Board of Professional Standards, 2006) for teacher-learning communities are attained through online intervention and support, several issues regarding communities of practice need to be addressed.

When investigating the degree of community in teachers, Evans and Powell (2007) suggested that the isolation of teacher practice actually begins in pre-service training. Insufficient evidence exists to describe the formation and sustainability of communities

with engaged and participating members (Evans and Powell, 2007). The authors argue that the platforms being used by instructional technologists to foster communities of practice may not be the ones that are preferred by younger generations and pre-service teachers who may prefer a different range of emerging technologies such a blogs and wikis. As stated by Evans and Powell, (2007), student-teachers are entering pre-service training with more advanced technological skills through the use of social networking cities like, MySpace[42] or Facebook[43], than some faculty and staff members of teacher training programmes.

More studies on communities of practice are needed in order to understand them better (Evans and Powell, 2007). Leeder, McLachlan, Rodrigues, Stephens, Wharrad & McElduff (2004) list a number of 'should do's' which nurture effective practice in these online communities and include: putting the people first; addressing the real needs, being practical and hands on whilst communicating, promoting discussion and sharing. The activities should be fun, stimulating and engaging whilst fostering a culture of inclusion (Leeder et al., 2004).

## 2.5 TECHNOLOGY INTEGRATION BY TEACHERS AND IN TEACHER EDUCATION

Computer technology is not as readily assimilated into teachers' existing routines as other innovations, typically requiring change along multiple dimensions of practice (e.g., personal, organisational, pedagogical). In general, the more integrated one's technology use becomes, the more fundamental the required changes (Kerr, 1996; Sandholtz, Ringstaff, & Dwyer, 1997).

> *'Technology is seen by reformers as a means to effect significant changes in the curriculum and instruction – to prompt and support a pedagogy based on constructivist learning theories."* (Carney 1998, p. 7)

[42] http://www.myspace.com/
[43] http://www.facebook.com/

Technology can have positive effects on pupils' learning and provide considerable support for higher-order thinking and active learning, (Carney, 1998). The NCET[44], now BECTA[45] published a compendium of research findings entitled 'IT Works!' (1994) According to these findings IT can offer the flexibility to meet different needs and abilities of students. It can reduce the risk of failure at school, whilst giving them the opportunity to achieve. IT provides access to a rich source of materials and presents information in new ways which help students understand and assimilate. Being more visual and interactive, difficult ideas are made more understandable with IT and consequently motivate and stimulate learning. IT can often compensate for pupils with profound learning difficulties. It makes teachers take a fresh look at how they teach and the ways in which students learn. More recently, BECTA (2003) has stated that ICT can stimulate, motivate and spark students' appetites for learning and helps create a culture of success.

Technology, however, has not lived up to its potential, (Carney, 1998). In the ImpacT project the findings showed that IT did make a contribution to learning, but the contribution was not consistent across subjects or age groups (Watson, 1993). Despite the research findings showing the cognitive opportunities that ICT can provide for teaching and learning (Lim and Khine, 2006) as well as numerous teacher training courses and investment of ICT resources in schools, the integration of technology in the curriculum is still slow (Mumtaz, 2000). Little change seems to have taken place in the way teachers teach with ICT (Lim and Khine, 2006). The wrong assumption was that once hardware and software is installed and available in schools, ICT integration will follow (Lim and Khine, 2006). They indicate that the teacher is one of the key determinants in integration. Cuban (2002) asks whether teaching and learning has changed as a result of two decades of heavy promotion and investment in computers and other technologies in some schools and if not, he asks whether the investment has been worth the cost.

[44] National Council for Educational Technology
[45] British Educational Communications and Technology Agency

One must also appreciate that there are intrinsic and extrinsic barriers which can play a crucial role in ICT integration. There must be more focus on training and support for the teachers in a school setting which is totally engaged to increase effective technology use in classroom practice. In a study carried out by Cuban (2001), in schools scattered throughout the Silicon Valley and San Francisco Bay, teachers who could integrate technology seamlessly into daily classroom practice and demonstrate high pedagogic skills were the exceptions. For most, the uses of technologies were infrequent and limited. Robinson (2006) points out that despite the policies and large investments in ICT for schools, there are weak connections between this investment and the use of ICT for teachers' in-service professional development except for teaching teachers basic computer skills. Consequently, she identifies the main challenge as the need to turn to the potential of ICT into a reality in the classrooms and in institutionalising successful pilot projects.

Teachers may be utilising a computer extensively for personal use, yet technology integration in curricula is not yet satisfactory. Cuban (2001) found that teachers spend time on their home computers for personal business, preparing lessons, writing notes to parents, documenting children's work and emailing and doing internet searches. The majority of teachers he implies picked up the expertise through the use of their personal computers on their own or through a friend or spouse. Locally and more recently student-teachers are now qualified in computer skills through an obligatory entry requirement certification in the ECDL[46]. Difficulty in the transformation process in developing effective and appropriate skills for using technology in the classroom may be linked to a lack of computer competence or confidence, computer phobia, disinterest, lack of equipment and lack of time to learn appropriate uses of technology in instruction, (Wentworth, Waddoups & Earle, 2004) and a lack of technical support, (Cuban, 2001). In most technology instruction in teacher education courses, the use of technology is not linked to methodology that supports real experiences of the student-teachers of students in schools (Wentworth et al, 2004). This does not help in the transformation process. Cuban (2001) discovered that whilst teachers do acknowledge that using computers in

[46] European Computer Driving Licence

class was a valuable developmental activity for children, they still saw this as an enrichment activity or learning tool and not as a central task for the students to perform. If a teacher is going to successfully integrate ICT into his/her teaching, the training that is required should be based on two areas: ICT skills for personal productivity (technical) and ICT use within his/her subject area (pedagogic). Both types of courses are needed in initial teacher training even though the provision of these courses will not necessarily lead to a teacher integrating ICT into his/her teaching. Integrating technology into set practice will require additional relevant and powerful professional development programmes for teachers as these are being asked to drastically change what they teach and how they teach it (Carney, 1998). Most of the technology available remains unknown for teachers unless they are sharing their practice in collaborative communities.

If technology is to be used effectively pedagogically, there are other factors which teachers need to experience. Many teachers feel ill-prepared to use technological tools and resources for the teaching of content in innovative and effective ways, (Hughes, 2004; Ertmer, 2005). When there are opportunities to learn how to use technology effectively in class, these are developed without a theoretical framework to guide the nature of technology integration and this is not increasing the effectiveness of technology-supported content area teaching (Hughes, 2004). Apart from adequate training in classroom strategies related to the integration of ICT into learning activities, teachers need time and specific examples of alternative practices in technology integration for their subject. A short term approach is not enough. Bradshaw (2002) shows that in certain areas school districts are moving away from the short-term training approach in technology integration to professional development that is more long-term and ongoing. Pearson (2003) describes the Australian scenario where teachers are given opportunities to attend conferences where one can experience cutting-edge demonstrations by fellow teachers of ways in which ICT can be used to support learning activities. This sharing of good practice and networking presents important opportunities for teachers' professional development (Pearson, 2003). Becker and Riel (2000) showed that a source for motivation into using computers in the curriculum was professional

interaction and activities amongst teachers. The more intense these interactions, the more they would use the computer in constructive and exemplary ways in class.

Carney (1998) focuses on four crucial elements for effective teacher learning: challenges to the frames of reference, situated learning, collaborative reflection and long-term collegial interaction. There are diverse models of how ICT professional development can be organised in ITE as well as for in-service teachers. Hughes (2004) has identified four technology learning principles to guide the design of technology learning experiences and increase the likelihood that teachers will become technology integrationists. The principles are: 1) connecting technology learning to professional knowledge, 2) privileging subject matter and pedagogical content connections, 3) using technology learning to challenge professional knowledge and 4) teaching many technologies. I have utilised these principles to support the design and development of ICT integration in the CoP.

### 2.5.1 ICT and Professional Development for Student-teachers and Teachers

Hughes (2004) suggests a foundational vision together with the above mentioned guiding principles which will develop teachers into full technology integrationists. The term *'technology integrationists'* as used by Hughes (2004) would describe teachers who possess the unique ability to understand, consider and choose to use technologies *only* when they uniquely enhance the curriculum, instruction and students' learning. Hence this author shows that these are not high-tech individuals but are capable of interpreting new technology concepts through their professional knowledge in order to direct their daily teaching activities and hence identify innovative ways of using technologies to teach their subject area.

The emphasis in this particular discourse is on the need for planned and individual instruction for teachers in technology use in the classroom, rather than merely providing resources (Bray, 1999; Dias, 1999; Sherwood, 1999). Pearson (2003) claims that in Australia, professional development programmes for experienced teachers have taken four main forms: 1) certificate award courses offered by universities; 2) programmes

initiated by employing authorities (conducted by ICT professional agencies or others) and 3) through visits to exemplar schools which would increase teachers' awareness of the potential of ICT and the strategies that can be used to incorporate ICT in learning activities. The final form of ICT professional development for teachers are online learning networks, similar to what was used in this research. Collis and Jung (2003) have stated that ICT has opened up a new model for professional development for teachers through the growth of e-communities, teacher-nets, web-based courses and online resources. Whichever form is adopted, these are all initiatives aimed at encouraging effective integration of technology in class. The important aspect in either of these courses and future programmes is, as Pearson (2003) states, that emphasis has to be placed on learning *with* ICT not *about* ICT. In this way student-teachers and teachers will be in a better position to integrate ICT into their classroom and bring about the pedagogical changes our classrooms need.

### 2.5.2 The Process of Integration of Technology in Teachers

Teacher technology use may have increased because of the increased levels of access and skill as well as favourable policies, however, many teachers are still using technology for low-level tasks, whilst high-level technology usage is still in the minority (Ertmer, 2005). The integration of technology in schools and classrooms as an effective practice is a long process. Each new addition of multimedia technology requires negotiation, collaborative decision making and curriculum adaptation (Pedretti, Smith-Mayer, and Woodrow, 1999). The idea of collaboration, sharing and follow-up support by helpful staff that is not critical is crucial states Sherwood (1999), a technology teacher herself who supports teachers and students in enhancing their curriculum with technology. She notes that in order to achieve transformation teachers need to be provided with a colleague or specialist who can facilitate technology integration in a non-threatening and non-evaluative way. According to Sherwood, (1999), individual learning programmes or a range of staff development models (McCarney, 2004) are required and the strategies adopted will be effective if they support the needs of a diverse staff. It is felt that ITE courses need to move away from single modular type courses in ICT and develop a holistic vision that runs throughout the whole programme, with particular emphasis on

isomorphic practices by those lecturing pre-service teachers. Specialist tutors in subject content areas as well as in the learning technologies need to be adequately focusing on innovative pedagogic practices. Hughes (2004) indicates that single courses involving cross-disciplinary participants often focus on pedagogic issues rather than solid treatment of subject matter topics and the relevant technologies and hence the approach will be limited and general. It may therefore be better to offer pedagogic courses, especially those involving technology through subjects of specialisation. Crocket (2002) has suggested a different type of approach through the use of collaborative inquiry groups, where small groups of teachers (who could be subject-specific) come together with other specialists such as curriculum co-ordinators, administrators and technology experts to investigate content and pedagogical issues. This approach provides a more promising practice in which all four technology learning principles are implemented (Hughes, 2004). Hunter (2001) suggests a 'team action projects' situated within schools where support comes from a collaborative working group. This type of constructivist approach proved to be quite successful in achieving increased knowledge of computing technologies, greater confidence in their use and more creative ideas to teach with computers.

Robinson (2006) uses another process in ICT integration through ICT-supported teachers' resource centres, where teachers can learn through a variety of media and appropriate technologies. These centres included a selection of equipment and activities which could support a range of functions required for teachers' professional development in ICT[47]. Robinson (2006) states that this kind of model managed to develop a working prototype of blended learning technologies and social structures which were appropriate for the professional development of teachers in rural areas in China, showing that rural teachers in China were capable of learning to use ICT effectively in their teaching.

[47] These could include workshops, up-to-date information, observation of lessons by other teachers, educational resources to use in teaching and learning plans, the opportunity to create teaching materials using a variety of media and interactions with other professional colleagues and trainers.

### 2.5.3 The PT3 Programme

The PT3[48] programme is one such technology integration programme initiated by the US government and carried out in a number of universities or institutions which host teacher preparation programmes. The Brighman Young University's (BYU) teacher training faculty, in the United States, was one such place which got a grant to use the PT3 programme. This programme is based on the understanding that teachers must understand how to create and deliver high-quality technology-infused lessons that engage the students and improve learners[49]. As stated earlier, innovative pedagogies bring about a significant change which need to occur in small incremental modifications if true transformation is to be successful and sustained (Ertmer, 2003). Significant scaffolding is required to support the student-teachers' or teachers' learning process in this area.

### 2.5.4 Isomorphic Approaches to Model Effective Use of ICT

Henriques (2002) suggests that, *'The idea that technology has a legitimate role to play in instruction, as opposed to being the point of instruction, is key'* (p. 6). Effective use of ICT by teachers or student-teachers may help in modelling strategies which are associated with instruction. Student-teachers do not have much experience of the subject context so they cannot associate a context-free technology experience with meaningful applications and run the risk of not seeing the value or potential of technology to learning (Flick, 2002). When promoting technology, it is therefore important to relate technology to the context of the subject specialisation-area. Thus it is felt that in order for teachers to integrate technology effectively in their subjects, trainers must be both subject specialists and technology integrationists, who can link the subject content to the pedagogy whilst showing them what technology works for their subject methodologies. With the production of the NETS[50], the ISTE[51], (1999) and the NCATE[52], (1997) are promoting the increased use of technology by teachers. These standards propose directions for pre-service teachers and teachers to integrate technology into the curriculum.

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[48] PT3 is an acronym for a programme called Preparing Tomorrow's Teachers To use Technology, a programme designed to alleviate weaknesses in traditional teacher preparation when being trained to integrate technology in the curriculum and hence to transform practices.
[49] http://www.ed.gov/programs/teachtech/index.html
[50] National Educational Technology Standards
[51] International Society for Technology in Education
[52] National Council for the Accreditation of Teacher Education

Henriques (2002) gives some practical examples included in this course: evaluating CD-ROMs as a teaching aid and allowing for numerous investigations to be done on a computer, for example, 'growing' a plant under hundreds of different conditions. Although not done to replace the real situation, growing plants virtually can give students a greater understanding. Another example and useful technique is that of using the VCR in slow motion. This gives students the opportunity to understand the phenomenon much better than in the real world or through more traditional forms of teaching which lack hands on experiences and visual resources. As Henriques (2002) states, there are things which can be done with technology which are better than what is done without it.

Zisk (2002) argues that technology has contributed largely to the area of communication. Using this[53] form of communication with teachers, students and parents is a way of increasing the use of technology beyond technology courses and teaching opportunities (Zisk, 2002). Henriques (2002) and Zisk (2002) have provided us with several good examples which have been used for modelling purposes for teachers. There are other researchers who have given concrete examples on how technology has been integrated into projects for teachers or student-teachers which cannot all be listed here. This is just a brief indication of some practical ideas and projects which technology integrationists have used in the past in order to make student-teachers or teachers comfortable with technology and become familiar with its potential for the curriculum. Student-teachers cannot be expected to use ICT as pedagogy in class if the ITE programme they followed has only exposed low-tech use of ICT as in presentations. The use of static text-based PowerPoint presentations is not an example of effective technology integration. Appropriate pedagogy is vital (Zisk, 2002).

### 2.5.5 Teachers' Views of Staff Professional Development in ICT

McCarney (2004) argues that there is a need for effective and relevant staff development in ICT with consideration being given to the nature, type and form of the development. Staff development for teachers needs to address technical, pedagogic and

[53] Emails, Listservs and discussion boards

networking/collaborative considerations (Davis, 2003) and should be targeted at pupil tasks in order to have direct relevance to the classroom (McCarney, 2004). The short term and long term integration of technology into the classroom need to be addressed as some approaches may only support either one of the above. Training should encourage teachers to take responsibility of their own learning (McCarney, 2004). 'One size does not fit all' and therefore Individual Learning Programmes (ILPs) as suggested by Bray (1999), can be useful. Bray (1999) created a technology staff development programme to include eight different steps which address individual needs, teacher resistance and possible ways of working with teachers as adult learners who bring with them an advanced set of beliefs and attitudes. Over the years they develop set views of what works for them and what does not. There are teachers who fear change and those that will not but who may lack resources, time, support or a flexible curriculum which can affect their use of ICT in class (Bray, 1999).

As seen from the above examples, professional development for teachers could include a diverse range of models[54]. In his study, McCarney (2004) found that the most popular models for staff development in ICT were the traditional type of face-to-face in-service courses and the five day type of in-depth courses as teachers seem to have the perception that 'traditional' courses are more effective. Peer support was rated as being satisfactory whereas courses taken at the end of a school day or through online support were not effective. The same study indicated that teachers found the professional development based on pedagogy as having the greatest impact.

> *'The pedagogic context should enable teachers to understand how to use ICT in the classroom and to consider how ICT can support and enhance pupil learning as a natural part of the work in the classroom'* (McCarney, 2004, p. 71).

Within the local context of this study a different scenario exists, where teachers tend to be reluctant participants in courses outside school hours. It is thus important to evaluate the

[54] These could include one day seminars, three to five day courses, long term plans, three year cycles, online networks and communities of practice, distance learning, in-school activities and school-based approaches, evening courses and colleague-to-colleague support.

online learning network in the Maltese scenario and culture, which could be a successful alternative. This research is in particular trying to evaluate the effectiveness of an asynchronous learning network, particularly an online community of practice as a model for professional development in ICT. Following on from the literature that has been presented here, the CoP would provide knowledge on the learning technologies and applicable ICT pedagogic practices in order to generate awareness towards ICT as a pedagogic tool and give teachers the confidence to use ICT through exposure. This would enable the participants to adopt and adapt these practices in the HE curriculum.

### 2.5.6 The Barriers Towards The Use of Technology In The Subject Curricula

The classroom environment is a complex and dynamic one which places great demands on the teacher, even more so when new tools or practices are to be introduced (Lim and Khine, (2006). Becker (2000) states that for computers to serve their purpose as valuable instruction tools in classrooms, teachers must have convenient access and be adequately prepared to teach with technology and hold personal beliefs in line with constructivist pedagogy. Over the past decade many of the conditions for successful technology integration appear to be in place in the US and yet despite the successful conditions[55], high-level technology use is still surprisingly low (Ertmer, 2005). Ertmer states that there must be additional barriers specifically related to teachers' beliefs that may be at work. Ertmer (1999) identifies two types of barriers: first-order and second-order barriers, which hinder teachers from integrating technology into their curriculum despite having positive attitudes. First order barriers address external issues such as the acquisition of technical skills, whereas the second-order barriers are more intrinsic and address attitudes and beliefs. Technology training, for both pre-service and in-service teachers, has focused on helping teachers overcome first-order barriers, although in some more recent training programmes second-order barriers have been addressed. Ertmer (1999) states that:

> *'Little discussion has occurred that clarifies the relationship between these different types of barriers or that delineates effective strategies for addressing*

[55] These include having access to technology, increased training for teachers and favourable policy environments.

*different barriers. If pre- and in-service teachers are to become effective users of technology, they will need practical strategies for dealing with the different types of barriers they will face. In this paper, I discuss the relationship between first- and second-order barriers and then describe specific strategies for circumventing, overcoming, and eliminating the changing barriers teachers face as they work to achieve technology integration'.* (p. 47)

Cuban (2001) has argued that computers as a medium for instruction and a tool for student learning are not compatible with teaching requirements. Teachers have large numbers of students to teach and at times may cover many subjects (especially in primary), which makes it difficult to find time to focus on technology and integrate it as an effective pedagogy (Cuban, 2001). Dias (1999) identifies other barriers to technology integration in class which include: time, training, resources, support such as an on-site technology experts and lack of leadership, financial support and change. The above two authors who identified barriers strengthened my reasoning for creating an ongoing online community of practice as this could create collaboration and activities to support teachers in the integration of technology whilst attempting to address some of the above mentioned barriers and trying to help teachers overcome them. When teachers are being asked to integrate technology they are being asked to change and adopt new teaching practices. They are also being asked to change their role in class and its physical arrangement (Dias, 1999).

Technology integration is complex and difficult when one considers that teachers are being asked to change their pedagogies and practices and adopt new teaching tools which can be challenging technically. Computers are hard to master and use and technical problems can easily arise (Cuban, 2001), thus creating another barrier which might discourage teachers from using technology. Although training is provided for in many ITE programmes as well as afterwards, teachers are still grappling with all the possible educationally-related technologies and how to use them appropriately in their subject and in class to maximise the benefits. In order to adopt the necessary knowledge, practices and dispositions associated with technology integration, Wentworth et al. (2004) state

that ITE programmes should not just focus on basic computer operation but should provide examples and experiences of learning enhanced with technology. Besides rethinking the curriculum and methods of instruction, successful integration includes mentoring and support and the development of collaborative relationships among university lecturers, pre-service teachers and teachers (Wentworth, 2004).

Cuban (2001) offers a number of explanations as to why a gap may exist between the classroom reality and technology integration. He states that one of the key factors is 'reliability' of the technology being used. Teachers are discouraged from using technology for fear of a technical problem, leaving them without resources for teaching. The second factor he finds as crucial is 'complexity'[56] where he shows that if an innovation such as technology is complex to use teachers are bound to ignore it and maintain the less risky traditional resources. The third and final explanation presented by Cuban (2001) is called 'contextually constrained choice'. He explains that teachers are not defying the challenge of integrating technology wilfully as not even computer enthusiasts use technology in ways that will transform the practice of teaching. Teachers, he states, meet too many contradictory objectives in class: cognitive development, socialisation and preparation of students for exams. There is much to cope with for the teacher and this sets off barriers which may be discouraging the transformation to different teaching and learning practices. Cuban (2001) suggests a few changes that are necessary for ICT to be integrated in class. He claims that teachers should be respected by policy-makers and engaged fully in the design and implementation plans for technology integration; he also asks for structural constraints to be reduced where teachers would be allotted time for planning to teach with technology and collaboration for integration; and professional development needs to be sensitive to the constraints of schools and the realities in schools.

With all this in mind, I selected a particular model which addresses some of the factors mentioned by Cuban (2001) and provides a framework for the diffusion of an innovation

[56] This is an important perceived attribute in Rogers' (2003) Diffusion of Innovation model which will be discussed later on in this chapter.

such as technology integration for teachers. This was the Diffusion of Innovation model as described by Rogers (2003) and that formed the basic structure of the CoP as it progressed from one week to the next.

## 2.6 THEORETICAL UNDERPINNINGS FOR THE INTEGRATION OF TECHNOLOGY IN TEACHERS' PRACTICE – DIFFUSION OF INNOVATION

Individuals often settle into comfort zones and find change from traditional practices difficult. Teachers are no exception and an innovation can take a long period of time to get accepted and adopted. It brings with it a degree of insecurity and a lack of predictability and structure (Rogers, 2003). Innovation leaders have to empathise with those who need to accept the innovation in order to affect change. Rogers (2003) describes a conceptual paradigm of how organisations can diffuse innovation and this framework was used in this CoP to structure the integration of the innovation and bridge the gap between technology integration and classroom realities in HE.

Diffusion research began about a century ago when anthropology and sociology were emerging as new social sciences (Rogers, 2003). It now has relevance to many disciplines and has spread as a research tradition to other sciences such as education, public health and medical sociology, communication, marketing and geography. As Rogers (2003) states, the intellectual paradigm offered in this research field enables researchers to pursue a coherent set of research directions.

### 2.6.1 What is Diffusion?

According to Rogers (2003), diffusion (of an innovation) is the '*process in which an innovation is communicated through certain channels over time among the members of a social system.*' (p. 5). This definition highlights four elements[57] which every diffusion research study will constitute. The process involves a special type of communication throughout the process about a new idea where the participants will be communicating to

[57] This means that a diffusion process will constitute four elements: the innovation itself, the communication channel, time and a social system.

create and share information to reach a mutual understanding. Rogers (2003) suggests cycles and a multi-levelled process, where the change agent tries to persuade a client to adopt a new idea or practice, with an inevitable a degree of uncertainty. Diffusion is a social change as once the new idea is adopted, a social change occurs.

> *'Diffusion is a process in which an innovation is communicated through certain channels over time among members of a social system. Diffusion is a special type of communication concerned with the spread of messages that are perceived as new ideas.....Diffusion has a special character because of the newness of the idea in the message content. Thus some degree of uncertainty and perceived risk is involved in the diffusion process. An individual can reduce this degree of uncertainty by obtaining information.'* (Rogers, 2003, pp. 5 - 6)

Ertmer (2005) states that it can take five or six years for teachers to accumulate enough experience in this innovation in order to change practices to constructivist approaches when utilising ICT. She states that teachers will move from low-level uses of technology to high-level uses over a substantial span of time.

### 2.6.2 The Innovation-Decision Process

The innovation-decision process is an information-seeking process and activity where an individual consciously or unconsciously obtains information and goes a five stage process when considering an innovative idea or practice. From when an individual is exposed to the innovation and gains the initial knowledge up to confirmation of the decision to adopt the new idea, a whole process is experienced as will be seen in this study. Leaders have an important role to play in the process of diffusion through the process of interpersonal networks and communication.

Rogers (2003) describes a framework within the diffusion of innovation model as a five stage process and conceptualises it as the innovation-decision process which consists of: *knowledge, persuasion, decision, implementation and confirmation.* According to Rogers (2003), knowledge is gained when an individual acquires 'awareness knowledge', learns

about the innovation through the change agent and gains understanding on how it functions. Persuasion takes place when the individual forms favourable attitudes towards the innovation. However, one can also form unfavourable attitudes. Favourable attitudes alone are not enough and thus a further step is decision. During the persuasion stage Rogers (2003) identifies attributes which may influence this process and the rate of adoption or rejection of the innovation. The attributes which will be exposed in greater detail below and in later chapters are: *relative advantage, compatibility, complexity, trialability and observability.* Returning to the five stages one finds that the third stage is decision which occurs when an individual decides to adopt or reject the innovation. The individual seeks to lower uncertainty and needs to know the innovation's advantages and disadvantages for his/her own situation. Here the individual decides to either make full use of the innovation or decide to reject or discontinue utilising it. This may occur for a number of reasons including dissatisfaction with the innovation, lack of competence despite the acquisition of the 'how-to' knowledge and lack of time amongst other reasons. In fact, the innovation-decision process requires a period of time (the innovation-decision period) for individuals to feel comfortable to adopt the innovation. In some individuals this may even take years, whereas others may move more rapidly throughout the process. The fourth stage is implementation which takes place when the individual puts the innovation to use with the possibility of re-invention. The final stage is confirmation and this occurs when reinforcement of an innovation-decision that has already been made. During this stage though there could also be a reversal of the previous decision especially if conflicting messages about the innovation are experienced.

### 2.6.3 The Perceived attributes which influence the rate of adoption of the innovation

*Relative Advantage:* The individual must see that the innovation has some advantages over the present practices and the innovation is perceived as being better than the previous habit. *Compatibility:* An innovation must be seen to be in line with the individual's values, beliefs, needs and past experiences. An idea which is compatible is taken on much more rapidly than one which is not. *Complexity:* When an innovation is difficult to understand or use, it is less likely to be accepted and adopted as an innovation.

Individuals should not be overwhelmed with complex skills which may cause rejection rather than adoption. *Trialability:* The individuals will take on an innovation much faster if they are to experience it, even if in a limited way, and be able to adopt or reject through experience. Finally, *observability,* according to Rogers' (2003) relates to the way in which an innovation will be accepted and the adoption may be faster if the results of the innovation are visible to others. The visibility will stimulate discussion of the new idea and peers will be adopting a social learning theoretical approach based on observation, imitation or modelling, evaluation and reflection. Rogers (2003) states that innovations that will be perceived by individuals as having greater relative advantage, compatibility, trialability and observability and are less complex will be adopted more rapidly.

### 2.6.4 Considerations and Criticisms of the Diffusion Research

Despite the growth of this model as a conceptual ground spanning a number of research areas, nonetheless there are factors which demonstrate shortcomings. One such factor is the pro-innovation bias, which, as Rogers (2003) states, is the notion that an innovation should be diffused and adopted by all members of the social system and that it should not be re-invented or rejected. This is understandable since often an innovation is presented by change agents themselves whose sole aim is to diffuse the innovation. In the project I was implementing, the attitude was in fact different. Participants were encouraged to discuss and consider ICT issues for use in education after exposure to knowledge on the subject and then work was presented in order to persuade them to form positive attitudes towards ICT. During this stage the participants were exposed to discussions or activities which would make them experience the perceived attributes so as to come to the decision stage. Participants were allowed to be flexible and choose what to take up and were only encouraged and not pressurised to adopt the ideas.

### 2.6.5 Other Models for Technology Integration

There are a number of models which could be utilised for the integration of technology amongst teachers and student-teachers. Although I chose the diffusion of innovation model I also wanted to consider other models which may be directly focused on

technology integration for teachers. I did this in order to support Rogers' (2003) model which can address any type of innovation and not just technology integration. The choice of one model over any other depends on the context in which one is setting out to integrate technology.

Besides Hughes' (2004) principles which were described earlier, I also selected Sandholtz et al.'s (1997) five levels for technology integration to support the main framework due to its focus on teachers. This five level model can only take place if spread over a period of time and where teachers are allowed to progress from one level to another after induction. Sandholtz et al., (1997) show a model which supports the idea that technology cannot be integrated overnight. They indicate that teachers must be provided with ongoing support. Their model includes five stages: *entry, adoption, adaptation, appropriation and invention* and state that appropriation is the most important milestone as this phase is the catalyst to a change in technology use. In this phase teachers are aware of the usefulness of technology and having arrived at this stage, they apply it effortlessly with a higher degree of interaction with the students (Sandholtz et al, 1997). Initially, teachers will move from the entry phase to the adoption phase where teachers will use ICT for general activities and in conventional approaches but can then progress to the adaption level. In this phase the students are involved one fourth of the time on computers and use ICT for homework and daily work, thus leading to the appropriation level where the teacher becomes fully confident in the use of computers and integrate technology regularly. Finally the teacher reaches the fifth level which is the invention phase where one can experiment with new ways of using technology with students.

#### 2.6.5.1 Which Model?

Numerous frameworks are provided for the integration of technology in class, yet I chose the diffusion of innovation model (Rogers, 2003) to be the main backbone for the design and implementation of ICT for HE teachers and Sandholtz et al.'s (1997) and Hughes (2004) principles as a support for Rogers' framework. Sandholtz et al.'s (1997) and Hughes' (2004) models focus on technology integration, particularly where resources are adequate, yet Rogers' framework was most suitable for this study because it addressed

particular needs of this cohort. In particular it emphasises the need for the 'how-to' knowledge and addresses attributes which teachers need to gain in order to adopt an innovation. This model is also concerned with external factors such as the communication channel, time and the social system, which may affect take up of an innovation and all these play a role in technology integration for teachers. I feel that the innovation-decision process allows participants to move at their own pace from knowledge to confirmation for each particular technology used and allows participants to be at different phases at the same time. Sandholtz et al's (1997) model would have been appropriate to use had the project been conducted under ideal conditions (adequate resources and equipment in schools), which was not the case in this study. Since this project involved teachers who came from different schools and were involved in this study on a voluntary basis, the other models were not found to be suitable.

## 2.7 CONCLUSION

Whichever the model chosen and whichever communication channels, whether virtual or not, networks must be coherent and consistent and hold a strong connection between technology training, curriculum integration, student learning outcomes and performance assessment (Sherry, Billing, Tavalin and Gibson, 2000). I would put weight on the context and culture in which the teachers are working in. Teachers are still resisting change so there has to be a stronger and wider effort for these approaches with persistent support (Sandholtz et al, 1997) for teachers who are not yet able to make effective use of technology in their curriculum. In agreement with Ertmer (2005), one has to look at teachers' beliefs and examine the relationship between pedagogical beliefs and their classroom uses of technology. If take up of technology is still not sufficient, even when most conditions for technology use are in place in schools, then a deeper approach is required. This would involve the teachers themselves and their beliefs in order to address Ertmer's (2005) second order barriers.

The literature review shows that the question of technology integration by teachers, the effectiveness of delivery of ICT spending in education and the effectiveness of ICT

across all subjects and across all ages are extremely pertinent questions. Technological change has permeated pedagogic practices, tools and environments. Literature shows that these are not pervasive enough. Even though some of the environments are quite recent[58] in educational settings, there is already extensive research on the behaviour and their effectiveness. This research is a case study on whether an online community of practice can be effective for teachers who need to be given ongoing support to apply technology to their pedagogic practices. The cohort chosen were HE teachers, as HE is my area of specialisation.

[58] Such as online environments and Web 2.0.

# CHAPTER 3

# METHODOLOGY

## 3.1 INTRODUCTION

This chapter gives a detailed overview of the various stages of this research. The objectives, the context for the study, description of the course, the methods used, data collection procedure and analysis will be described. The aim is to explore and find the most suitable methods to inform the research and facilitate the emergence of data. The different stages of the research will also be described here. Outcomes of the research will be described and discussed in a later chapter.

### 3.1.1 Aims

The aim of this research was to expose the teachers to a project on learning technologies and ways of using technology as a pedagogic practice which could enhance the teaching and learning of HE through the use of technology. As has been mentioned earlier, teachers feel ill-prepared to move teaching away from traditional methods and use new pedagogies where appropriate, thereby putting students on centre stage in the classroom. Literature has shown that new pedagogies and constructivist approaches can enhance learning; therefore here I have chosen to focus on ICT as a new pedagogy, hence bringing ICT knowledge and effective pedagogic practices closer to HE teachers. The aims of this online project were to:

1. create a platform suitable for professional development of teachers in order to help them experience effective ways of integrating ICT in the HE curriculum;
2. encourage teachers to reflect on their values and beliefs towards innovative pedagogies, particularly in the light of those used in class;
3. encourage teachers to share and expose good practice and collaborate on new projects with their colleagues;
4. establish a number of forums which will promote interaction between in-service and pre-service teachers so as to give insights into classroom practice from those more experienced, as well as inject fresh and innovative ideas;
5. investigate appropriate technological tools for use in the teaching of Nutrition in HE;

6. promote the use of a variety of activities using ICT and constructivist approaches in order to make teachers aware of effective pedagogic practices with the use of technology.

### 3.1.2 The Research Questions

Research carried out over the last two or three decades provides evidence as to the positive effects and benefits of the use of ICT on students' learning (NCET, 1994; Mumtaz, 2000) and teachers' teaching, Hawkins, (2001). *'ICTs provide an array of powerful tools that may help in transforming the present isolated, teacher-centred and text-bound classrooms into rich, student-focused, interactive knowledge environments'* (UNESCO, 2002, p. 16). In education, technology can provide considerable support for higher-level thinking and active learning (Carney, 1998). There is the potential for a new paradigm in teaching and learning as a result of all the technology that is becoming accessible in schools. Yet although there is this potential to drive new modes of teaching and learning and there has been heavy investment in ICT equipment for schools, technology has not lived up to its potential (Carney, 1998). With the newly published e-Learning Strategy for the Maltese Education System, one expects radical changes in schools and in teaching and learning. In his studies on a wide range of schools and universities, Cuban (2001) found that students and teachers use new technologies far less in the classroom than at home and teachers who use computers in class do so infrequently and unimaginatively. Amongst the positive benefits quoted by the NCET[59] (1994), were assertions that computers can increase the enthusiasm of children, help address the different abilities of students, reduce the risk of failure, help students reflect, ease certain chores and thus help students concentrate on other more useful responsibilities and hold the attention of students even those with learning difficulties or challenging behaviours.

The main research question in this study was to explore how online interaction and collaboration can provide professional development by helping teachers share good practice of their current ICT use, explore new practices and integrate technology in the HE curriculum more effectively. The aim was to promote the use of ICT as a new

[59] Now BECTA

pedagogic skill and to then analyse this CoP as a potential tool for professional development. The following questions have been used to explore the above research question in different ways and stages:

1. How effective is an online CoP in developing teachers' and student-teachers' knowledge about ICT in the curriculum?
2. How effective do teachers and student-teachers feel an online CoP is in improving their classroom practice?
3. How effective is the medium itself (the CoP) in contributing to professional development in ICT?

## 3.2 FRAMING THE RESEARCH

The study is divided into three main stages: the initial stage which involved the design, planning and implementation of an online learning network developed in the form of a CoP; the middle/project stage in which the set period of six months (later extended) for this CoP was utilised for technology integration and a final stage whereby data was analysed through three different tools: the analysis of a questionnaire to all the participants; the analysis of both deductive and inductive aspects of all the discussions linked to ICT which emerged on the CoP and the analysis of the interviews with a small number of teachers and student teachers to further determine the impact of the CoP on teachers and its effect on technology integration. The data collected was meant to determine the effect of the innovation intervention as a means for professional development and hence on the teachers' and student-teachers' perception of the use of ICT in class. The CoP did go on beyond the research period as it seemed to have a positive effect on teachers and was deemed beneficial for all the participants. The feedback from the questionnaires and interviews indicated the need for this online community. As shown by Sandholtz et al., (1991) teachers indicated the need for further knowledge and examples through ongoing support even after the research period was over. I had also sensed this need particularly because I did not feel the teachers had arrived at the final stage of Rogers' (2003) innovation-decision process.

### 3.2.1 Structuring the Research Methodology within established models

The Diffusion of Innovation model as described by Rogers (2003) provided the main theoretical framework for the development of the HE teachers' CoP. This framework was further supported by a constructivist scaffolding approach to learning and Sandholtz et al.'s (1997) model for technology integration. Hughes' (2004) principles for technology integration were also referred to during the design of the project. These models were selected because they offered a definite structure for technology integration and for the innovation interventions. The models provided a structure for the dissemination process and the type of knowledge and skills required, facilitating the diffusion of ICT as an effective learning pedagogy.

Different data gathering tools were used to reach a level of comprehensiveness and thoroughness in the interpretation of the results. A multi-stage design incorporating both qualitative and quantitative methods was used so as to collect data at different stages of the research. This was done because of the nature of the project and in order to utilise research techniques that would eventually provide effective triangulation for the research. I wanted to identify general patterns from the teachers which could give insights for a larger sample of teachers and then look at these in more depth through the qualitative methods. A questionnaire was therefore used for a holistic depiction of the participants under study. Triangulation enables the strength of one method to compensate for the flaws of another (Knafl, Pettengill, Bevis and Kirchhoff, 1988). In this case it was felt that the discussion forums could give a lot of information which would, however, not necessarily be exhaustive. In order to achieve a deep interpretation of the impact of the CoP on the knowledge of teachers' use of ICT for HE as well as identifying how effective it was as a medium to help teachers integrate technology into their subjects, a questionnaire was used. Furthermore, to ensure validity and depth of interpretation, after the analysis of the questionnaire and discussion forums, I wanted to allow the emerging data to lead me to examine the teachers' experience of the CoP in different ways and examine how effective the medium itself was in contributing to professional growth. This process and the data collected from the discussions and the questionnaires then

guided me to develop the interviews which then followed. Further details of each method and analysis will be given later on in this chapter.

## 3.3 METHODOLOGICAL RATIONALE

### 3.3.1 Structural Issues

An online interactive learning site open to all HE teachers, student-teachers and lecturers (from the University of Malta), subject co-ordinators and the education officer[60] was designed. It was decided from the start of this study that the online medium would be the only means of communication with the participants apart from the initial introductory contact. The main reason behind this decision was that in order to promote the use of ICT amongst participants and technology integration in class, the sole means of communication would be the innovation itself and hence it would be all technology-based. This was thought to cultivate familiarity with technology, especially with those who are not such frequent users of ICT. It was only during the first meeting which was used to introduce the CoP to HE teachers that a presentation was conducted through a face-to-face meeting. This was done during an in-service course for the mentioned cohort of teachers.

Student-teachers from the University of Malta who were reading for a Bachelor of Education degree and specialising in the teaching of HE were also met face-to-face during the introductory meetings held at the start of a scholastic year.

### 3.3.2 Engaging the Participants

Participants from the HE team of teachers and student-teachers were needed for this study. The face-to-face presentation meeting which took place in September 2006 served as an introduction to the CoP. Through a brief PowerPoint presentation, teachers were shown the benefits of ICT use in class and in curricula. They were exposed to the latest research findings on ICT in education and the purpose of the CoP was stated. A few

[60] This is the person who is in charge of HE curriculum and teachers in schools and holds an office in the Education Division.

examples of the type of work which was going to be held on the CoP were exposed. The HE teacher cohort consisted of 93 teachers who teach HE in state, church (Roman Catholic) and independent (private) schools in Malta. The same type of meeting was held for the student-teachers. The student-teachers eligible to participate were those from the second year of the initial teacher education programme to the fourth year. This involved a cohort of 29 students. HE lecturers and hence colleagues in the Faculty of Education were not met personally as this was difficult to arrange with so many being part-time lecturers. However, some of these lecturers are in fact teachers in schools and were therefore present during the presentation meeting held during the in-service session described above. Others were sent emails as is the normal means of communication amongst lecturers. During the presentation meetings, email addresses of all the potential participants were taken on a voluntary basis. These were used closer to the date of the launch of the CoP when numerous emails were sent out to invite and encourage participation.

### 3.3.3 The Sample

The CoP acquired fifty-one participants with a coincidental equal representation of student-teachers and teachers. There were twenty-four (25.8% of teacher cohort) teachers and twenty-four (82.7% of student cohort) student-teachers participating. Three lecturers of HE from the University of Malta also accepted the invitation to participate. I would have preferred to engage more teachers and ideally the sample would be a representation of all the schools where one teacher from each school could act as a multiplier on the CoP. The teachers' participation was, however, from a large range of schools, although no-one from Gozo[61] enrolled. There was a school in Gozo which was given a computer in the HE room and attempts were made to encourage the respective teachers to join. However, there was no response from the teachers from this island and since this exercise was entirely voluntary for the teachers I could not pressurise further. Hence, all the participants came from Malta, with one participant being the education officer for HE, two were from church schools and one was from the HE seminar centre.

[61] Gozo is Malta's sister island with half the area and about one twelfth its population. The Gozo educational system follows the same system as the Maltese one.

The remaining twenty came from different schools. From this teacher cohort, fifteen were graduates who had graduated from the Faculty of Education[62] within the previous five years. Given the diverse backgrounds, one could classify this group as a random type of sample.

This exercise had the approval of the education officer for HE[63], one could not force enrolment or participation. Had this CoP not been a voluntary activity for the teachers, it might have developed much differently as I could have enforced particular participation whereby each participant submits at least one posting as feedback and another posting to comment on someone else's remarks, on forums and in the ICT activities. This is normal practice in distance learning courses.

### 3.3.4 Issues of Accessibility

The discussions and information being shared aimed to give teachers an opportunity to become a team and receive support through this collegiality with their own colleagues. Face-to-face sessions for teachers would create a variety of logistical problems due to family commitments and other matters. Hosting an asynchronous learning network allows the participants to access the site at whatever time is convenient for them and all the material remains archived on the site readily available for use whenever a teacher might need it.

## 3.4 THE RESEARCH DESIGN

This research was a case study of one online programme in which a mixed-methods approach was used. Throughout the process there was a self-reflective enquiry which was undertaken in order to improve the processes which were taking place on the CoP and to justify the practices as they were carried out. Qualitative methods were utilised for the CoP content analysis and for the interviews. The aim was to identify emerging patterns and themes from the discussions and questionnaires which would then lead to

[62] At the University of Malta
[63] Herself a participant on the CoP

questions for the interviews and their interpretation. Inductive and deductive processes were utilised in the analysis. In the deductive process the theories mentioned in the literature, particularly Rogers' (2003) diffusion of innovation, were applied to the data, whereas in the inductive process I examined the data to explore the themes which were evolving from the data. However, as Strauss and Corbin (1998) stress, there is interplay between induction and deduction and thus researchers have to recognise that in the midst of the analysis and interpretation, the human element is also present and may impinge on the concept of induction and hypothesis. Thus there will always be aspects of the researcher in any analysis. In the quantitative aspect, questionnaires were utilised to map out the main responses and through this method descriptive statistics were developed.

### 3.4.1 The Cycles and Processes in the CoP

As host of this professional development exercise, I ensured that the participants felt they were an integral part of all the activities. Participation was the essential feature. My role was to design, implement, observe, reflect, re-plan, implement, observe again and move onto the next step. I also wanted this professional development intervention to help teachers examine their attitudes on ICT, observe how this pedagogic practice can be used in the classroom, plan for it to be used in the HE curriculum where appropriate, implement and reflect on its adoption.

The project went on after the first period of six months by general request. This was meant to provide the participants with enough time to experience, share and generate more awareness towards ICT and practice and give the participants an opportunity to develop a discourse on ICT in the HE curriculum. My intention was to provide experiences and discourse to support change or improve classroom practices through the integration of technology and which evidently required more time. Carr and Kemmis (1986), indicate that participants may be regarded as objects of the study as with "experimental subjects", or as "co-operators" with the researcher in the quest for knowledge. Participants, they add, may also be regarded as "collaborators" in the quest for improved practice. This is what I hoped to achieve.

The idea to utilise an online platform as a means for professional development of HE teachers in ICT integration was developed to address the specific requirement to reach out to teachers and student-teachers flexibly and effectively. The idea was not to have a highly structured programme as in a community of practice it is the participants themselves who carve out the pattern of the activities and build knowledge. Therefore although Rogers' (2003) theoretical framework was followed to diffuse the innovation, I needed to respond to the participants' needs, knowledge and skills of ICT and amount of usage in class.

A framework was created with cycles which would structure the flow of the sessions taking place on the CoP depending on what messages the participants were passing on. Each cycle would have a different action which emerged from the feedback of the previous cycle as can be seen in table 19 (Appendix 1). Each week an activity[64] was posted on the site in the central block, constantly being sensitive to the needs of the participants and the feedback I would be receiving regarding their attitudes towards ICT, the state of readiness to integrate ICT, the implementation of ICT in the HE class and the ICT pedagogic needs. I accessed the site daily to monitor and prompt the development of this community and to give prompt replies to answer, clarify, motivate, give further feedback or provoke discussion. The activities were varied between researched information on ICT integration and activities or concrete examples in order to address the needs of the diverse participants. The complexity of the seventeen cycles and the processes involved throughout the twenty-five weeks can all be seen in Appendix 1. More work was presented after this period and following the feedback received through the questionnaire.

## 3.5 THE FIRST STEPS IN THE COMMUNITY OF PRACTICE

As indicated in the literature review, teachers are not using ICT to its full potential. I sought to use a virtual medium which would not involve an expense for the participants,

[64] This could include a forum, a resource, and a question to provoke a discussion or a note with information.

which could be accessed easily and flexibly from home or school and which would therefore maintain a close contact between the participants and me over a long span of time.

The first steps involved the setting up of the CoP on a weekly format through which the communications would unfold. Following Rogers' framework, a discussion on ICT knowledge would be launched and when appropriate ICT activities or other contributions on ICT were shared. The activities on the CoP were constantly designed to encourage the participants to share ideas and resources and help them develop further knowledge and skills in ICT as a pedagogic practice.

Once the CoP was set up, the participants were encouraged to enrol and thus instructions were given. An induction period followed in which participants were given activities to help them become familiar with the online open source software, Moodle. Three blocks were created for familiarisation and navigation. These were placed on the right hand side column and included: the 'New and Useful Booklist', 'Links to Handouts and Fact Sheets' and a mini survey which asked the participants to 'List Five Consumer-Related Issues which will be in the media in 2007'. In the central and main column, initially there was a 'Welcome Note' and information entitled 'Enrolment'. For further familiarisation during the second week, the 'Nutrition Concepts and Terminology' forum was launched as well as a glossary with the same title. This enabled the participants to practice accessing, reading and posting comments. Following the scaffolding methodology this initial phase was planned in order to provide clear instructions and step-by-step procedures. On the left hand side of the screen I retained the two Moodle standard blocks for administration. The Moodle site was easy to use and user friendly. See Appendix 2 for a sample of the CoP on Moodle.

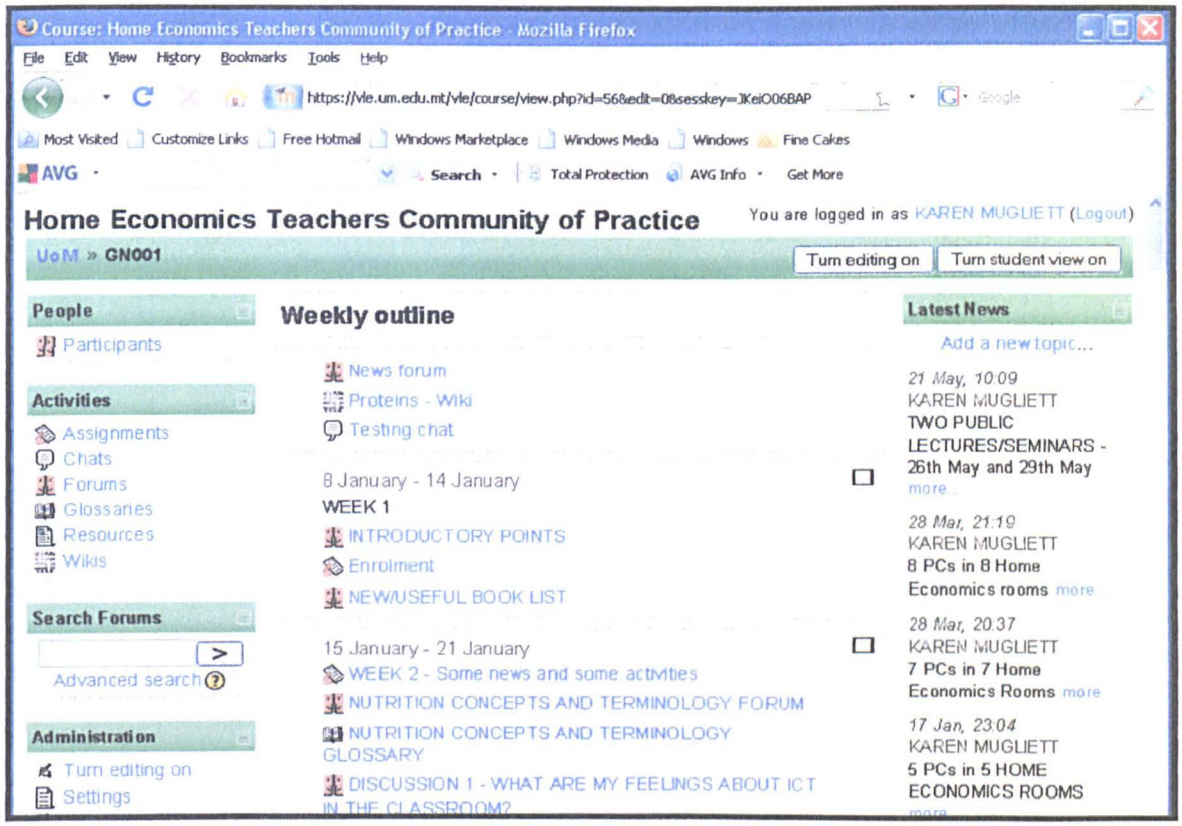


Figure 1
The CoP site on Moodle in the initial days

After the initial familiarisation and prior to sharing awareness knowledge on ICT, the first step was to proceed to discuss attitudes, beliefs and values related to ICT. I wanted the participants to reflect on what ICT meant to them. This discussion called, 'What are my feelings about ICT in the classroom?' took place in the second week and introduced the participants to some research findings on the benefits of ICT in education. Such benefits mentioned were taken from current research (Watson, 1993; NCET, 1994, ImpaCT2 Report[65]; BECTA 2nd edition report) and showed that *'ICT can enhance and stimulate learning, encourage motivation, help children with special needs, make learning more constructive, make children more reflective through the interactivity and thus help more in understanding'*. The two questions posed here were 'What are your feelings about ICT?' and 'Do you really think ICT can work in class?'

[65] BECTA 2002

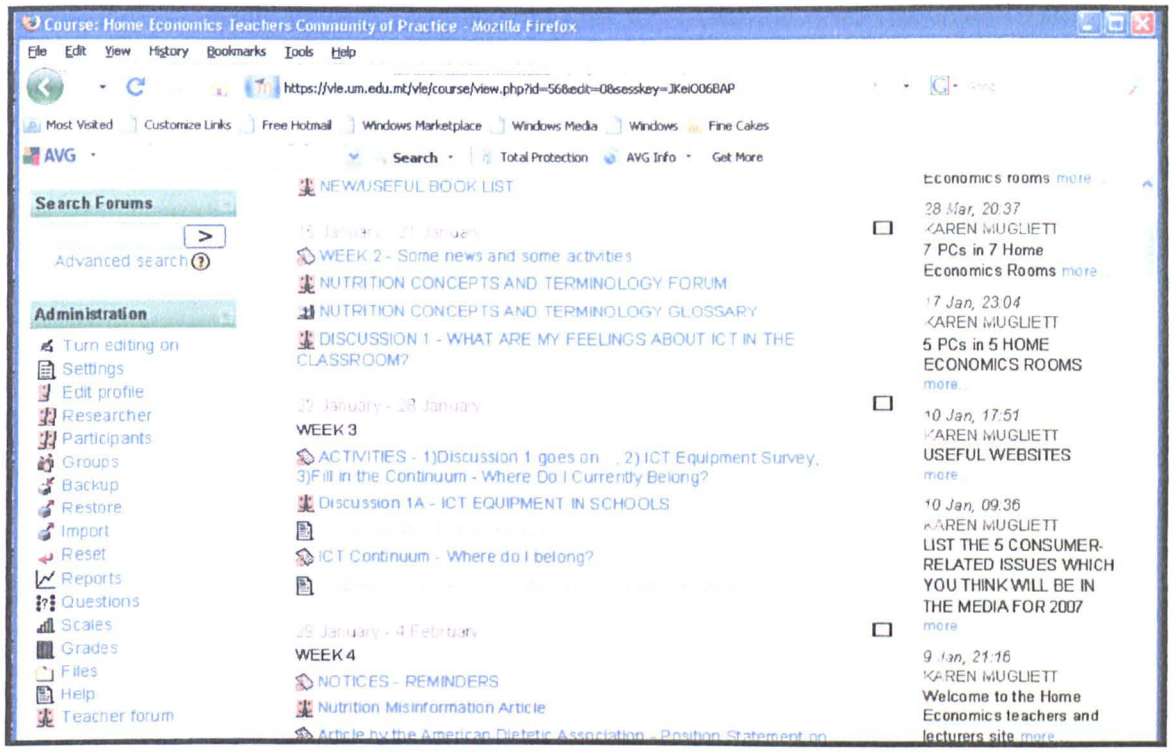


Figure 2
The CoP site showing the second and third weeks and the above mentioned discussion areas

Besides giving an insight into the participants' attitudes, beliefs and values related to ICT in classroom practice the discussion was meant to provide an indication of ICT usage in the local HE scenario. As Ertmer, (2005) states, it is important to examine teachers' pedagogical beliefs and technology practices as they can have an influence on teachers' adoption and use of technology. This also served as a basis for correct planning for the next step. At the same time I was learning about the attitudes and ICT knowledge of the participants, about ICT from the other participants and about the best way forward depending on the emergent needs.

In order to encourage wide participation I was constantly ensuring that the teachers and student-teachers felt involved in every part of the project and in each activity or discussion. The need to constantly include others and widen the participation further was shown by frequent invitations to the participants to ask them to encourage more colleagues to join.

### 3.5.1 The Nature of the Innovation

ICT integration as the innovation in this research was dependent on the teachers and meant to develop in time. The CoP was meant to generate awareness towards technology and together the participants would collaborate to create and share a number of possibilities of using ICT in HE. In addition the CoP was meant to give the participants opportunities to experience as many of the stages and perceived attributes from Rogers' (2003) framework to then adopt ICT in class as an effective pedagogic practice. Rogers' (2003) suggests that an innovation-decision process requires more than a passive role of just implementing a template or a new idea. In this case, there were quite a few ideas which were uploaded on the CoP. The teachers would initially observe and trial low tech and less complex technologies as an innovative pedagogy and experience the relative advantage and compatibility with their past practices. Most importantly, I wanted the teachers to gain an understanding of the underlying philosophy of using technology effectively to eventually know how to independently assimilate new technologies into their curriculum and assimilate higher-order usage of technology. As suggested by Sandholtz et al. (1997), integration would have developed from the entry level, through the adoption, adaptation and appropriation levels to reach the final invention stage where teachers would be experimenting with new ways of using technology with their students and students would be engaged in networking, project-based instruction and interdisciplinary approaches.

### 3.5.2 The Communication Channel

A channel of communication is required for an innovative idea to be exchanged between one individual who is disseminating the innovative idea to others who are in the process of accepting this new idea. Technology plays an important role in the transfer of information and this too could be a channel of communication. By using ICT technologies, participants were utilising the very same tool which one was trying to innovate. The online medium was a means of constant communication with the participants thereby utilising the very same tool which one was trying to innovate.

### 3.5.3 The Time Factor

Time is an important factor in the innovation-diffusion process. Rogers (2003) mentions three stages which show how the time dimension is involved in the innovation-adoption or rejection process. The time dimension involves: 1) the innovation-decision process by which an individual passes from the knowledge phase of the innovation to the (confirmation) adoption-rejection phase. 2) an allowance for diversity in time taken by individuals to adopt an innovation, since people adopt an innovation at different paces; 3) the rate of innovation for the members of the group, which is usually measured by the number of participants in the group which adopt the innovation in a given time period.

The CoP was ready to commence in January 2007 when enrolment started and the formal research activities took place until July 2007, followed by a questionnaire which was sent out in August of that same year and collected at the end of September 2007. The interviews with six volunteer participants were held after the questionnaire was analysed, in May 2008. These three teachers and three student-teachers were deemed as a sufficient number to expose any gaps in the model or lack of information emanating from the responses.

### 3.5.4 The Social System

Members of a social system such as members of a community, staff or a school can determine how the innovation gets adopted or rejected. Rogers (2003) determines the issues which will affect the diffusion, such as how the system's social structure determines the diffusion, the effect of the norms on the diffusion, the roles of the leaders or change agents, the types of decisions, and the consequences.

## 3.6 THE RESEARCH TOOLS

There were three research elements in this study: the case study of an online Community of Practice which was set up on the Moodle platform and the questionnaire and the interviews which were used to collect data from the participants. The data would indicate

how the CoP impacted on the participants in the light of professional development in ICT and indicate whether there was an effect on the integration of technology in the HE class.

### 3.6.1 Modular Object-Oriented Dynamic Learning Environment (Moodle)

Moodle is a powerful learning management system that allows users to engage in synchronous or asynchronous online learning experiences. These learning experiences could be structured into online courses or could promote informal forms of learning as one finds in some online communities of practice. The open source facility means that users have access to the source code of the software and so a user can write new features, improve the design and look at how others have found solutions to problems (Cole, 2005). The Moodle open source software is available for an online community to grow together through knowledge sharing and interaction. It is a social process where learning can take place through the construction of shared activities and discussions which are done in groups. Moodle can be accessed and downloaded[66] freely. Once teachers become familiar with this open source management system they could start using it themselves in class with their own students. *'Moodle's design philosophy makes this a uniquely teacher-friendly package that represents the first generation of educational tools that are truly useful'* (Cole, 2005 p. 5). Whereas Moodle is learning-centred, other computer management systems are tool-centred and would require a list of tools for a complete interface (Cole, 2005). Their cost and degree of complexity would make them inaccessible for teachers to use.

### 3.6.2 The Structure of the Community of Practice on Moodle

The site running Moodle for this CoP was the University of Malta e-Learning site[67]. A space was set up by the site co-ordinator and the name GN001: Home Economics Teachers' Community of Practice was given to the area. One can only access this site[68] with a specific user identity and password. On entering the site a main screen with the site news and categories appears as well as any other courses one may be teaching using Moodle on the same server. The Moodle main screen is structured into three sections: a

[66] http://www.moodle.org/
[67] http://web.um.edu.mt/moodle/
[68] http://web.um.edu.mt/moodle/course/view.php?id=56

right-hand side block[69], a central one and a left-hand side[70] one. The central one is the main part where the course, discussion forums and other activities are hosted[71]. This can be seen in the above figures 1 and 2 above.

### 3.6.3 Aesthetic Appearance

Moodle does not provide the software to make the design of the online network colourful and enticing. There are Moodle themes which can improve the graphic representation of the page though, however, this was not used in the HE teachers' CoP as I was not aware of it before the project. Moodle is suitable for online teaching and for use to supplement face-to-face learning. The software promotes social constructionist pedagogy, a method which includes collaboration, activity-based learning, and critical reflection. It does not however, have the facility to add signposts and other similar symbols on the site. Thus the site lacks sophisticated symbols which might entice the learners further.

### 3.6.4 Content Design

As Hammond, (2005) states, curriculum designers of online asynchronous learning networks should encourage participation through a number of measures. In online courses curriculum designers can ask for the following measures as mentioned by Hammond (2005): formative or summative peer assessment; minimum level of participation; set group work; rotation of roles within groups and credit for participation. Some of these measures were possible whereas others were not because of the voluntary nature of this CoP. The CoP did include a number of different measures thought to encourage participation, such as: constantly promoting learner participation; explicit tasks (such as specific assignments to trial out an activity or discussion forums, readings, surveys, forums to share good practice); time for trialling, observation, feedback, reflection and discussion and give a variety of relevant ICT activities which were easy to apply in classrooms or schools with limited resources.

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[69] Other activities listed here with information such as latest news, calendar of events and upcoming events and records of recent activity.

[70] Consists of an administrative section for the course creator. This enables you to alter settings and lay out every detail of the course.

[71] Moodle offers three different types of formats in order to organise a course: chronologically by week, conceptually by topic or socially into one big forum (Cole, 2005).

The online environment has unique features and coordinators as well as participants must adjust to this new medium for professional development. As Hammond (2005) indicates, participation itself does not necessarily ensure that learning has taken place. With respect to this study, participation or lurking on the site will not ensure that technology integration will take place in the HE classroom or whether it will take place effectively. Constant messages, ongoing support, new suggestions and concrete ideas in the pedagogic use of ICT may help in effective technology integration.

### 3.6.5 The Structure of the Content and Components

The main elements of the CoP were divided into two parts: the ICT section and the Nutrition section. Within these sections one could find information, knowledge, discussion forums, assignments, activities, a glossary, notes, surveys to fill in, news together with other material and links to other online sites which may be relevant to either ICT in HE or Nutrition.

## 3.7 METHODOLOGIES AND TECHNIQUES USED IN THIS RESEARCH

In deciding on which methodologies and techniques were most suitable for the analysis of the online research with teachers and student-teachers, a number of qualitative and quantitative tools were considered. When making choices the most appropriate data collection methods and techniques were used with respect to the context and type of response required from participants. All methodologies and research are subject to certain limitations, which can impact on the validity, reliability and generalisations of the findings. Below is an explanation of the techniques and methodologies utilised in this thesis with justifications of the choices made.

Qualitative or interpretative research about people's lives, behaviours or experiences has always been my preferred research method. I always preferred a non-statistical type of approach. Beyond the personal preference one might foremost consider the nature of the research and adopt the most appropriate method. It is often through a blend of both

qualitative and quantitative methods that a piece of research gets done, although this is not the only way of doing research. Whichever method is used, the aim of theorising is to develop useful theories (Strauss & Corbin, 1998). Validity and reliability are major considerations which should be thought of during any piece of research. The issue is which method is most useful to establish theory or contributions which are valid and reliable. In this thesis the research method employed was primarily qualitative involving an in depth analysis of the discussions on the CoP and interviews. The quantitative element in this project was a questionnaire which was sent out through the online medium. The use of qualitative methodology was seen as the most appropriate in this study since a major part of the analysis depended upon the interactions on the discussions on the CoP. This methodology was seen to be more likely to tap into the teachers' attitudes, beliefs and experiences towards ICT and classroom practice. Through the discussions and interviews one would be able to establish the constructs and re-constructs of teachers' beliefs and practices with respect to ICT in the HE curriculum. This thesis was not about generalisations and statistics. It was meant to influence change in set practices and test the impact of the online medium for professional development. It was meant to break teachers away from their isolation in the individual schools and bring them together and through ongoing interactions provide reflections on pedagogic beliefs and practice which in turn could lead to the take up of technology. The interpretation of the realities and outcomes would be dependent on the systematic analysis of the discussions.

### 3.7.1 The Questionnaire

The questionnaire was specifically designed to map out the main responses which could emerge from the CoP experience in the diffusion method as laid out by Rogers (2003). The questions were planned to gain an insight into the attributes enabling the innovation as well as the innovation-decision process which took place in the teachers and student-teachers as a result of the interventions on the CoP. The first section is meant to convey an understanding of the impact of the awareness-knowledge that the CoP may have contributed to the teachers. Questions were here addressing issues which would show whether the participants gained enough awareness of ICT in education and HE to be

motivated to seek more knowledge. Participants were also asked whether they had gained enough knowledge on how-to use the ICT in class appropriately for the content and pedagogic needs of the HE curriculum and the students. The second part addressed the persuasion stage where the participants were asked whether they had formed a favourable or unfavourable attitude which would then increase the likelihood of adoption of ICT in the HE classroom. At this stage of the innovation the individual would become more psychologically involved with the new idea and would actively seek information about the innovation. During this stage, the perceived attributes of an innovation are seen as catalysts to the process of innovation adoption. There were questions in the third phase of the questionnaire which addressed the decision stage. Questions were asked to depict whether a decision would be likely to be reached in favour of adoption of ICT in HE or rejection. The perceived attributes of trialability and observability would help in contributing to a speedier adoption rather than a rejection. In the fourth stage of the questionnaire, the questions addressed each participant to see whether they were mentally prepared and convinced to implement ICT in class. Problems of implementation will exist and hence questions were also directed at this area. Finally, the last stage was the confirmation stage where participants were asked if they would seek more information and be motivated to use more ICT in the following year even though they may have not adopted during the research period.

#### 3.7.1.2 The Questionnaire Procedure

The original questionnaire consisted of forty-nine questions mostly consisting of close ended quantitative type questions. There were a number of open-ended questions which gave the respondents an opportunity to answer in more depth. A pilot project was carried out with 7 participants who included the student-teachers, teachers and a lecturer. There were very few amendments to the questionnaire, although the respondents pointed out a little repetition and the need for further clarification in a few questions. Appendix 3 shows a sample of the final questionnaire. Most commented that the questionnaire was rather long. After going through the questions and making the necessary amendments, I still ended up with a slightly longer document having fifty-three questions.

Out of the fifty-one participants, thirty-three responded. From the outset I explained the purpose of the questionnaire on the CoP and participants were told that responding to the questionnaire meant that they were giving consent for the data to be used during the analysis of this research. The questionnaire was conducted over a period of two months from August 2007 until the end of October 2007. The respondents could choose the most convenient way for them in which to send the responses: some opted to send them back online, others via email or post.

The analysis of the questionnaire was carried out manually due to a manageable number of responses, although after coding, all the data was inputted on the Microsoft Access database. A discussion of results will follow in the next chapters.

### 3.7.2 The Online Interactions

The online discussions in the forums which were related to ICT in education were analysed using a simple content analysis method. The discussions were structured on Rogers' (2003) diffusion of innovation model as described above. Originally other theories which could support the diffusion model were considered, predominantly, Hughes' (2004) four technology integration principles and Sandholtz et al.,'s (1997) levels of technology integration. They provided a very good insight into frameworks for technology integration and initially the three models worked well together. However, the main focus was on Rogers' (2003) process as the different confidence levels of teachers, together with the lack of responses from a large number of participants, made it difficult to maintain all three models. Simultaneously, I was also using a scaffolded learning approach to help me maintain a step by step clear approach.

Table 20 in Appendix 4 clearly exhibits how the online interactions and activities were developed on the CoP, with Rogers' (2003) five steps and five perceived attributes as the principle framework. The table gives a detailed account of the development of the theory and structure of the CoP and the gives a clear insight of the discussion forums as designed on the CoP together with the ICT activities. One needs to emphasise that because the participants were coming from a social system and each one of them had

different norms, needs and personality variables, not everyone was moving at the same pace. This meant that although the model was there to give a structure towards innovation diffusion there were times when other things were implemented. The participants were given importance and it is possible that the framework was not fully developed as one would have desired by the end of the six month period. There was a sensitisation of the needs or status of the participants and it was these not the theory that determined the pace of the interactions and activities.

Following the structure and activities as seen in table 20 in Appendix 4, it was felt that Rogers' (2003) process was not concluded and neither had the teachers reached the phases or levels of technology integration as presented by Sandholtz et al., (1997). Therefore I carried on uploading material in order to support and move teachers towards full integration. A few teachers uploaded some material too. This site is now also used for the uploading of ICT work and assignments by student-teachers so as to share their work. Two tables 21 and 22 in Appendix 5 show the ICT material and activities uploaded beyond the twenty-fifth week which is when the research project was concluded.

During the analysis of the discussions, the content analysis provided data which was utilised to identify the emerging patterns and themes. All the discussions were broken down into pieces of important information and categorised. These data were further broken down into themes which provided insights as to how the framework was impacting on the participants and classroom practice with respect to ICT integration as well as how the participants themselves were impacting on the model being used. The emergent data from the analysis of the discussion (both inductive and deductive) and the questionnaires served as valuable information for questions for the interviews in areas where I may required further data. The interviews were then carried out at a much later stage so that during this analytical process, I could go deeper into the impact of the CoP on the teachers and classroom practice as well as explain it as a medium for professional development. In-depth interviews with a small sample of teachers and student-teachers were thus seen as necessary. The decision to postpone the interviews to after the analysis

of the questionnaire and online interactions proved to be a wise decision since the theoretical framework was also used for analysis purposes.

### 3.7.3 The Interviews

> *'The use of the interview in research marks a move away from seeing human subjects as simply manipulable and data as somehow external to individuals.'*
>
> (Kvale, 1996, p.11)

The potential for in-depth discussions in interviews allows for interpretations and opportunities to express one's regard on situations from their own point of view (Cohen Manion and Morrison, 2000), even if the participants are not equal partners in the conversation (Kvale and Brinkmann, 2008). Subjectivity and bias on the side of the interviewer could be a disadvantage (Cohen et al, 2000). Interviews are seen as conversations that have a structure and a purpose and which help the interviewer gain access to the lives, perceptions, attitudes and feelings of people (Kvale and Brinkmann, 2008). They serve to gather information through a number of ways: structured, unstructured, non-directive and focused (Cohen et al, 2000). In this research, this tool was used to gather more insightful information on the functioning of the CoP and to further enable me to discuss, analyse and interpret the data. Whilst the questionnaires were set to gather general views on the CoP, the interviews were considered to be essential in order to achieve more coverage and evaluation about the experience of the professional development exercise.

An unstructured interview would require a seasoned researcher with advanced interviewing techniques. I needed the interview to be focused and well planned to obtain relevant data and acquire information on the lacunae in the data.

#### 3.7.3.1 The Interview Procedure

The questions identified for the interviews (Appendix 6) were based on Rogers' (2003) framework for the diffusion of innovation, in order to indicate the applicability of this framework to diffusion of ICT integration amongst HE teacher on a community of

practice. To support this, the interview was designed to seek data on the three main objectives for the CoP particularly that of improving the knowledge in ICT (both awareness knowledge and concrete applications) in HE; to discover the teachers' perception of classroom practice and whether improvements were observed as a result of the work carried out on the CoP. One also needed to evaluate the role of the CoP as a medium for professional development from the teachers' perspective. The questions focused on all the stages in Rogers' (2003) framework through the assessment of teachers' perceptions on the stages of adoption and opportunities the CoP may have offered. The interviews also focused on classroom practice and whether the CoP promoted and motivated any improvements or changes. In this section the interviews explored Rogers (2003) perceived attributes, where the interviewees were asked to give more detail on each of these stages in order to evaluate whether the activities and discussions on the CoP and whether teachers had managed to achieve these. The interviews also dealt with professional development in order to establish whether the teachers perceived the CoP as a suitable medium for growth in one's career and knowledge and whether the CoP did in fact help them develop professionally in ICT integration.

Three teachers and three student-teachers were selected to assist me in these interviews and act as interviewees. The teachers chosen were a recent graduate, one who has been teaching for around five years and another who has been in the service for over twenty-five years. The three student-teachers selected were from three different year groups, specifically a second, third and fourth year student. A pilot study was carried out with another student-teacher prior to the start of the interviews. No modifications were necessary.

The identified interviewees were contacted by an email, stating the purpose and approximate duration of the interview and were then invited to participate. All those contacted accepted and dates were set for each interview. Most teachers were visited in their schools, whereas one came over to my home. The student-teachers were all interviewed at the university. They were already familiar with the research but the

purpose of the interview was further explained and a letter of consent was presented for them to sign (Appendix 7). Confidentiality was assured and this was further explained in the letter where participants were told that their identity would never be disclosed. Permission to take notes and audio recording was sought. During the interview participants were asked general questions on technology integration in addition to the structured questions according to the framework as listed above.

My role during the interview was that of a listener whilst also posing the questions in a clear straightforward way. I enjoyed each interview and would have preferred a two way communication yet this would not have achieved the desired outcome. In addition to audio recordings, brief notes were taken during the interview to serve as a back up.

## 3.8 ETHICAL ISSUES

The participants in this study enrolled on a voluntary basis and were asked for consent right from the start. Teachers were made aware that the CoP was a research project which was being undertaken for purposes of a doctorate thesis and knew that their contributions would be utilised in the research. In a message that was sent to the participants on one occasion I had asked them for this permission and stated that the feedback and interactions were to remain unidentifiable in the thesis and their identity would never be disclosed. The participants were free to object to this and let me know through an email. No emails were ever sent back to me and therefore I feel I have the participants' consent to utilise all the contributions in the discussions. In addition to this, letters of consent were later forwarded to the participants for the use of the data in the online interactions and the interviews and all the participants were asked to send me an email with their consent to be able to use the material on the online CoP. Most participants replied allowing me consent. If participants did not reply or consent, I did not use their contributions.

There was no assessment of performance involved in this thesis. This may have raised ethical issues of measurement. Neither were students assessed to see if learning had been

enhanced or if understanding improved. These delicate forms of ethical issues were avoided and I exerted extreme responsibility when commenting on the online interactions and responses from the teachers or student-teachers.

## 3.9 VALIDITY

Following a study of the literature on research techniques it was seen necessary to include a number of different techniques in addition to the detailed analysis of the online discussions. It was felt important to use diverse techniques which would triangulate the data and the categories emerging and thus develop patterns and themes which are valid and reliable. Since the study is often concentrated on teachers' and student-teachers' beliefs and perceptions, it was felt that the different methodologies described above would contribute to a more wholesome interpretation.

## 3.10 THE DATA ANALYSIS

The data collected from the questionnaires, online interactions and interviews were then analysed in three different stages using Rogers' (2003) five major themes[72] of the innovation-decision process in the analysis process. In addition to these five themes, the perceived attributes[73] were utilised to further analyse the potential of the CoP for professional development.

### 3.10.1 Analysis of the Questionnaires

The fifty-three questions in the questionnaires from the thirty-three respondents were all inputted on a Microsoft Access database file. Five different tables were created as this was considered better than if all the data were placed on one large one. These tables reflected the different sections in the questionnaire. Table 1 addressed demographic data such as age, gender, subjects taught in school, teaching qualifications, computer and internet access in the school, HE room and their homes and information showing from

[72] The five major themes are: knowledge, persuasion, decision, implementation and confirmation.
[73] The perceived attributes are: relative advantage, compatibility, complexity, observability and trialability.

where the respondents access the CoP. Table 2 focused on aptitude and skills of the respondents towards ICT and on whether they looked forward to the postings, whether these were valuable to the teachers and whether they contributed to gaining an understanding towards ICT in HE. Table 3 contained responses on needs, motivation and interests for ICT in HE and teaching and whether they found the ICT activities relevant and motivating and whether all this increased their ICT awareness knowledge. Table 4 focused on awareness knowledge and level of usage of ICT and therefore included responses on perceptions on correct usage and adequate levels of ICT, 'how-to' knowledge, whether the attitudes towards ICT and their values were more positive following their experience on the CoP. Table 5 included responses on the participants and their contributions on the CoP together with their perception of adoption levels and implementation of ICT. It also included data on the participants' perception of the effectiveness of the online CoP as a medium for professional development.

Codes were given to each and every possible response. Examples of codes would be 'Yes' would be a 1, a 'No' would be a 0. Other responses which included a longer list were coded with more numeric symbols or alphabetic codes. All the coding, inputting and analysis was done by me and although this was time consuming, it helped me grasp the data well. Although the number of questions was substantial, the sample size was not large; I then used a simple method for analysis and counted the codes manually.

### 3.10.2 The Analysis of the Online Discussions

Content analysis techniques which were initially based on the constant comparative method based in grounded theory were to be utilised for the analysis of the interactions. However, the constant comparative method was later disregarded and only a content analysis method was utilised for the analysis of the online discussions and interactions. This was due to the lack of sufficient interactions and discussions which could be compared. This process therefore involved phases of collection of all the data from the discussions, categorising, summarising and reflecting on the data from beginning to end of the discussions and interactions on ICT from the CoP. When selecting this choice over other qualitative methods, it was with regard to the appropriateness of this method for

delving into the interactions closely and identifying any patterns or themes which would emerge. Due to the extent of the project which ran over six months, the amount of discussions and interactions to discuss was substantial even if the interactions were limited. It was important to understand the interactions in the light of the emerging views on ICT in classroom practice. The discussions were valuable and it was important that they were interpreted accurately, in the light of the theories which were being used to scaffold the ICT integration. This type of methodology was seen to be able to determine the perspectives without bias and in a systematic approach.

Each discussion was dissected as it was unfolding into inductive and deductive elements. Through this type of coding I was sorting and defining various elements of the data and putting the themes together under categories which emerged from Rogers' (2003) framework and my research questions. In fact the major themes I was looking for in this data corresponded to Rogers' (2003) five stage process from knowledge to confirmation. These major themes, together with the underlying factors from my research questions, gave me the data which could then contribute to the findings. This was done for every discussion and interaction on ICT and significant comments were recorded under an extensive list of categories. The frequency of a category as it emerged from the different participants and from the different topics on the CoP indicated the major themes. Finally at the end of the project, all the discussions were seen as one whole set of data from which I tried to detect the required data.

### 3.10.3 The Analysis of the Interviews

The interviews were all carried out by me and although brief notes were taken, the audio recordings required transcription. It was necessary to carry out the transcriptions myself, in order to become familiar with the emerging data. Each forty-five minute interview took approximately four hours to transcribe[74]. I also ventured into using more sophisticated software which could turn voice into text but this proved to be time consuming to learn and also required a period of time for the software to 'learn' the

[74] A Sony IC P520 audio recorder was used for the audio recordings and the transcriptions. The device is equipped with an usb pc link which facilitates the installation of its software on the computer and hence the transcriptions.

voices on the interviews. Since there were seven different voices in all on the recordings including my own, this would prove to be a very long process. Thus this software was abandoned and each interview was transcribed in the manner described below:

- Interview was first heard from the audio recorder for familiarisation with the speed, diction, utterances and any superfluous comments or noises.
- Then the transcription process using the computer to stop and start the device rather than the device itself was carried out.
- Transcriptions were read to mark off any irrelevant and superfluous utterances.
- Categorisation of the interviews into three particular themes was made: knowledge, classroom practice and professional development. Data was subdivided and taken out from each interview and placed under these themes.
- Each piece of data was broken down and relevant phrases were marked in order to facilitate focus on the themes and data emerging in order to prioritise and condense the data.

Through the identifications of themes I tried to analyse the data according to inductive and deductive procedures, linking the categories from the three different techniques in order to examine and interpret the prevalent data. The main themes which were common in each interview and which reflected any inductive or deductive elements were highlighted and then coded so as to be compared with the responses in the questionnaires or similar patterns in the discussions.

## 3.11 CONCLUSION

This chapter has given a detailed overview of the methodology involved in the different stages of this research: the formation and structuring of the CoP and the three different research techniques. The choice of methods and the research tools for each phase were based on a study of the literature and on the outcomes of the preceding phases in the research whilst ensuring rigour and validity required in such a piece of work. The results are described in the following two chapters. The first chapter focuses on the findings

from the online interactions, and the next chapter focuses on the CoP as a medium for knowledge dissemination, improvement of classroom practice as well as analysing the CoP as a platform for professional development.

# CHAPTER 4

# ANALYSIS OF THE ONLINE COMMUNITY OF PRACTICE

## 4.1 INTRODUCTION

The intention to use this online innovation for teachers of HE in Malta was to engage teachers in the use of technology in schools and generate awareness of ICT through the use of the online community. A further intention was to cultivate pedagogic practices which integrate ICT. My personal contributions on the CoP aimed to:

- encourage knowledge sharing
- raise awareness of ICT use in HE
- generate pedagogical knowledge in ICT
- raise confidence and motivation towards ICT skills and technology in class
- use a systematic process to support teachers in implementing change in their classroom practice through the use of technology.

As stated in the literature review, asynchronous online settings can be flexible and permanent thus providing more opportunities for reflection and interaction. The online community being discussed here was asynchronous, although this could have worked synchronously too. It addressed the often cited issue, that technology integration in special subject teachers is a systematic, slow process requiring an experimental approach and using ICT in everyday practice (EU Schoolnet Report 2007). Through the online medium I could be in contact with HE teachers on a daily basis for a long period of time depending on access of the participants. There were however, several constraints during this project which may shed light on the barriers for online learning as a means of professional development as well as for effective technology integration.

## 4.2 ROGERS' THEORETICAL MODEL

Here I will illustrate how Rogers' (2003) model was used and its contribution to support the diffusion of innovation process in the online interactions. As recommended in the review of studies of the impact on ICT in European schools (EU Schoolnet, 2007), this project was a practice oriented project aimed at maintaining contact with teachers on a

frequent basis. This was meant to encourage a variety of ICT skills and pedagogies in teachers in order to facilitate classroom use of technology.

### 4.2.1 The Diffusion of Innovation Process

The manner by which the diffusion of innovation process was utilised in the project in simple scaffolded steps has been synthesised in a model which is shown below. This is a graphic representation of the steps and perceived attributes which contributed to this process, as well as the knowledge being built as a result of the interactions which should increase throughout the process. The steps followed on the online CoP aimed at taking the participants through the different phases of the model: knowledge (awareness, principle and 'how-to'), persuasion with the five different attributes[75], decision-making, implementation and confirmation. Finally, at the end of this chapter, I will examine the effectiveness of the CoP in helping teachers and student-teachers go through the different phases and assess whether the process improved their use of technology in class.

The model below shows processes involved in the framework as adapted from Rogers (2003) over a span of time. The model has been transferred to boxes which signify stages and development. I tried to emphasise that the focus was on the different stages but which also had other influencing factors such as the perceived attributes which were utilised constantly throughout the research. External factors also played an important role such as the social system in which the participants function. The model reflects the processes involved from initiation, the levels of influence which the participants were experiencing, specifically, individual (intrapersonal) and community (interpersonal) influences. The small boxes on the left hand side symbolise the effect of the processes involved in this project or more explicitly the inductive and deductive elements to and from the participants as a result of the CoP experience. They show how this multi-level model this increased with time, even if collaboration or knowledge building was not achieved.

[75] These are: relative advantage, compatibility, complexity, trialling and observation.

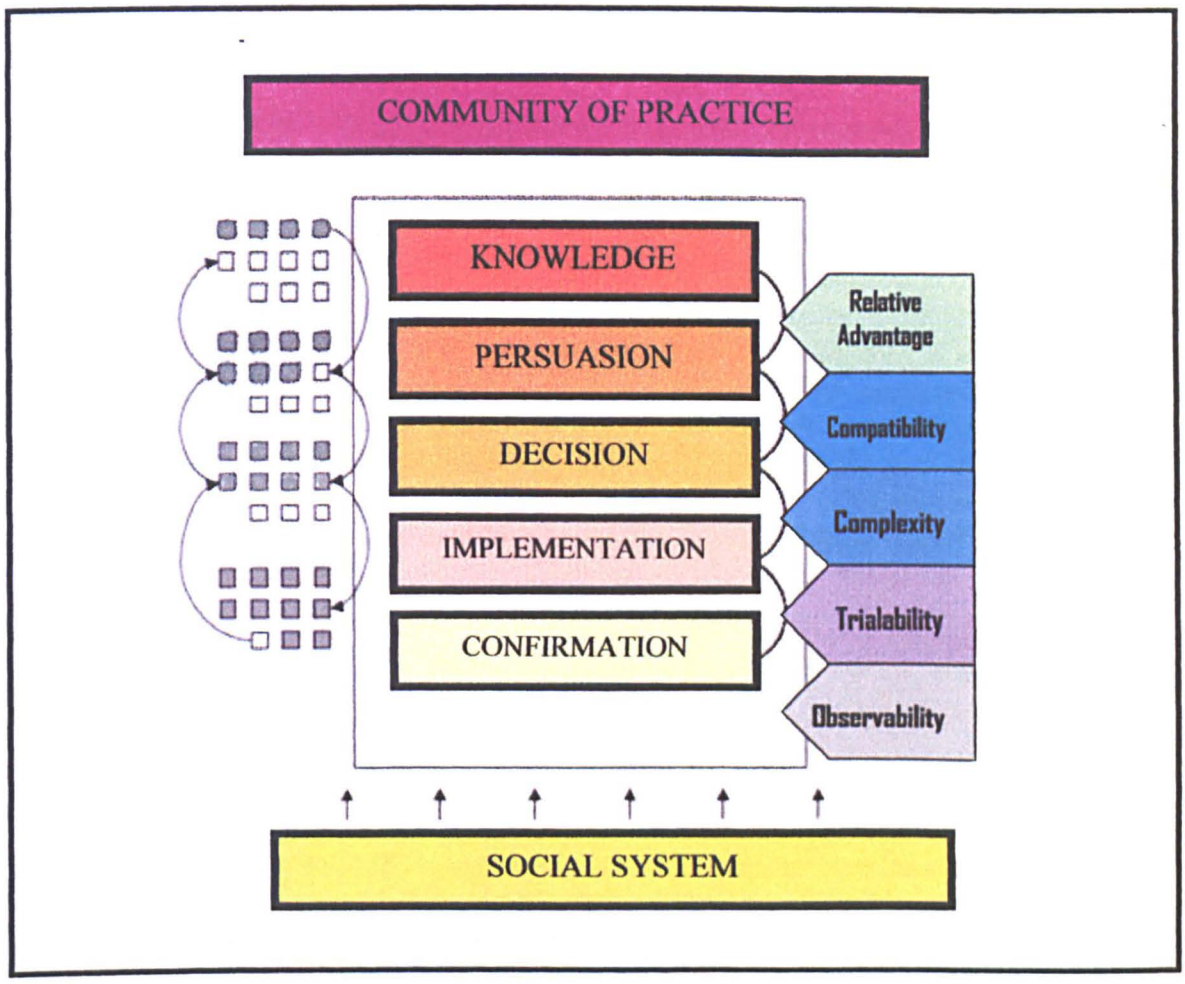



Figure 3
The above diagram shows Rogers' Diffusion of Innovation model and the Innovation-Decision Process as adapted for use in this online community of practice as designed for this project

## 4.3 THE KNOWLEDGE PHASE

Knowledge is the first stage in Rogers' (2003) innovation-decision process where during this process the HE teachers were exposed to the benefits of ICT to gain initial knowledge of ICT as a practice in class.

### 4.3.1 Initial Steps

The Moodle facility to relay messages directly into the participants' email accounts proved to be convenient and preferred by the participants to accessing the site. This

quote shows the first message posted which was meant to give clear instructions and encourage enrolment as well as an idea of what the CoP will offer:

> *'After you enrol, I suggest you go to the middle column and read the Introduction and then go to the column on the right hand side and go through the topics there. They are there for ongoing information but also to allow you to experiment a little with this Moodle site. If we make this work it will be an extraordinary experience for all of us. We could have an amazing range of resources uploaded ready for us to use in class. We could have a chat forum for a synchronous discussion or invite a guest speaker one time for an exchange of views. We could provide resources, games, activities and ready to use presentations. We will discuss good practice you may already have experienced in schools with the use of ICT in Home Economics or build an ICT resource together. So please get started and it should be a very fruitful experience.'* (Karen Mugliett, 11/01/07)

The excerpt below is taken from the Introduction in Week 1 and offered more information.

> *'Week by week we will then scaffold our discussions and learning to get us familiar with the ICT resources available and create new ones and find ways of how to integrate ICT fully into the HE curriculum. In full knowledge that we are all busy people we will move slowly with only one activity a week to focus on. If we need more time we will extend and move at a pace that is convenient for all. So good luck and let's all collaborate.'* (Karen Mugliett, 8/01/07)

The postings indicated a lot of enthusiasm and positive feedback towards this innovation during the first week of this online community, with participants even giving suggestions in order to encourage use of the site and maintain a constant contact. As indicated in the methodology chapter, there were other sections[76] in the CoP used to encourage social networking and knowledge building to enable the community to maintain interest and build trust in the community members.

A participant called the CoP a *'virtual staffroom'* and another sent photographs of her lesson whilst she was on teaching practice in which she used a PowerPoint presentation.

[76] New/Useful Booklist, News of Activities, Nutrition Concepts and Terminology Forum and Nutrition Glossary amongst others.

The participants themselves who had already enrolled by the first week were encouraging other participants to join. In this CoP some participants were active from the start although slowed down later, whereas others were never active and remained so. Teo and Webster (2008) suggest encouraging active and responsible participation, which I did. Participation was voluntary and I could not introduce any assessment criteria or enforce contribution, which could have increased participation.

### 4.3.2 The Awareness-Knowledge Phase

Rogers' (2003) knowledge phase indicates the importance of disseminating awareness knowledge of the innovation to the individuals. This phase began with an introduction of the growing importance of ICT in education and the way it is changing the notion of schooling (Abbott, 2001). Here I also used a participant's earlier contribution to pass on more knowledge about the benefits of ICT[77]:

> *'From my personal experience and research which I came across I think that; besides HE being in line with NMC objectives which continuously promote ICT across the curriculum, I also feel that ICT is crucial in education:*
>
> - ***Because the future is here***
>   *ICT is the learning and teaching tool of the 21st century..*
> - ***Pupils love it! So a great tool to promote HE!***
>   *Incorporating ICT and multimedia resources into our lessons is a great way to reach our students.*
> - ***It helps develop teaching professionals too***
>   *Teaching using ICT helps us adopt fresh approaches to familiar material, and to develop new skills to expand our own career potential.*
> - ***We will attract students interest and enhance their motivation***
>   *I believe ICT will increase students' interest in our subject*
> - ***It is so flexible...broad range of learning activities***
> - ***Students expand their ICT and networking skills***
> - ***It enhances the involvement of exciting, challenging and engaging modern technologies in HE***
> - ***Oh! And because it's fun'.***

Besides this valuable contribution from amongst the participants they were also exposed to international research on ICT in education as every discussion was linked to relevant research, thus making them aware of the trends and benefits of technology integration.

[77] The full excerpt can be seen in Appendix 8.

This was meant to give them food for reflection and to stimulate thinking and done through: Discussion 1 – What Are My Feelings about ICT in the Classroom? Discussion 1A – ICT Equipment in Schools Survey and a through a reflective exercise on use of ICT: Where Do I belong?

The participants were constantly encouraged to contribute within any of the forums or activities and even initiate new topics. A forum which attracted a high amount of participation was the 'ICT Equipment in Schools' discussion. In this forum, the participants were meant to fill in a survey about the ICT equipment and resources that exist at their school, simultaneously making them aware of what exists in other schools. However, they used it as a platform to write about their ICT beliefs, even giving feedback related to the previous discussion: Discussion Forum 1 which was launched to give awareness knowledge on ICT in education. The first message posted by me on this forum was the following:

> *'Research (NCET, 1994) indicates that ICT can enhance and stimulate learning; it can encourage motivation and help children with special needs; it can make learning more constructive. The interactivity makes children reflect, think and understand.*
> *What are your feelings about this? Do you really think ICT can work in class?'*
> (Karen Mugliett, 20/01/07)

Responses flowed in and participants were contributing valid information about ICT as can be seen in all of the following:

> *'I simply HAD to comment on the importance of ICT in contemporary schooling. Following my teaching practice experience and the inclusion of ICT in these week's lessons, I have to confirm to the immense opportunity provided by such technologies, in enhancing the learning experience. I made use of PowerPoint presentations in two of my lessons and they worked greatly with the students. I intend to include ICT in my coming lessons with my TP classes and I also plan to make use of internet. Whenever resources are available, they should be exploited. Students do learn effectively, have fun and adopt a positive attitude towards the lesson. These benefits do not only target students, but they also maximise the teaching experience of the educator'.*

Another participant said: *'I am someone that would love to use ICT in the classroom... either for presenting lessons, or making students use this important tool either to look up some interesting topic or encouraging them to set up presentations for their classmates... I think that this would really boost their moral and also encourage those students who tend to keep back and feel shy'.*

Yet another participant stated: *'At the moment I am a student teacher, which means that I am placed in different schools and can only comment on what I see or hear of during my teaching practice sessions. The feeling I get, when the word "computer" is mentioned in front of some teachers is that it is something scary to use...*

*I would love to use a computer to deliver my lessons... especially were PowerPoint is concerned... it enables to pass on the message in such a way that helps the student comprehend better.*

*I know that it is quite costly to use ICT... but let us make an effort and make use what is already available... so both us as the teacher/lecturer and student can achieve excellent results!'*

All these showed favourable attitudes towards ICT in class. However, there were others who were not active at this stage are more in congruence with Rogers' (2003) claim, that participants tend to be passive in the initial stages. Some participants have leadership qualities as in the example below from one of the participants which shows a contribution to content knowledge on ICT and led the participants to exchange ideas about the benefits of ICT in education.

*'I think most of educators are in unison re. use of ICT in lessons! I am totally in favour myself. From my personal experience and research which I came across I think that; besides HE being in line with NMC objectives which continuously promote ICT across the curriculum, I also feel that ICT is crucial in education:*

This participant was not representative of the typical participant on the CoP. Online communities are made up of a variety of participants with diverse needs and interests. Some are innovators, possibly signifying a stronger belief in the innovation, others are less frequent users and still others remain passive and lurk around the site, receiving but not giving. As confirmed in the interviews lurkers were learning and contributing to others, thus having a strong influence outside the online set-up as Takahashi et al. (2003) also state. In the excerpt above this participant is contributing to the knowledge phase

through text and opinions when she states phrases such as: *ICT is crucial to education, is the learning tool of the 21st century, helps students learn better and motivates the learning experience through raised interest, it prepares them for their workplace, brings new dimension into teaching and can give rise to flexible and a broad range of learning experiences.* This participant also encouraged the participants to use ICT. Other participants reiterated some of the themes above and added more to the knowledge component when stating that ICT: *enhances the visual resources, understanding and motivation, students in class have favourable attitudes towards computers in class.* One participant pointed out that students *were very confident and skilled at handling PC work.* In line with Rogers' (2003) knowledge stage one can here observe the participants contributing and gaining awareness knowledge through the activity on the CoP. They had a favourable attitude towards ICT in schools, as was confirmed in both the questionnaires and interviews. The excerpt shown above may have contributed towards or strengthened the teachers' perception and beliefs towards ICT. The CoP was here still in the initial stages where the community was being built and participants were getting used to each other.

During this phase the individuals were exposing themselves to ideas that are in accordance with their needs and interests (Rogers, 2003) and therefore sharing ideas which portray their beliefs. Most participants acknowledged the potential of ICT in education but may be experiencing difficulties at their school:

> *'I do find it very difficult to do an ICT lesson in my school, not to say impossible. I cannot use the computer labs since they are all occupied with IT and computer study lessons at all times. We do have a laptop and a projector which I can borrow, but I have to carry and use everything myself and I never used it so I do not know how to use a projector or connect them together. It would also be a hassle to carry the equipment for each lesson. I do not even know when we are leaving the school as we have to go somewhere else because of MCAST. Currently we don't even have a head, so I can't ask for other equipment. We don't even have a pc or internet in staffrooms'.*

This is a strong statement which brings out the serious logistical problems faced by teachers in schools when accessing ICT equipment. Others claimed difficulty when trying to access online resources that were filtered as in the following:

*'One of the problems I encounter when using ICT is when I want to use online games or activities since the majority of the sites are filtered even though they are educational. At the moment at my school we are going to organise a health and safety week for the whole school, where we are going to focus on healthy breakfast, safety at home and various other topics. We intend to use some slots for online educational games. However all sites are filtered. Luckily we are working as a team and the computer teacher at my school is very helpful and she's going to contact the ICT department so as we could access these sites. Hope we manage to carry out this ICT activity effectively'.*

Quite a number of participants were silent, consciously or unconsciously avoiding to participate, which could have been through lack of confidence in the area or because they preferred to remain silent or due to the fact that their thoughts on the innovation were still unrefined. One other contributor, who had a computer in class, was more positive:

*'Having a computer in class is a Godsend. It has given a new dimension to my teaching techniques. The students are so happy with their new computer that they want to make full use of it. Some of my Form 3 students on their own initiative, made a PowerPoint presentation on the Food Pyramid and Healthy Eating. Because of this and to encourage them to make use of ICT, I am allotting some time from the lessons for this kind of work which is followed by a discussion. I fully agree with L C, as I have encountered the same problems regarding the lack of access to the internet in my H/E room, as this is preventing us from utilising the many online information and exercises which are so beneficial to the students'.*

As stated in the literature review, Teo and Webster (2008) identify a number of obstacles impeding asynchronous discussions[78]. There could have been an element of 'selective exposure' (Rogers, 2003) which shows that the topic of discussion may have been in conflict with their existing predispositions such as looking at ICT as a resource with logistical problems associated with this resource.

Participation was a key condition to the success of the online community and the professional development in ICT and needed to go beyond merely writing about attitudes and difficulties. One had to accept the different types of participatory levels and that through writing, text is made public and permanent (Hammond, 2005). This could have

[78] Obstacles include: taking decisions whether to participate, unmotivated by discussion topic, not knowing what issues to discuss or how to discuss them.

been a barrier. Some participants inspire communication and interaction; others are less comfortable with this kind of communication.

### 4.3.3 Knowledge Dissemination across the CoP

The exchanges during the above mentioned discussions, (see excerpts in Appendix 9), showed the type of knowledge being disseminated as well as those being presented by the participants. These were used to assess their knowledge, beliefs and needs and formulate the next phase. Below is a summary of the main points contributed by me in Discussion Forum 1 and 1A and which were aimed at passing on awareness-knowledge on ICT in education. The participants' contributions also listed below summarise the themes which emerged in the discussions by the teachers and student-teachers. I felt it was important to give a succinct overview of the main messages which were being exchanged as they give an indication of the beliefs and values towards ICT. These messages emerged towards the beginning of the interactivities on the CoP and many of these messages were repeated thereafter.

**Table 2**

**Knowledge dissemination across the CoP**

| **The Researcher's Contributions in the initial stages of the knowledge phase** | **The Participants' Contributions** |
|---|---|
| ICT can contribute to any subject and all teaching and learning | Would love to use ICT in the classroom for presenting lessons, or making students use this important tool either to look up some interesting topic or encouraging them to set up presentations for their classmates |
| ICT is important and beneficial for teachers in teaching. | Boosts students' moral and also encourages shy or reserved ones to participate. |

| The Researcher's Contributions | The Participants' Contributions |
|---|---|
| It will not necessarily lead to understanding especially if we do not have aims and objectives of what learning we want to take place | ICT would work a great deal in the classroom |
| It cannot take the place of traditional forms or learning or other pedagogies eg hands on experiences. I believe in **blended learning**. I believe we should choose the appropriate pedagogies that would suit the topic we want to teach and blend them with traditional forms of learning. | When teachers hear the word "computer" mentioned they think it is something scary to use |
| ICT can offer the opportunities and the resources for learners in Home Economics lessons to have fantastic media rich experiences and utilising methods that will suit the range of learning styles that pupils might have. | The computer enables teachers to pass on the message in such a way that helps the student comprehend better |
| ICT allows pupils to access and achieve wondrous possibilities, from seeking for information, communicating with an expert to creating their own presentations and multimedia products. | I agree with the inclusion of ICT in the HE curriculum as nowadays we are surrounded by ICT and it is an asset to include it. |
| ICT can enhance teaching and learning as research shows, even when it does not involve complex technologies. | The students show much more interest when I use ICT as it is quite interactive and appealing because you can add sound, colour, pictures, etc which make the lesson very interesting. |

| The Researcher's Contributions | The Participants' Contributions |
|---|---|
| ICT as a pedagogy in the HE classroom makes learning more fun, creative and interactive. | I think ICT is a powerful tool as it helps us to teach in a different and better way |
| ICT can enhance and stimulate learning | It increases our motivation let alone that of our students who spend most of the time sitting down listening to the teacher |
| It can encourage motivation and help children with special needs | ICT is an excellent way of incorporating interactive learning whilst becoming more technical oriented in our subject. This will remove the odd thoughts about HE about being just cookery |
| It can make learning more constructivist and the interactivity makes children reflect and think and therefore understand more. | I believe that ICT is an effective way of passing on knowledge while making the students enjoy it and therefore engage more in the lesson. Students like it since it is something they are more than accustomed to; therefore they enjoy using such activities. |
| Teachers need to use ICT effectively in class and not just as an add-on or for drill-and-practice tasks only. | I also believe that thanks to technology we can use a variety of pedagogies both for the actual lesson and as revision. In future one can even use ICT in exams (more interactive and less stressful and quicker to correct as well) |
| ICT can help in group work, differential approaches and acknowledging diversity. | Using ICT in the classroom can add a myriad of activities: games, PowerPoint, quizzes and videos. Many local schools (if not all) have computer labs. If we push the ICT area forward I think we will be lucky to have an ICT element in our room |

| The Researcher's Contributions | The Participants' Contributions |
|---|---|
| Teachers can aim to start on those applications that are familiar and simple. One should start with low tech technologies and gradually increase as one masters confidence and ability. | We should include ICT in our classrooms, its good for the name of the subject, it makes our lessons interesting and effective for us and the students and it entitles us to use a variety of activities other then the usual pedagogies. |
| Teachers need to demand for the appropriate resources and be seen using them. | A computer in class has given a new dimension to my teaching techniques. |
| Team up with other teachers on this CoP or in the staff room to create initiatives in teaching with technology. | The students are so happy with the new computer in class that they want to make full use of it. |
| Share good practice and share resources. It is impossible for a teacher to work with technology throughout on his/her own. | Students have out of their own initiative, made a PowerPoint presentation on the Food Pyramid and Healthy Eating. |

Throughout the project, I attempted to build positive attitudes towards effective use of technology in class. The data above indicated that the majority of the participants who contributed had favourable attitudes towards using ICT in class and saw it as a powerful tool even though the full applications of technology to one's subject were still unknown. The contributions indicated that some still had a limited view of how ICT could be used in class; others were showing some improved pedagogic practices. It could be that the diverse group of participants were not in synch with each other and with me and this resulted in a discrepancy in the interactions. Favourable attitudes alone will not necessarily transform the practice (Demetriadis et al, 2003). As Cuban (2001) discovered, teachers may see computers as tools and not central to a task. Rogers (2003) claims that in the innovation-decision process it is the 'how to' knowledge that individuals need to adopt the change. Peer mentoring, teaming and collaboration is key to professional development (Vavasseur and MacGregor, 2008). The teachers on this CoP sharing ideas

and interacting can have a positive impact on the integration of technology in their classroom practice. This will be verified in the following chapter. As identified in the ImpaCT evaluation report (Watson, 1993) and in Sandholtz et al (1991) teachers need ongoing training in order to make regular use of computers in their teaching and to exploit the potential of ICT as a pedagogic practice rather than as an add-on. Teachers benefit more from planned opportunities to share their experiences of using IT (Watson, 1993). As a result, the first phase of the CoP focused on creating of the ICT benefits whilst also creating pedagogic examples of ICT in HE.

### 4.3.4 The 'How-To' Knowledge

Rogers' (2003) model then proceeds to the second and third types of knowledge: 'how-to' knowledge and the principles-knowledge. The principles-knowledge consists of the functioning principles underlying how the innovation works (Rogers, 2003). Without these two types of knowledge an innovation will most probably be underutilised or misused, which may result in discontinuance.

With respect to pedagogic transformation, teacher affordances of the whole learning environment need to be considered (Webb and Cox, 2004), and more extensively the professional activities teachers are likely to undertake. Becker and Riel (2000) found that when teachers were engaged in professional activities beyond their classroom they were more likely to use computers in exemplary ways. In the interviews two teachers indicated they had gone beyond the classroom and were venturing in professional activities with colleagues from different schools. They were interested to know more about ICT in education and were keen to obtain more knowledge and concrete ideas on how to use this resource in class, whilst passing this on to other colleagues. The contributors showed a willingness to adopt ICT in class, knowing that a variety of uses exist and were motivated to learn more. The discussions were meant to motivate the participants to seek more information about ICT. It was important to show the participants that each stage is cyclical and that the pattern should be learnt so as to be able to carry on developing irrespective of this professional development exercise. Those that were contributing showed that awareness was raised; others that were lurking

showed they were still there through an occasional email. Wenger (1998) stated that a low level of participation does not mean a low level of learning. It was evident from the interviews that, despite the level of participation, teachers were still learning. The participants were still new to this whole activity and this must be kept in mind when judging participation.

From this stage onwards, the discussions and activities in the CoP addressed all three types of knowledge (awareness, 'how-to' and principles) and the persuasion stage was initiated. As stated by Rogers (2003), many change agents concentrate their efforts on awareness-knowledge, whereas I wanted to give due importance to sharing the 'how-to' knowledge too. Teachers wanted this and needed concrete examples and the exposure to technology in context (Davis, 2003), hence working with appropriate examples in their subject.

### 4.3.5 Other forms of knowledge dissemination

Following the feedback gained during the interactions on the CoP, the knowledge and persuasion phases and particularly the 'how-to' knowledge were the main focus for most of the first six months of this study. 'Notes' were used as from the sixth week to disseminate knowledge and current research to the participants (see Table 3 below and more details in Appendix 10). These notes were meant to give the participants a theoretical background and sound knowledge on ICT or integration. The aim was that participants would reflect on the information to support their own professional development, utilise this in the discussions and have informed opinions. Feedback was expected following the information being shared. This indicates divergent priorities between me and the participants or that the practitioners were not as concerned with theory as I was. One should point out that Hughes' (2004) principles of integration were used in these notes as a means of information to the participants as this was considered most relevant for practitioners. Rogers' (2003) model says nothing to the participants about technology integration as it is a model for any innovation. Hence, utilising Sandholtz et al.'s (1997) methods of technology integration and Hughes' (2004) principles supported me in aspects of how technology should be integrated and that is why they were applied in parallel as work was progressing.

**Table 3**

**Description of the notes which were uploaded on the CoP**

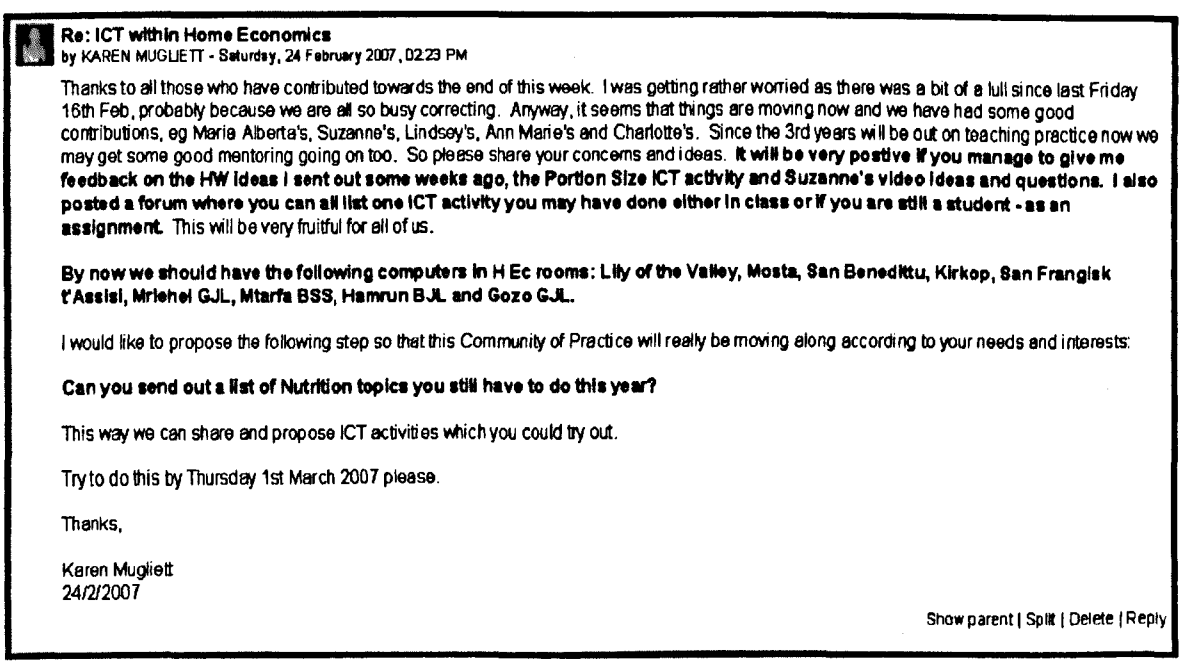
| NOTE | CONTENT |
|---|---|
| 1 | Teaching with ICT: What is the potential of ICT in teaching and learning? |
| 2 | Feeling good about innovation |
| 3 | Hughes (2004) first principle for technology integration: Connecting technology learning to professional knowledge |
| 4 | Hughes (2004) second principle: Subject Matter and technological pedagogic connections |
| 5 | Hughes (2004) third principle: Using technology learning to challenge current professional knowledge |
| 6 | Hughes (2004) fourth principle: Teaching many technologies |
| 7 | Constructivist approaches to teaching: The Scaffolding process |
| 8 | Constructivist approaches: Problem-Solving technique |
| 9 | The Interactive Whiteboard – A powerful pedagogic tool |

Through these notes the participants were given a knowledgeable background of the benefits of ICT in teaching and learning, a methodology for integration and a brief look at constructivist approaches. From the questionnaires and interviews it was evident that this material was read. One could note the impact of these notes when they were used by the HE ITE programme co-ordinator[79] in a professional development workshop for lecturers of HE at the University of Malta.

There was evidence of high rates of viewing but low rates of active participation indicating that teachers may still be tied to the face-to-face mode of instruction which can often be passive and which was then transposed to the online environment. It seems that

[79] The HE ITE co-ordinator was one of the lecturers who were members of this CoP for HE teachers and student-teachers.

teachers are still maintaining their distance and will be slow to change to a mentality of sharing resources, giving feedback or reflecting. The teaching profession is still an isolated job (Becker and Riel, 2000) in which very little exchange of ideas takes place with colleagues (Wubbels, 2007). Mc Carney (2004) indicated that teachers preferred traditional courses for professional development and here teachers have not yet been able to transform their professional development practices to the online medium. Teachers also lacked time and accessibility in which to be able to spend time on the CoP and this seemed to be a hindrance, although this might not be the real reason as all had computer and internet access at home. Faced with this scenario, I felt I had to persist not only in giving more knowledge and ideas about ICT in class but also had to maintain the encouragement to the participants to participate and share as can be seen in the figure below.



**Re: ICT within Home Economics**
by KAREN MUGLIETT - Saturday, 24 February 2007, 02:23 PM

Thanks to all those who have contributed towards the end of this week. I was getting rather worried as there was a bit of a lull since last Friday 16th Feb, probably because we are all so busy correcting. Anyway, it seems that things are moving now and we have had some good contributions, eg Marie Alberta's, Suzanne's, Lindsey's, Ann Marie's and Charlotte's. Since the 3rd years will be out on teaching practice now we may get some good mentoring going on too. So please share your concerns and ideas. **It will be very postive if you manage to give me feedback on the HW ideas I sent out some weeks ago, the Portion Size ICT activity and Suzanne's video ideas and questions. I also posted a forum where you can all list one ICT activity you may have done either in class or if you are still a student - as an assignment.** This will be very fruitful for all of us.

**By now we should have the following computers in H Ec rooms: Lily of the Valley, Mosta, San Benedittu, Kirkop, San Frangisk t'Assisi, Mriehel GJL, Mtarfa BSS, Hamrun BJL and Gozo GJL.**

I would like to propose the following step so that this Community of Practice will really be moving along according to your needs and interests:

**Can you send out a list of Nutrition topics you still have to do this year?**

This way we can share and propose ICT activities which you could try out.

Try to do this by Thursday 1st March 2007 please.

Thanks,

Karen Mugliett
24/2/2007

Show parent | Split | Delete | Reply

Figure 4
Excerpt from one of the forums where I am praising, encouraging participation and proposing ways of how participants could contribute.

## 4.4 THE PERSUASION PHASE

The main type of thinking in this stage is affective, thus involving attitude formation and change on the part of the individual (Rogers, 2003). One's feelings or beliefs will be structured or re-structured through more information about the innovation and the individual's internal processes will be forming whilst internalising the information. This 'selection perception' (Rogers, 2003) of information about an innovation is usually dependant on the individual's beliefs and attitudes and selection is often made on the basis of existing ideas. In the persuasion phase the perceived attributes of relative advantage, compatibility and complexity come to the fore. It is during this stage that a general perception of the innovation is developed (Rogers, 2003).

Rogers (2003) argues that technology transfer is difficult because in general the effort required for technology to be used effectively is underestimated. The same can be said of technology take up in classroom practice. Research indicates that practices develop over time and the collaboration or collegiality does not necessarily trigger off the process (Loveless, DeVoogd and Bohlin, 2001). Affordances (Gibson, 1997) need to be considered when examining pedagogy with respect to the use of ICT (Webb and Cox, 2004). In the CoP I did address these affordances by focusing on the learning environment, the resources available in schools, the need for ideas and reflection and focused particularly on the perceived attributes which, according to Rogers (2003), may influence the adoption of technology in class or the rate of adoption. The following is an analysis of how these attributes were featured in the CoP as well as an interpretation of their effect.

### 4.4.1 The Perceived Attributes

The aim of discussion forum 2 was to address the persuasion phase, particularly focusing on the attribute of relative advantage and compatibility whilst continuing to concentrate on the 'how-to' knowledge. Throughout the activities on the CoP 'complexity' was also addressed whereby I was very careful not to make technology look complex for fear of losing the participants. Familiar forms of technology were presented and shown to be a

powerful tool for learning which poses challenges for today's teachers when used effectively.

#### 4.4.1.1 Relative Advantage

During the fourth and fifth week I started to focus on relative advantage and thus started Discussion Forum 2 – When Using ICT, is this Innovation better than what it replaces? (See Appendix 11). The aim was to provoke the participants' thinking on whether ICT is better than the teaching methods or practices that it replaces and whether there were any differences in the learners' approach or feedback on the homework tasks shared in this forum. The teachers did not take up the idea of giving feedback on the homework tasks but some did respond by sharing their own homework ideas. Three teachers shared homework which included websites and a self-created activity. One teacher shared an activity which shows she was using ICT to promote aspects of group work. Here there is an attempt to use internet in class as a research tool for accessing information easily. This was the first ICT task posted and indicated a trend which later emerged more strongly, that of a lack of participation particularly in discussing pedagogies and practices. I would like to adopt Lebec and Luft's (2007) term 'deprioritisation' of an online course if this is not associated with tangible forms of motivation. There could be elements of this in relation to both the teachers and student-teachers. The first advantage that was experienced by the participants was the flexibility in the use of the online medium for the CoP. This was stated in the discussions as well as in both the questionnaires and the interviews where they claimed the online CoP was an ideal medium to use for professional development and communication. The quotes below show that the CoP was seen as effective and convenient and in the first one also shows reasons for lurking:

Participant 1:

> *'Dear Ms. Mugliett,*
> *Thanks for giving birth to this wonderful community. I always make sure to find time to read everyone's feedback but I rarely give mine, due to my hectic life, and for this I excuse myself with everyone.*
> *As regards to nutrition topics I still have to cover minerals, vitamins and food commodities with form 3s. Thanks for all.*

Participant 2:

> *'Thanks for this Community of Practice. It is a chance to share ideas with one another. I try my best to read the mail every day. As regards to nutrition topics I still have to cover: balanced meals, food commodities with special reference to cereals and pulses/nuts, micro-nutrients, yeast cookery and planning meals for specific diets. Thank you'.*

Favourable attitudes towards the CoP and ICT were evident in this discussion and show that some were using the innovation in class even if merely as a tool. One teacher stated that she used a PowerPoint which worked with some students but not with others because of disciplinary problems. Hence, teachers realise that ICT integration does require a different classroom management set up to teaching in traditional mode. Teachers were even trying initiatives for group work and requesting students' presentations whilst using ICT and hence making a move towards effective pedagogic practices. Another teacher who contributed homework ideas also claimed to have given group work and a presentation following ICT work and uses email for coursework tasks with the students. This teacher in fact indicated that email contact with students even during the holidays builds '*a better relationship with the students who discuss and work more freely*' and set a good example by saying this because she also stated that she does not have a computer in the HE lab and accessibility was a problem. Teachers are not finding the ICT resources accessible and therefore can hardly trial anything. One of the lecturers from the university contributed to this forum by providing a website with useful video clips and also provided questions to provoke further discussion on the relative advantage of ICT in class as shown below:

> *'How could the videos be used effectively with an HE lesson?*
> *Are they any better than a real live demonstration?*
> *Are there instances when they could replace a real live demonstration?'*

Some of the participants were at this stage actively contributing useful opinions, ideas and reflections whilst bringing in the realistic scenario from the schools. It is unfortunate that a higher percentage of the participants were not participating actively as this would have provided them with some rich experiences in knowledge building and longer

debates. Teachers who were not contributing may have not been comfortable or professionally prepared to deal with virtual discussions as yet.

Teachers may not be convinced that learning can be enhanced due to lack of ideas, something which keeps emerging from most of the postings. Teachers were here given the opportunity to experience and reflect on the relative advantage of ICT as an innovation for classroom practice. However, the messages from the participants focused more on the need for support agencies and subject specialists to support teachers with ideas and resources for ICT use. Participants were made aware from early on that one can start integrating ICT slowly but that full ICT integration aims to achieve student involvement in the pedagogic processes.

All ideas posted were compatible with the teachers' past experiences with ICT and which only required low-tech facilities similar to those available in schools. I tried to emphasis the importance of collaboration, training, the need for time and appropriate resources, also quoting from literature (Loveless et al, 2001) that these will help to develop practice in ICT.

There were quite a number of new topics created by the teachers within this discussion forum and the one which attracted the most threads was initiated by a student-teacher[80] who stated that it is evident from her study that ICT is a visual tool which makes a difference whilst also motivating and raising the students' enthusiasm. She stated that the experience of using ICT was very positive and showed from the students' response that it was helpful to learning. She wrote: *'ICT is not better than what it replaces but it is has lots of potential as a tool that we should use as teachers to support our students in their learning experience'.* Responses were positive and indicate that ICT is seen as beneficial.

The first note[81] addressed the issue of relative advantage further and gave the participants an opportunity to make an informed choice. Teachers commented on students' feedback

[80] This student-teacher was in the final stages of the ITE programme and was finalising a dissertation on ICT in HE and testing whether ICT enhances learning.
[81] Teaching with ICT: What is the potential of ICT for teaching and learning? See Appendix 10

on ICT who claim that *'using ICT is fun and a break from the norm'*. Students have shown them that motivation increases and therefore it is worth the preparation. Comparisons were also made with a school in the UK which was visited by a participant who related how the classrooms were equipped with technology. In another forum a teacher stated:

> *'From informal conversations with many HE teachers and student-teachers, I believe that a good number of HE teachers do feel the need for innovation regarding the use of ICT in their lessons and they do feel that it is most relevant to the students' needs. We are all now aware of the many benefits of using ICT. Perhaps concrete ideas on how to actually use ICT are required so HE teachers can actually say, "Yes, this is what I can do.....this is how I can effectively incorporate ICT in my lessons and demonstrations." This is exactly what this CoP is showing us and it is a great experience to share ideas and actual resources and homework tasks. Many teachers are getting more interested, curious and informed about this innovation and as a result seeking practical ways of how to incorporate ICT in HE lessons.'*

The social system at large perceives technology as having a relative advantage and should be used in schools to expose students to technology. These messages surround our national ICT policy 2008-2010. The state is sending messages that ICT is beneficial through its investment on hardware primarily even if in our local scenario teachers show this is far from adequate. Schools must offer technical support as if not provided may affect the rate of adoption. One must therefore question whether teachers' slow take up of ICT was resulting in an ineffective investment where the investor is not getting the deserved value for money. Slow uptake of ICT may be because of personality factors, confidence levels, attitudes or skills but also due to economic factors, lack of accessibility to appropriate software, training and technical support. What is not clear or quantifiable is the extent of advantage that teachers see in ICT or whether this is marred by other factors.

#### 4.4.1.2 Compatibility

*'Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experience and needs of potential adopters'* (Rogers, 2003, p. 240). One may expect that age can influence technology integration where young teachers in schools may adopt technology earlier than those older in age, whether it is for personal

use, lesson notes or as a tool. This difference can be attributed to compatibility and can explain why the majority of teachers who joined the CoP were younger than forty years old. The issue of compatibility was not easy to tackle in the CoP. In this forum it could only be done through trying to make the teachers reflect on their own attitudes, values and experiences. In the interviews all teachers mentioned that ICT was compatible to their past or existing practices and felt it will help them enrich the HE curriculum. They may not have understood the actual meaning being sought here but most acknowledged it was in line with their existing practices. They were focusing on whether they are prepared to take up technology to contribute to their teaching. One participant said:

> *'Teachers are afraid of more work and are afraid to use ICT. They think it involves a lot of work which will differ from what they have already developed. I feel younger using new methods. Even is someone talks about computers, I can now join them. I can also show students I know what is happening and ICT enhances your curriculum and your relationship with the students.'*

In the CoP the compatibility issue was addressed through giving teachers 'how-to' knowledge which was familiar to existing practices. This is why teachers might have felt they were compatible with ICT. In Rogers' (2003) terms, teachers would have used their old ideas and mental tools to access new ideas and give them meaning. Individuals cannot deal with an innovation except on the basis of the familiar. It is through the standard provided by the previous values and practices that an innovation can be interpreted.

Hence technology was introduced sequentially starting with what is simple and most compatible to teachers' 'old' practices and also having a high degree of relative advantage. This results in less of a behavioural change and would help teachers adopt ICT in slow scaffolded steps growing and developing from one stage of compatibility to another. The facilitator needs to build on the initial success with minimal innovation and then to support teachers to transform from innovations which are quite congruent with existing practice to innovations which are least compatible.

#### 4.4.1.3 Complexity

*'Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use. Any new idea may be classified on the complexity-simplicity continuum.'* (Rogers' 2003 p. 257) Complexity may not be as important as relative advantage or compatibility but if the innovation is not clear to the individuals, then the rate of adoption could be affected (Rogers' 2003). New ideas can be a barrier to adoption. Teachers do not necessarily have a high level of technical expertise and so technology can be a complex innovation. My personal experience in this is years of bafflement and lack of confidence. Having received no training in technology or with technology throughout compulsory school age and in teacher training, I could only learn through my own mistakes and some advice from relatives who were more literate than me in technology. The amount of confusion disengaged me from using the computer beyond word processing or specific simple software for quite a while. It all seemed very complex. It was only after email and internet was introduced that the computer had to be used more frequently, that the confusion seemed to decrease as the level of uncertainty decreased and I started to cope with the complexity through trialling, hence becoming a more confident user. Young teachers are now more fortunate than those who did not have any training or exposure to computers in their formative years. They are more familiar with technology for personal use. Nonetheless using technology in class requires different skills and knowledge so teachers may still be using it in class in the way it is used for their personal productivity.

The teachers questioned in the interviews claimed to feel quite confident and did not fear any complexities. In the CoP teachers were talking about the technology as they know it. One older participant did indicate she wanted to start slowly and consolidate her experiences in technology on the CoP before attempting anything further. The CoP addressed complexity through the step by step process for any ICT activity shared. Every activity was scaffolded carefully and included clear information and instructions so that teachers would not get disengaged.

#### 4.4.1.4 Trialability

*'Trialability is the degree to which an innovation may be experimented with on a limited basis. New ideas that are generally tried on the installment plan are generally adopted more rapidly than innovations that are not divisible.'* (Rogers, 2003, p. 258) In the CoP the ICT activities were designed in such a way so as to offer the teachers the opportunity to trial them out in class, were relevant to the HE curriculum and appropriate to the equipment available in schools and diverse technological abilities of the teachers.

#### 4.4.1.5 Observability

*'Observability is the degree to which the results of an innovation are visible to others. The observability of an innovation as perceived by members of a social system is positively related to its rate of adoption.'* (Rogers', 2003) The use of the ICT activities suggested in the CoP and the sharing of good practice by teachers helped disseminate the 'how-to' knowledge to other participants and entice them to trial. In the interviews it was evident that this played a major role in encouraging teachers who may have been reluctant to use technology in class to actually doing so. According to Rogers' (2003, p. 258), 'the observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.' The teachers did manage to experience some element of observability which could have been more effective had more teachers or student-teachers shared their good practice or gave feedback. There may not have been many teachers who could share ICT activities if they had not tried them out in class. Student-teachers had more to share through the assignments carried out as part of the ITE programme, although not many did, possibly resulting from over-caution and not wanting to expose their work to their peers whilst still in the course.

#### 4.4.1.6 The Teachers' and Student-Teachers' Responses showing Trialling and Observability

Student-teachers and teachers identified a number of beliefs and uncertainties linked to ICT use in their class, as in the following:

- positive effects when using ICT in class

- organisational and logistical problems which arise when using ICT in class
- the need for appropriate ICT to be effectively integrated for the students
- barriers which hinder effective take up of technology such as lack of ICT skills or school related barriers.

Organisational skills may be setting barriers for teachers which influence the capacity of teachers to embrace new pedagogical practices with ICT use. The study clearly indicates that in the absence of access to appropriate good quality ICT material/examples for one's subject, the level of ICT integration is jeopardised. Teachers feel that it is not the basic ICT skills only that they need but the practical hands on applications and resources relevant for their subject. In the interviews teachers also indicated the need for face-to-face hands on sessions on the application of ICT for HE.

During the discussions teachers complained of logistical problems or a lack of resources. At times they need to be shown that even with limited resources, technology could still be used. Participants were told that initially usage could be low-tech, merely using PowerPoint presentations, websites, extension work, word processing and video clips as an example. Once these have been adopted and teachers have understood the full potential of ICT through these forms of technology, the level of ICT in class could be improved once teachers become fully aware of the potential of ICT in their subject. This is in line with Sandholtz et al's (1997) framework for the adoption of ICT in class which was utilised in this thesis as a support to Rogers' (2003) model. One can conclude that use of ICT in class is limited because of three factors which may fluctuate in extent from teacher to teacher:

- lack of computer skills in teachers impeding their ICT confidence;
- lack of resources in schools where these are insufficient or logistically difficult to access;
- lack of 'how-to' knowledge of ICT in one's own subject;

Teachers need to be given support and time to trial out, discuss, collaborate and rehearse with technology and fellow teachers and hence should be reflected within their work

load. Until technology integration is taken up by the whole school including the administration and is reflected on the time-table, technology integration may take very long to materialise effectively. The teachers on the CoP showed they needed this.

## 4.5 THE DECISION PHASE

This stage in the innovation-decision process takes place when an individual engages in activities that lead to a choice to adopt or reject an innovation (Rogers, 2003). Hence at this stage a decision is taken for full adoption or complete rejection. Thus close to the end of the six month period of this CoP, a new forum focused on the applications of ICT in HE. Those participants that were participating were indicating that they were adopting ICT, so I wanted the participants to question whether ICT can be applied as an effective pedagogic practice in HE in order to enhance learning. This came at a stage in the CoP in the twenty-second week and after a series of ICT activities. It was envisaged that the discussion would take place after experimentation and trialling of the activities and therefore the participants would have first-hand experience on how ICT worked for them in class. This would give the participants the opportunity of an informed discussion and the opportunity to observe and reflect. However, this forum did not attract any discussion except from one other participant. Reasons which were mentioned in the interviews and questionnaires for this lack of participation were uncertainty of opinion, passive attitude, not enough 'how-to' knowledge, lack of time to trial the ICT activities and lack of confidence to respond and participate. One interviewee stated:

> *'Time was my problem. I used to access the site or read the emails at 10pm from home as I had no access at school'.*

> Interviewee 2: *'At first I felt that I didn't have to participate since I did not have the experience or the knowledge teachers had. When I participated it was mostly to ask questions'.*

> Interviewee 3: *'When I participated it was because I had different ideas and sometimes I wanted to ask questions or just contribute a different point of view. When I didn't participate it was because I was just thinking about the matter and may have not had an opinion about the issue being discussed and so let the others*

*fill in what I didn't know. I was always there and following through email, this being a really convenient way of receiving the posts'.*

In general, from both the interviews and the questionnaires it is apparent most of the participants had reached an informed decision when stating that they had the intention to seek additional information about ICT for future use in their curriculum and had the intention to try the innovation. Twenty-five (75%) of the respondents of the questionnaires stated that they had adopted ICT as a teaching method in class with seven (21%) saying they did not adopt ICT. Reasons given by the latter group of respondents were that they were still students or had just graduated; there was no laptop or hardware in class and one still found it difficult to include ICT in nutrition. Fourteen (42%) stated they were at a confident adoption level and sixteen (48%) stated they were in partial adoption. The participants were also asked if they would be keen to seek more information on ICT in HE in the future and thirty (90%) replied positively and three (9%) said they are somewhat inclined to seek more information. No-one gave a negative reply.

In this thesis I am exploring two issues: the take up of ICT by teachers in the HE classroom and the success of an online CoP for HE teachers' professional development. It could be that the culture for online interaction on professional communities was lacking and had to develop over time. A longer project was needed for participants to make this paradigm shift in professional development. Other projects, as with the ACOT decade long project,[82] are not only much longer but much more extensive.

Online participation requires an amount of discipline for autonomous learning and professional development out of school hours. I may be assuming that everyone has the time to log in, read, understand postings and work on what is presented. Teachers do have a shorter day though and need to take continuous professional development seriously in both content and pedagogy. Although all teachers accessed the site from home, they still did not engage with it as much as is necessary to make the knowledge

[82] This was a 10 year project called the Apple Classrooms of Tomorrow and was research collaboration between universities, public schools and Apple Computer Inc. (Sandholtz, Ringstaff and Dwyer, 1997).

building process and collaboration successful. In the interviews it became apparent that a lot of the participants relied on others to participate, but were reflecting in isolation. It is as if the participants preferred to maintain an observer status and failed to see the importance of participation, despite the constant reminders. Student-teachers in the interviews showed that they kept back and relied on teachers who had more experience in schools to participate. Teachers stated they had little or no time and found access at school difficult.

### 4.5.1 Adoption or Rejection

Despite the acknowledgement of an adoption of ICT in class and the affirmation of managing to raise teachers' positive attitude towards ICT, there is still the need to examine the extent and type of adoption and integration. It is clear that teachers were still using ICT as an add-on, often mentioning PowerPoint presentations, video clips and searching on internet. When I had suggested more constructivist approaches to the use of ICT as with an internet project, the participants did not offer feedback on this. In the discussions and in the interviews they did, however, claim to have found all the ideas shared on the CoP useful and innovative. The excerpt below shows how a participant who had never used technology before was now allowing her students to design and present PowerPoint presentations in class. She stated:

*'I started to use PowerPoint presentations at school with the students and gave the homework to research using ICT and afterwards discussed their research. I also asked students to prepare PowerPoint presentations themselves and they took to it immediately and they contributed really good work'.*

The impact ICT will have on the teaching and learning process in HE depends largely on how teachers use ICT in class. As stated in the review of studies of ICT impact on schools, the most difficult part for teachers is to gain confidence to give up control and allow the students to work independently (Balanskat, Blamire & Kefalla, 2007). The review states that an overwhelming body of evidence shows that the majority of teachers have not yet embraced new pedagogical practices and teachers do not feel confident in this new approach to teaching. Teachers use ICT to enhance current pedagogical practice

and have not tried to understand the philosophy underlying educational software and other resources and trialled them out (Balanskat et al, 2007). In this study I tried to show new practices of how to utilise ICT for differentiation purposes, creativity, project-based learning, team work, independent learning, higher order thinking and collaboration amongst students.

## 4.6 THE IMPLEMENTATION PHASE

This occurs when an individual puts an innovation to use and is therefore moving from a mental exercise in the innovation-decision phase to one of overt behaviour (Rogers, 2003). In the previous three phases (knowledge, persuasion and decision) the process focuses on reflection, thinking and deciding whereas in the implementation phase the individual is moving to action. This stage is not only about deciding to adopt an innovation but about putting the innovation to use (Rogers, 2003). Normally the innovation follows the decision stage directly unless it is held up by some logistical problem which can be said to be the case in the local ICT scenario. Teachers who were participating on the CoP could not always adopt ICT in class and contribute to this network because of lack of access and logistical problems. The unavailability of ICT in HE labs and in schools hindered the integration of ICT amongst these participants. Student-teachers were also at a disadvantage because they could not try the activities out in a class of their own.

The first phase of this project, which ran from January 2007 – June 2007, did not allow me to reach this level of integration with the participants on the CoP. The lack of feedback on implementation makes it difficult to establish whether the teachers had adopted ICT in class. This was more forthcoming in the responses of the interviews, where it was evident that teachers recognised they were in two stages. All the interviewees claimed to be in the knowledge phase for some aspects of technology and in the implementation phase for others, which they had trialled. During the project, due to lack of feedback on the type of implementation, I could not evaluate the teachers' adoption levels or the ICT practices being taken up. I maintained focus on the initial

phases of Rogers (2003), whilst exposing different ICT activities. The activities had to remain simple due to lack of resources and utilise laptop or desktops with or without a projector and being accessible for all types of teachers irrespective of the technological abilities. I could not use educational or commercial software as I could not distribute this software due to copyright license. Following the evaluation of the questionnaires and the positive comments in the interviews, it was evident that more ongoing support is required for effective technology integration. In the second phase of this project following the evaluation of the questionnaires and the interviews, this is what I tried to do.

There are other factors too. Some teachers may not feel motivated enough to engage with ICT and re-organise the lesson plans to fit into this new paradigm and use technology effectively. It could be there is no real gain for a teacher. The gain is on the students' side. There is no gain in financial or economic status although there might be an element of wanting to show that professionally the teacher is in line with the latest trends and tools in education. This may be a motivation which encourages ICT usage in some teachers. HE teachers, however, may not be attracted to innovations merely because they might be trendy, since they are cautious consumers. This, together with the fact that HE is a practical and hands on subject in many ways, may not make HE teachers early adopters of technology.

## 4.7 THE CONFIRMATION PHASE

*'At the confirmation phase, the individual seeks reinforcement for the innovation-decision already made and may reverse this decision if exposed to conflicting messages about the innovation.'* (Rogers, 2003) During this phase the individual recognises the benefits of the innovation and integrates it fully into one's routine as well as promotes the innovation to others (Rogers, 2003). At the same time the individual may be met with problems which may cause rejection even though adoption would have been confirmed.

In the CoP the phase following the six month period was purposely meant to maintain contact with the participants in order to avoid discontinuance. I therefore sought to

extend the use of ICT and give more concrete ideas. The activities and forums that went on in this phase which went beyond the first six months were shown in Appendix 5.

## 4.8 GAPS AND BARRIERS IN TECHNOLOGY INTEGRATION

Appendix 12 shows other ideas I put forward and which were adapted from different research onto discussion 4 in the CoP. These fifteen other ideas based also on constructivist approaches show a continuous effort to really show the teachers what and how they can use ICT and constructivist approaches in class.

This discussion forum only had a limited amount of participants, although I felt it was appropriate to move on and share more applications of ICT in HE. It was evident that a vicious circle was present here and teachers were caught in it. The structures in most schools for ongoing support and concrete ideas are not present, which at the same time is hindering teachers from trialling what is being shared on the CoP and therefore were not returning with feedback or reflections.

There are barriers which are hindering teachers to fully integrate technology into their teaching in effective ways. Although teachers claimed to be using ICT, it is evident from this study that there is hardly any use of software which could be considered for use by the pupils. Interaction and constructivist approaches using ICT were not part of the teachers' discourse. Only one participant who happened to be a student-teacher was capable of handling the software Illuminatus to design and create one's own programme. In the ImpacT project (Watson, 1993), results identified a lack of training and in-service courses as being a main concern. In agreement with these research findings, I emphasise that ICT cannot be taken up by teachers after one course. However, teachers cannot rely on the support from external staff such as technology integrationists or IT support staff, as they need to eventually be able to manage the situation on their own.

The number of participants who were not participating actively was significant and had an impact on the structure of the rest of the CoP events. With very little feedback and not necessarily knowing if the participants were reading the material, I had to move the

innovation-decision process at a slower pace than anticipated. However, a few responses such as the following would show that the participants were viewing the material, especially that which was sent to their email account. One such comment stated, *'Thank-you for sharing this ICT activity with us. Although I do not participate so much in this CoP, I do read all the material which is sent to us.'* It was surprising that many of the student-teachers did not participate even though they are competent users of IT and enjoy social networking on other chat forums. Online learning is different however, and as Preston (2007) states, social networking only supports some of the stages in a framework for online learning. Knowledge building[83], according to Preston (2007), is above the level of social networking. The CoP did not foster the required level of online socialisation between the members. Observation of the participation levels shows that members progress at different speeds and levels much in the same way as is indicated in Preston (2007). She states that individual members and the CoP as a whole progress through the five steps of Salmon's (2002) five stage model for online learning. Members will be at different stages and some will be lurking. Models may in fact not address the issue of diverse individuals.

## 4.9 CONCLUSION

In this chapter I tried to show how the model was used in order to bring ICT knowledge in all its forms to the participants on the CoP. Details were given as to how this framework gave structure to the CoP in an attempt to introduce an innovation. The way the CoP developed and the interactions that went on were the main focus of this chapter. It is clear that despite the lack of participation, the teachers did move from knowledge through to implementation and recognised that there was a cycle of this process for each new technology they had to assimilate. Some significant quotes have been listed here or in the appendices which show very favourable attitudes of the participants towards ICT, the way knowledge was being disseminated and how the stages evolved on the CoP. This chapter is only the preliminary chapter to the analysis and interpretation of the findings. The next chapter will delve further into this and here the focus must lie on whether the

[83] Collaborative knowledge and meta-knowledge building (Salmon, 2002)

CoP and the framework supported the participants to go through the different phases required for an innovation to be adopted.

# CHAPTER 5

# THE COMMUNITY OF PRACTICE AS AN EFFECTIVE MEDIUM FOR KNOWLEDGE DISSEMINATION, IMPROVEMENT OF CLASSROOM PRACTICE AND PROFESSIONAL DEVELOPMENT

## ANALYSIS AND DISCUSSION OF RESULTS

## 5.1 INTRODUCTION

Matzen & Edmunds (2007) indicate that technology can be used in class in ways that are consistent with teachers' existing practices and in ways that will shift their practice, but state that skills-based technological approaches to professional development are flawed if they fail to focus on instructional practices. Kirschner and Lai (2007) consider communities of practice to be places where a process of social learning occurs between participants with a common interest and who will collaborate over long periods of time to share ideas, construct knowledge and solve problems. In agreement with these authors, I feel that it is through dialogue, reflection and collaboration, enquiry, construction of meaning and mutual understanding, that individual understanding is then built. As stated by Becker and Riel (2000), teachers need to break the isolation they work in. The social process should help teachers develop professionally in content or pedagogy. An online community may be an effective mode of professional development to support classroom ICT integration (MacDonald, 2008) and a shift in practice and can offer many benefits including flexibility, collaboration and communication amongst teachers from different schools. Reflection time and permanent storage of messages makes the online community convenient and interactive. One interviewee stated:

> *'It was very convenient and very good as you can get a lot of information from the CoP, especially if you don't have time to search.'*

In this chapter I have tried to evaluate whether this CoP was effective as a professional development medium to support ICT integration within the HE curriculum by addressing the research questions which focused on the effectiveness of the online CoP as a medium for developing teachers' and student-teachers' knowledge about ICT in the curriculum and their perception of the effectiveness of the medium in improving their classroom practice with ICT. The CoP provided a medium where participants can pose queries and benefit from the interchange of informed opinions. They seemed to be less intrigued by the discussions on pedagogy and new technologies, indicating a need towards interaction on content area instead.

The results and discussion here focus on two of the data collection methods utilised in this study: the questionnaires and interviews. The salient themes emerging from the results will be analysed utilising the same theoretical framework which was used to build the CoP.

In the analysis I tried to discover whether the CoP made a difference in generating awareness of ICT as a pedagogic practice in teachers and student-teachers of HE, whether it made a difference in classroom practice, and hence whether the online CoP was a good medium for the professional development of teachers in ICT integration.

Starting off from a perception that technology is not being used well and supported by research (Becker, 2001; Cuban, 2001, Conlon, 2004; Ertmer, 2005; Lim and Khine, 2006; MacDonald, 2008) the focus of this online CoP was on instructional practices for technology integration. Kirschner and Lai (2007) indicate that in teacher training the two areas of ICT and teacher learning are kept apart. The instructional practices shared on this CoP aimed to bring the two areas together through addressing ICT pedagogic skills which are relevant to the HE content.

From the discussions, questionnaires and interviews it was evident that most participants found the topics interesting and useful. Significantly 19, (57%) respondents stated the postings were valuable whilst 14 (42%) said they were very valuable. The interviews showed that participants turned to the CoP to be part of the innovative medium (Moodle) and to see how online communities functioned, share experiences and new ideas and obtain useful ICT practices and resources. The participants welcomed new knowledge on ICT and claimed that the most useful aspects were the mutual learning and advice from teachers through the discussions, sharing of knowledge and experiences and the ICT activities. They felt part of a community which was disseminating new ideas for HE teaching. Initially there also was an element of curiosity and interest; however they seemed more intent on gaining material rather than sharing. Overall, one can state that most of the data was gained from the interviews and questionnaires rather than the

discussions on the CoP as the feedback was not forthcoming, therefore limiting the depth of the discussions into what could develop into higher order knowledge building.

## 5.2 GENERAL INFORMATION

Thirty-three (64.7%) participants responded to the questionnaire with thirty-one (94%) being female and two (6%) were males. Sixteen respondents were student-teachers, two were lecturers and the remaining fifteen were teachers of HE. The age distribution can be seen in Table 4 below. All student-teachers fell within the first category, (20 – 30 year old bracket), whilst the remaining ten in that same bracket were all recent graduates teaching in schools for the first few years of their teaching career.

**Table 4**

**Age Distribution of the Respondents**

| AGE | PERCENTAGE AND NUMBERS | |
|---|---|---|
| 20 – 30 year olds | 78.8% | 26 |
| 31 – 40 year olds | 9.1% | 3 |
| 41 – 50 year olds | 6.1% | 2 |
| 51 – 60 year olds | 6.1% | 2 |

Teachers in Malta under fifty years old are most likely graduates of the University of Malta's ITE programme. Those over fifty years old would have been qualified through a different route, gaining a teacher's certificate from the then Teachers' Training College. Sixteen (48.5%) of the teachers who responded were undergraduates, another sixteen (48.5%) were University graduates and one (3%) was qualified through a different route.

### 5.2.1 Perceptions and Beliefs

Beliefs and attitudes towards teaching and learning have an influential role in transforming classrooms through the use of technology (Ertmer, 1999; 2005). Teachers' beliefs exert a powerful influence on teachers' instructional decisions (Pajares, 1992). In

this analysis I am using teachers' perceptions about the knowledge gained and its effect on their classroom practice and to identify the role of the CoP within the context of Rogers' (2003) framework as a route for the professional development in ICT integration. Importance is given to the teachers' and student-teachers' perceptions because of the influential role these have, as indicated in the literature. Second-order barriers may be harder to overcome than first-order barriers[84] (Ertmer, 1999) and this indicates that perceptions and beliefs of teachers are crucial for classroom practice and the integration of technology in classrooms. As indicated by Richardson (2003) teachers have deep rooted beliefs about teaching and learning which they obtain from their experience as students. Teacher education programmes have to challenge previous behaviours and influence new teachers to think critically about past experiences of schooling. Bai and Ertmer, (2008) show that an important goal of teacher education programmes is to help pre-service teachers identify and develop beliefs about teaching. It is hard to change perceptions and beliefs but not impossible and it is likely that these changes occur over time and after deep reflection and new experiences (Bai and Ertmer, 2008).

### 5.2.3 Accessibility Issues

The responses of the questionnaire show that all participants own a computer at home with access to internet. Student-teachers and the two university lecturers also have access to computers and internet at the University. Teachers differed, in that, from the fifteen teacher-respondents, only twelve (36%) teachers had computers in school even if this meant limited access. The remaining three (9%) teachers did not. Only six teachers (18% of respondents) out of the fifteen had computers in the HE room (five of whom were given specifically because of this project[85]. Two (6%) of these had internet access with the remaining thirteen not having access. Nine (27%) teachers said they had internet access at school. In total, the five teachers who said they had internet access in their room included: two lecturers (in office), one teacher working at a Seminar Centre

[84] First-order barriers (Ertmer, 1999) include lack of access to hardware and software, time, necessary support whereas second-order barriers are intrinsic to teachers and include teachers' belief systems about teaching and learning as well as their familiar teaching practices.

[85] These were distributed by the Education Division (ICT Department) to schools at random in order to support this project. Others could not get a computer in the room as the Director of Education though it was sufficient to have computers in labs in schools and that teachers should gain access to these even if just once a week.

and not in a classroom and only two teachers working in an HE room. Only two of these teachers were teaching the HE curriculum in the secondary schools. At the time of the project and from evidence gained from my visits to different schools all over Malta, it is probably safe to say that internet access was not available to teachers in the vast majority of HE rooms.

If teachers are to participate in online communities for professional development courses the necessary structures, resources, time and access must be provided in schools in order to avoid disconnectedness (Waltonen-Moore, Stuart, Newton, Oswald and Varonis, 2006). Three of the teachers who were given the computer in class because of this project were in fact amongst the most enthusiastic participants. One of these had never used ICT in class before and was one of the teachers who took up ICT following the ideas shared on the CoP. They stated that easy access to computers in the HE lab facilitated the use of ICT, albeit without internet connectivity. Two other teachers who were given a computer only accessed the site very rarely, which indicates a lack of engagement or other constraints.

This lack of accessibility at school and lack of time were the major barriers which impacted on this research and the extent of professional development. In fact, twenty-nine (88%) of the respondents stated that they accessed the CoP from home only, whereas only four, (12%) accessed it from both home or University, but this was likely as three of these were student-teachers and one was a lecturer[86]. Hardly any teachers claimed to have computers or internet access in staff rooms; hence a constraint which, as stated in the interviews, was a factor which effected participation on the CoP as teachers and student-teachers would have to find time to access it from home. One interviewee stated:

> *'I think the problem was for example that here in school we did not have internet access so that limited our access from school. The only internet we have is that in*

[86] At the University of Malta lecturers will have their own PC and internet connectivity in their office and student-teachers can access from the computer labs on campus.

*computer labs and these would be blocked/filtered extensively or used by the Maths people who hold their lessons there. It's not that easy for us to use it at school'.*

Access from school could have improved the level of participation and depth of reflection, hence more support and better facilities for teachers are necessary. The fact that two student-teachers declined[87] participation is a cause for concern in that the system is churning out teachers with these shortcomings and indicates that ICT integration must be addressed more effectively in our ITE programme.

The school day in Malta is relatively a short one and teachers may not have time at school to access even if the appropriate resources where available. Teachers leave school early afternoon[88] at the same time as the students and this may leave them with little time at school for preparation of lessons with ICT. With availability only from home, teachers claim the time for participation on the CoP would be restricted due to family commitments or logistical problems. However, considering that teachers work fewer hours than other workers and have significantly more holidays this cannot be looked at but as a lack of drive for continuous professional development.

### 5.2.4 Accessing the CoP Site

As indicated in the questionnaire, most participants preferred receiving the postings via email rather than accessing the site where twenty-nine respondents (87%) stated that they preferred receiving the discussions via email, although in another question, the respondents still showed that a substantial amount accessed the site. Twenty-five respondents (75%) accessed the site[89] whilst eight (24%) stated that they only read the emails received after a posting had been submitted on the CoP[90]. Significantly this

[87] These two student-teachers said they found difficulties in participation because they had a phobia for technological equipment including computers.
[88] This differs from school to school, but the school day in Malta ends at any time between 1pm and 3pm, with most state schools finishing between 1.45pm and 2.45pm.
[89] This does not show the frequency of accessing the site or show one's activity report.
[90] Moodle has a facility to relay messages or postings on the discussion forums direct into the participants' email accounts. Some participants could completely ignore the site and rely only on emails and hence may

shows that the participants would not reply possibly to stop short of accessing the site. This was evident through the interviews and specific statements made by the participants responding to forums on the site. One such example states: *'I am sorry for not participating so much but I do read all the emails.'* The other interviews showed this too and the reasons given were varied but were mostly indicating time as the detrimental factor. One particular student-teacher who was in the second year of the ITE programme during the first phase of this project stated that she did read all the emails and accessed the site but was not confident to contribute as she *'felt too new to the profession and preferred to leave the contributions to more experienced teachers'.* One has to question whether the mixed cohort of student-teachers with teachers may have hindered the discussions on the CoP. Nonetheless, the student-teachers in the interviews found this useful and felt they had a lot to learn from the experienced teachers had there been more knowledge sharing and construction.

As stated in the interviews, the participants would just read what there was rather than contribute. One participant stated, *'I think there were a lot of teachers who collaborated in this CoP. What I think however, is that some contributed more. I could have collaborated a bit more but since this was during my first year of teaching I had lots of things to prepare.'* The same participant stated that she could not respond to emails coming from the CoP when a sufficient number arrived in a short span of time. Another interviewee stated that due to work on her dissertation whilst the CoP activities were going on, she skimmed through the postings via email but then went back to them later in the summer through accessing the site.

Twenty-eight respondents (84%) said they looked forward to the weekly postings, particularly because they were interesting, exciting and a convenient way to keep up-to-date. Table 5 below shows all the reasons indicated.

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have simply read the postings without responding. It is only when one wishes to reply to the email that the site has to be accessed.

**Table 5**

**Reasons for Interest in Weekly Postings**

| REASONS | NUMBER OF RESPONDENTS | PERCENTAGE OF RESPONDENTS |
|---|---|---|
| Interesting and exciting | 11 | 33 |
| Updated and informed about HE and Nutrition | 7 | 21 |
| Great way to communicate with colleagues and get an idea of what other teachers are thinking | 5 | 15 |
| Widening knowledge and skills | 3 | 9 |
| Sharing of resources | 3 | 9 |
| Initiates new arguments | 2 | 6 |
| Good way to discuss with colleagues | 2 | 6 |
| Gives fresh ideas and something new to try in class | 2 | 6 |
| Answers to queries and clarification | 2 | 6 |
| Helps you think critically | 1 | 3 |
| Helps teachers change | 1 | 3 |
| To see how discussions would build up | 1 | 3 |
| Broadens views of ICT in Education | 1 | 3 |

### 5.2.5 Selection of what to read from the postings

Accessibility problems may have determined selection. In fact, nineteen (57%) of the respondents of the questionnaire stated that they selected what to read, whereas fourteen (42%) did not select. The criteria used for selection can be seen in the following table 6:

**Table 6**

**Criteria for selection of what postings to read**

| Criteria | Number of Respondents | Percentage number of respondents |
|---|---|---|
| Information or activities relevant to my needs and lessons | 7 | 21 |
| Those which interested me most | 6 | 18 |
| New readings | 2 | 6 |
| HE topics | 2 | 6 |
| Latest topics | 1 | 3 |
| ICT stuff | 1 | 3 |

One can note that the concern of teachers and student-teachers mainly lies with the content not with ICT integration. This lack of concern may be detrimental to the participation on the CoP as well as the take up of integration in class.

### 5.2.6 Rating one's Activity on the CoP

Communities of practice will have a range of interactions taking place amongst the diverse participants (Garrison and Anderson, 2003). According to (Salmon, 2002), the Open University states that online groups will have lurkers and those that drop out. None of the participants on the CoP dropped out even though most lurked. They were still gaining even if they were not contributing or, as stated by Wenger (1998), there may be low level participation but not low level learning. The CoP was useful even if the nature or amount of the discourse may have influenced the extent of professional development. From the interviewees it was evident that as a result of the CoP, teachers moved forward pedagogically, especially in relation to ICT, even if the usage is still familiar to existing practices. In this CoP none of the participants claimed to be leaders or innovators. Only four (12%) respondents felt they were active on the CoP, five (15%) claimed they were moderately active, whilst three (9%) said they were passive or lurking. Most of the respondents saw themselves as *'observers with little participation'*. Besides lack of time

and access, reasons given for this during the interviews included: inexperience, lack of confidence or knowledge. One interviewee stated:

> *'.....when I didn't participate it was because I was just thinking about the matter and may have not had an opinion about it and let others fill in what I didn't know. I was always there and following through email. The fact that we received most via email was convenient as you're always following without having to access the site.'*

### 5.2.7 Reasons Given For Type of Activity on the Site

Participants gave a number of reasons for their level of activity on the site and these data (in table 7) show that conditions for technology integration in schools were far from ideal. Despite different conditions in schools as found by Hunter (2001) states, I chose to give teachers professional development in ICT integration in full knowledge of the context of our local schools[91]. Dias (1999) and Hunter (2001) both state that technology integration should not be attempted unless resources and equipment are available. In order to help HE teachers start the long term process of transformation to effective ICT integration, I provided a start with examples of ICT activities which would still be operable in most situations.

[91] ICT resources and equipment vary from school to school. The situation is improving slowly with more investment from the state but facilities are still limited in most schools.

**Table 7**

**Reasons Given For Level of Activity**

| REASONS | NUMBER OF RESPONDENTS | PERCENTAGE OF RESPONDENTS |
|---|---|---|
| Too busy, could not access as much as desired | 11 | 33 |
| Answered and participated enough | 4 | 12 |
| Not on time to answer | 3 | 9 |
| Lacked the aptitude for ICT | 3 | 9 |
| Participated through giving feedback only | 2 | 6 |
| Participated only by viewing emails | 2 | 6 |
| Could not participate so much due to lack of access | 2 | 6 |
| Learnt a lot from teachers; too inexperienced to offer any contributions | 1 | 3 |
| Participants may not appreciate one's resources | 1 | 3 |
| Participated through asking questions | 1 | 3 |
| Not much online | 1 | 3 |
| Found it useful when on teaching practice | 1 | 3 |

Annetta et al (2008) state that a sizeable time and effort is required for substantial activity on a virtual environment. Barriers mentioned indicated time constraints, lack of accessibility at school, lack of confidence in submitting opinions and the effort required to participate in a hundred per cent virtual environment. Despite these barriers however, all the interviewees indicated that the CoP brought many teachers and student-teachers

together into an online community. Yet I feel they did not have the professionalism or the culture to use the CoP for self development.

### 5.2.8 Aptitude towards Computer Use

Most of the participants rated their aptitude towards computers as being 'quite confident'. Nineteen (57%) of the participants considered themselves as such, whereas a significant number: twelve (36%) considered themselves as 'very confident'. Two people (6%) were 'not very confident' and these included two teachers, one aged 55 years and the other 34 years. It is evident that seven student-teachers showed that they were 'very confident' users of computers and nine were 'quite confident'. One can conclude that only five teachers consider themselves 'very confident' and eight consider themselves as 'quite confident'. The two lecturers who responded to the questionnaire consider themselves as 'quite confident'.

Confident use of computers for personal use and productivity does not make teachers confident and effective users of technology in class. This was evident from the discussions and the interviews. Research (Dexter, Doering and Riedel, 2006) shows that teachers need to receive rich opportunities to learn to use technology in classrooms and to be able to plan and design learning environments and experiences to support teaching and learning. ICT is a relatively new addition to the formal curriculum and as a subject on its own tends to lack the weight of tradition associated with more established forms of knowledge (Burnett, Merchant and Myers, 2007). When integrated across the curriculum, teachers need to experience the role of ICT in other subject areas in order to be able to use it confidently to support, enhance or transform the curriculum (Burnett, Dickinson, Myers and Merchant, 2006) So whilst teachers may have the aptitude and basic skills to use computers and ICT, they may not have the ability to transform their pedagogic practices with ICT.

### 5.2.9 Attitude towards Technology

Attitudes are thought to drive a person's actions and behaviour (Richardson, 2003), and in technology these are meant to predict technology use (Bai and Ertmer, 2008), thus

playing a vital role. It is necessary to build positive attitudes towards effective technology integration (Bai and Ertmer, 2008) in all participants despite their diversities and differences. Hoadley and Kilner (2005) refer to the importance of having a clear purpose for coming together on an online community. Participants were asked to rate their attitude towards technology on a scale from one to five, one being the most comfortable. Their responses are recorded in tables 8 and 9 below.

**Table 8**

**Rating Of Attitude towards Technology In General**

| | Rating | Number of Respondents | Percentage of Respondents |
|---|---|---|---|
| Very Comfortable | 1 | 8 | 24% |
| | 2 | 14 | 42% |
| | 3 | 11 | 33% |
| | 4 | 0 | 0 |
| Very Uncomfortable | 5 | 0 | 0 |

The participants only differ in ratings between the 'very comfortable', 'comfortable' to 'semi-comfortable' attitudes. No-one is 'uncomfortable' or 'very uncomfortable'. This indicates they would be inclined to accept trials in the use of technology in class as can be seen in table 9 below. However, since not all the participants answered the questionnaire one can never be certain as to what attitudes the non-respondents have. Their lack of participation might be an indication of an indifferent attitude towards technology and therefore when tackling technology on the CoP one has to keep in mind the cohort is a diverse group.

**Table 9**

**Attitude towards Technology in Class**

| | Ratings | Number of Respondents | Percentage of Respondents |
|---|---|---|---|
| Very Comfortable | 1 | 8 | 24% |
| Comfortable | 2 | 13 | 39% |
| Moderately Comfortable | 3 | 11 | 33% |
| Uncomfortable | 4 | 0 | 0 |
| Very Uncomfortable | 5 | 1 | 3% |

As indicated in the literature, teachers may have positive attitudes but still not know how to integrate technology and so may never use ICT effectively. Attitudes alone are not enough to implement the innovation as stated by Rogers (2003) and in the previous chapter. The interviews indicated that the main barrier for a lack of usage in class was not negative attitudes towards technology but a lack of 'how-to' knowledge. Most teachers did not have an in-depth knowledge of ICT so their positive attitude does not reflect their knowledge or limitations. If teachers and student-teachers do not get to experience the full potential of educational technology through continuous professional development, one wonders if they will ever appreciate and integrate technology effectively.

The CoP helped form a more favourable attitude towards ICT as all the respondents (thirty-three, 100%) claimed this following participation. They were asked to specify what contributed to this during the activities on the online community, as can be seen in the results listed below in table 10. If teachers have favourable attitudes towards technology and the take up of ICT in teaching is not satisfactory, the reasons must go beyond awareness and principle knowledge or favourable attitudes. In agreement with Pearson (2003) one can state that there are common problems such as lack of time, school structures not being ideal, lack of team work and confidence levels besides a lack of

concrete ideas. Teachers in this study, particularly in the interviews claimed the need to observe and trial activities to experience technology integration in HE.

**Table 10**

**Reasons for Acquiring a Positive Attitude towards ICT From the CoP**

| Reasons | Number of Respondents | Percentage of Respondents |
|---|---|---|
| The sharing of resources and ideas was a big encouragement | 19 | 57% |
| Could see how resources are used in class | 5 | 15% |
| Learnt further | 5 | 15% |
| Positive feedback | 3 | 9% |
| Site was very user friendly | 3 | 9% |
| The encouragement received from the researcher | 3 | 9% |
| Computer in class which was given as a result of this online CoP was a big asset | 2 | 6% |
| Encouraged practice at home | 2 | 6% |
| Ability to share difficulties | 2 | 6% |
| Improved experience | 1 | 3% |
| Always had a positive attitude towards ICT | 1 | 3% |

This table shows what contributed to the favourable attitudes towards ICT and the principle reason was 'the sharing of ideas and resources'. This shows the dire need for concrete examples of how ICT can be integrated effectively by the teachers in their classroom practice. The participants in the interviews also showed that the sharing of ideas was one of the greatest assets they saw in the CoP. This can be confirmed by research (Sandholtz et al, 1991; Watson, 1993; Becker and Riel, 2000; Glazer and Hannafin, 2006) which indicates that there is better chance of integration where teachers group up in a team to share ideas and good practice, collaborate or co-operate. The

teachers and student-teachers who participated in the interview claimed to have been encouraged to use ICT in class because of the interactions on the CoP. One teacher stated: *'I felt better using ICT in class knowing I do not differ to others – we were all in the same boat I started using it more with less fear I think because of the CoP.'*

### 5.2.10 Level of Communication

The amount of communication which took place on the CoP was not consistent and therefore not satisfactory. Initially the discussion forums on ICT and nutrition were popular and participants interacted actively. The Nutrition Forum was quite active in the first two months and contained one hundred and forty-five postings in the first six months of the CoP.

Apart from specific tasks given to student-teachers[92], participation was only satisfactory in the Discussion 1A and Discussion 2. This was followed by another activity in which teachers and student-teachers were told to upload their good practice of ICT in class. Some of the above figures may include a number of postings by the same person and hence may not represent a wide spectrum of participants who could have contributed to professional discourse. What is more of a concern is that in this section where student-teachers were invited to share their good practice, only four uploaded a technological activity. Table 11 indicates the number of postings on each of the ICT-related discussion forums.

[92] This was the case when student-teachers were asked to contribute specific tasks as part of their work in the teacher training programme.

## Table 11

## Participation Level in ICT-Related Discussions on the CoP

| Discussion Number | Title of Discussion | My Postings | Participants' Postings |
|---|---|---|---|
| 1 | What Are My Feelings About ICT in the Classroom? | 1 | 1 |
| 1A | ICT Equipment in Schools | 6 | 14 |
| 2 | When Using ICT, is this Innovation better than what it replaces? | 14 | 25 |
| | Feedback Discussion on Homework Ideas | 1 | 0 |
| | Teachers' forum to share good practice of ICT in their teaching | 3 | 13 |
| | Student-teachers' forum to share good practice of ICT | 9 | 19 |
| 3 | Feeling Good About Innovation | 4 | 2 |
| 4 | Exploring ICT ideas: Get Comfortable with Innovation | 3 | 5 |
| | Explanation Prior to ICT Activity 9 – the Cereals interactive power point presentation | 3 | 9 |
| | Explanation Prior to the Problem-Solving Approach used in a power point presentation on Fats | 1 | 0 |
| 5 | ICT in Home Economics: Finding Suitable Methodologies | 2 | 1 |
| 6 | ICT in Online Teacher Professional Development | 1 | 0 |
| 7 | Finding an Online Medium which suits teachers best | 1 | 1 |
| 8 | ICT Matters! | 8 | 1 |
| 9 | Internet Projects | 1 | 0 |
| | 3rd year student-teachers' assignments –sharing of ideas (work from a unit on IT in HE, hence this was enforced) | 3 | 13 |
| | 4th year student-teachers' assignments – sharing of ideas (work from a unit on IT in HE, hence this was enforced) | 1 | 5 pairs |
| | 4th year student-teachers' assignments – sharing of digital stories (enforced) | 1 | 12 |
| 10 | Getting Acquainted with the tools on the internet | 1 | 0 |
| | Discussion 5 uploaded again to continue discussion at the start of new scholastic year | 1 | 0 |
| 11 | Exploring the Net: Google Online Tools | 1 | 0 |
| 12 | Exploring the Net: Google Blogs in Education | 1 | 0 |

The lack of feedback slowed down and influenced the whole process of integration, the progress and content-structure on the CoP. When asked about participation on the CoP, one interviewee stated: *'When I did participate it was because I had different ideas and so I would write. Sometimes it was to ask questions or just contribute a point of view.* This shows that participants refrained from contributing when thoughts were similar to what was being posted. It was when opinions differed that the above person chose to participate although opinions may not have differed extensively. The fact that participants found the email method of communication more convenient may have hindered communication and access on the site itself. This indicates that material on the site which was not delivered via email may have not been seen by some participants.

A more positive picture was received through the interviews, showing the CoP was a useful tool and a successful medium for professional development in relation to awareness of ICT and raising confidence and motivation to use ICT in class. The interviewees found the CoP useful because it gave them new ideas of how to use ICT in HE and how to use it as a pedagogic practice. As one student-teacher stated:

> *'We've seen that as teachers we should use new pedagogies to pass on our messages and not just use charts and things like that. We've seen that if we want to use PowerPoint we can add video clips and make it more effective and we can use music too. I saw how to use other forms of PowerPoint too. For me even using Moodle was a first. It's a new online application for me. I feel more equipped now to teach with ICT. I feel more technical and have a feel of how to organise myself now even in schools. The CoP helped me become more aware of ICT and gain ideas.'*

Thus the CoP contributed to the professional growth of teachers, helping in exposing new ways of using ICT in class thereby supporting improvements in classroom practice. Teachers may be convinced about the value of ICT intellectually but first or second order barriers may be hindering more improvement of practice in class as stated by Ertmer (2005) and as discussed elsewhere in this thesis.

# MISSING PAGE

### 5.3.1 Knowledge Dissemination to the Participants

Following the CoP intervention, participants gained awareness knowledge and stated they felt they knew how to use the computer in class as twenty-four (72%) claimed this whereas eight (24%) claimed they can 'somewhat' use the computer in class and only one (3%) answered negatively, but this was because this respondent was not teaching at secondary level at this point in time. Table 12 shows the reasons which the teachers gave as to why they feel they know how to use ICT better in class, all being confirmed by similar responses in the interviews. One stated she started to use the ICT activities she had prepared for her course assignments, another stated the knowledge she obtained diminished the fear she had for using technology in class and another stated that although the CoP raised awareness it was difficult to put into practice as the lack of resources at school was the main barrier.

The participants found the forums and notes on ICT informative, thereby giving them the principle and awareness knowledge about technology. The ICT activities and ideas shared by other participants gave them the 'how-to' knowledge and helped remove some of the unknowns teachers may have had. Two examples which were mentioned by each interviewee were the PowerPoint presentations which were designed specifically to bring in the interaction of the students and the digital stories. Passey (2006) indicates that teachers need to now how to use a range of technologies available in order to support the learning processes. They need to become acquainted with new methods in order to gain an understanding of technological tools in educational practices (Alimisis, 2007). The teachers in the interview mentioned that all the activities demonstrated how ICT could work; how it should be used effectively and how to maximise on its benefits in classroom practice. One can confirm that the CoP was successful in disseminating knowledge through the questionnaires.

**Table 12**

**Reasons for Improved Knowledge of ICT Use in Class**

| Reasons | Number of Respondents | Percentage of Respondents |
|---|---|---|
| Confidence has been raised through practice | 8 | 24 |
| There were suitable ICT ideas and resources for classroom purposes. | 8 | 24 |
| Can understand better how to use ICT | 8 | 24 |
| Opportunity to try out what other people have shared | 6 | 18 |
| More aware of other schools and teachers using ICT | 6 | 18 |
| Improved knowledge of adaptation of ICT resources | 3 | 9 |
| Stimulated the use of ICT | 3 | 9 |
| Learnt to use CoP - an medium was innovative | 2 | 6 |
| The lack of resources creates difficulties | 2 | 6 |
| Updated ICT skills | 1 | 3 |
| Gained more interest | 1 | 3 |

Thirty-two (96%) respondents claimed that they felt a need for this innovation, whilst only one (3%) respondents differed. The ICT activities were relevant to the teaching for twenty-eight (84%) of the respondents, as in table 13 below and five (15%) said they were 'somewhat relevant', because they had no computers in class or were not yet teaching.

**Table 13**

**Reasons for Relevance of the ICT Activities to Teaching**

| Reasons | Number of Respondents | Percentage of Respondents |
|---|---|---|
| New and enhanced ideas which were fresh and useful | 14 | 42% |
| To be motivated to produce better lessons | 10 | 30% |
| Helps students in the leaning process | 6 | 18% |
| Provided assistance in ICT use | 3 | 9% |
| To express and share opinions on teaching | 2 | 6% |
| Enhance teaching during teaching practice | 1 | 3% |

One individual who also claimed the activities were 'somewhat relevant' had a fear for computers, but was still positive in his remarks when he said that *'the ICT activities help greatly in motivating students as they will be interesting'*. The significant question emerging from this, is how we can expect individuals like these to integrate technology in their own classroom practice? This strengthens the need for long term online communities to support and instil more confidence and motivation in teachers to use ICT.

### 5.3.2 Increasing Motivation to Use ICT

All the thirty-three (100%) respondents thought that ICT makes a difference in class, this being encouraged by the increased motivation in students. One particular student-teacher whose dissertation was a comparison between an ICT and a non ICT lesson, stated:

> *'Indeed it was evident that a majority of students feel that ICT does help to improve their motivation. Thus if students are more motivated, they have a greater chance to understand and comprehend what is being explained during the lesson'.*

This response was echoed by other respondents too. Reasons given by respondents included the familiarity students have with technology and that they perceive it as fun and it increases participation and better understanding because of more visual representations. They also said ICT is an innovative, interactive and creative resource, it raises interest, sustains attention and is different to traditional lessons. Another respondent said that:

> *'ICT engages the students more in doing the activities prepared as well as capture their interest. It is more motivating and makes the lessons more interesting and enjoyable'.*

One respondent stated that students are expecting teachers to use this innovative method, whilst another said that students prefer ICT because it is different and another claimed that ICT should be today's technology in schools because the world is dominated by the computer. She felt that it would also inject new professional approaches to teaching and it is also flexible and provides a broad range of learning activities. Schools must create the necessary structures and essential conditions which will resolve the fundamental obstacles which hinder technology integration (Hunter, 2001). This was evident from the interviews in which the teachers said they would like the CoP to go on as they felt they need ongoing support in knowledge of ICT and application of this resource in the curriculum.

The new familiarity and confidence increased the motivation to include ICT in the participants' teaching. One participant stated in the interview,

> *'Since I was a beginning teacher I had a lot of fresh ideas, however, in terms of ICT the CoP helped me much more. I started to feel more familiar and confident with ICT and it (the CoP) gave me new ways of how I could enhance motivation in my lessons and try new things. Although I had new ideas, most of them were not with ICT.'*

During the interview I explained the theoretical framework which helped structure the professional development exercise in this CoP to the interviewees and one stated that,

*'The CoP helped me pass the persuasion stage as it persuaded me to use ICT in the class and now having trialled some of the activities, I can say that in the future I will add more lessons using ICT to my curriculum. It has become one of my aims to use ICT now. The CoP helped in this cause I could observe. Those were the instances when I was persuaded and even thought I was still a student then, these observations made me put ICT as one of my aims.....even though there were a few instances when teachers replied.'*

This teacher is showing that participants may not have had enough commitment to interact but did benefit through lurking. Another interviewee who was a student-teacher claimed:

*'I used ICT much more this year to last year in my teaching practice. I was still limited on resources but I did increase. I feel more confident and motivated because the CoP was not only good in the sharing of ICT resources but also in other discussions which were really interesting. I learnt a lot. The CoP has helped me in showing me how I should use ICT as it's easy to say: yes I am going to use ICT but then, how can I use it in First Aid for example. We have First Aid equipment in school, but then I saw the digital stories on First Aid and so this gave me an idea of how I can use ICT on that particular topic.....I want to advance and now I want to do advanced ECDL and Photoshop and all that is possible to advance. This will help me create more resources for my students.'*

Similar responses came from other respondents further indicating that the CoP managed to instil motivation for ICT use in class as an effective pedagogy whilst indicating a need for more ideas to enhance use. The CoP itself may be creating a need for the participants to learn more about the 'how-to' knowledge in ICT for classroom use. Rogers (2003) states that an individual may have a need or interest in an innovation or the knowledge of the innovation may itself create the need.

### 5.3.3 ICT Awareness-Knowledge

When testing the participants' knowledge of computers it seems that participants feel quite confident of the awareness knowledge of ICT as well as in using the computer. Table 14 below shows the participants' perception of the awareness-knowledge gained.

**Table 14**

**ICT Awareness-Knowledge amongst Respondents**

| | Rating | Number of Respondents | Percentage of Respondents |
|---|---|---|---|
| Confident | 1 | 7 | 21% |
| | 2 | 17 | 51% |
| | 3 | 7 | 21% |
| | 4 | 2 | 6% |
| Not Confident | 5 | 0 | 0 |

Table 15 shows how the participants rate their degree of 'how-to' knowledge in ICT usage in the HE curriculum.

**Table 15**

**Rating Oneself in 'How-To' Knowledge**

| | Rating | Number of Respondents | Percentage of Respondents |
|---|---|---|---|
| Confident | 1 | 3 | 9% |
| | 2 | 20 | 60% |
| | 3 | 7 | 21% |
| | 4 | 3 | 9% |
| Not confident | 5 | 0 | 0 |

Rogers' (2003) model for a diffusion of innovation highlights the need for specific and concrete ideas of how to use the innovation in practice. Out of the thirty-three respondents of the questionnaire, thirty (90%) agreed that they felt they had reached an adequate level of 'how-to' knowledge following their experience on the CoP. The lack of complexity in the ICT ideas suggested was encouraging the teachers to use ICT. The responses on the questionnaires and interviews indicate that usage was not adequate and

indicate that the quality of technology integration is still at the level of using PowerPoint presentations, DVD, video clips, music and websites.

As Cuban (2001) states, teachers are just coping with the new demands of ICT integration and sustainability and as in this study, it is felt that the usage is of a low level of ICT. The ICT ideas disseminated were purposely planned to extend ICT use further to a more student-centred approach. When asked if the teachers felt their 'how-to' knowledge of ICT in class had improved following the experience on the CoP, twenty-four (72%) respondents replied positively, eight (24%) felt 'somewhat better', whereas one (3%) said no because as she stated: *'No, as I have never used ICT in class yet.'* Table 16 shows replies given in the questionnaire[93] when participants were asked why they felt better at using ICT in class following the knowledge disseminated on the CoP.

**Table 16**

**Reasons why teachers feel better at using ICT in class following the CoP experience**

| Reason | Number of Respondents | Percentage number of respondents |
|---|---|---|
| Confidence has been raised through practice | 8 | 24 |
| Suitable ICT resources and numerous ideas for the class | 8 | 24 |
| Understood how to use ICT better | 8 | 24 |
| Observing and trialling what others have shared | 6 | 18 |
| More aware of what teachers in other schools are using ICT | 6 | 18 |
| Experienced how to adapt ICT resources better | 3 | 9 |
| Stimulated the use of ICT | 3 | 9 |
| Lack of resources was a difficulty | 2 | 6 |
| CoP was stimulating and innovative | 2 | 6 |
| Updating of ICT skills | 1 | 3 |
| Gained more interest | 1 | 3 |

[93] Teachers and student-teachers could give more than one answer in this qualitative type question.

The responses show an improved perception and knowledge of how to use ICT together with positive experiences of ICT usage, sharing and observation. One interviewee, however, showed a specific need for face-to-face meetings where hands-on workshops with ICT tools could have provided a better experience. These types of meetings always create logistical difficulties for many teachers when done after school hours and are often avoided.

Professional development in technology needs to help transform teachers from familiar practices towards ones which require more skills and pedagogic innovation. Teachers need to primarily adopt technology in accordance with their existing practice to ease the process of change whilst new technology is introduced (Cogill, 2003), similarly indicated by Rogers (2003) as the need for compatibility between an old practice and an innovation. I feel there is the need for focused practice on effective technology use in one's own subject in order for teachers to maximise the benefits of ICT. Cogill (2003) states that teachers will initially find technology use intimidating and indicates the need of a structured process which engages the teachers in a commitment to shift pedagogically from traditional approaches to emphasis on the involvement of the learners.

### 5.3.4 Effect of the CoP on Technology Integration

In the questionnaire, the participants were asked if they had previously felt the need to introduce technology into teaching and thirty-two (96%) stated that they did, whilst one (3%) replied in the negative. This indicated a very positive attitude towards ICT by these respondents and the take up should therefore be easier. The teachers who were interviewed indicated they were keen to learn more bearing in mind they knew very little about ICT in HE. They showed that the CoP increased their self-confidence in the use of ICT and encouraged them to use ICT more effectively, also preparing them ahead of time for the ICT resources which would afterwards be installed in the HE rooms. One teacher said,

> *'The CoP helped to keep us abreast with the use of ICT in teaching. Now we'll soon have interactive whiteboards set up and we can use the information that was*

*given to us on the CoP in order to operate this very good tool. My sister has been using the interactive whiteboard in England for quite a few years now and she says it is a very good tool.'*[94]

The teachers also showed that the CoP and specifically the ICT activities helped them reflect and also progress from knowledge to persuasion stage and then to decision-making. Although the teachers did not interact much, the responses in the interviews and questionnaire showed that they were reflecting and progressing. During this stage the teachers confirmed that they were choosing what was most appropriate for them and what to adopt. All the interviewees confirmed the acceptance of ICT and felt they were in the implementation stage as they were using some ICT in class yet needed more knowledge and ongoing training.

The respondents of the questionnaire found that the ideas on the CoP raised awareness towards a range of desirable ICT innovations. Table 17 follows to explain the responses.

**Table 17**

**Raising an Awareness for Desirable ICT ideas in the HE Classroom**

| | Ratings | Number of Respondents | Percentage of Respondents |
|---|---|---|---|
| Very Much | 1 | 6 | 18% |
| | 2 | 12 | 36% |
| | 3 | 11 | 33% |
| | 4 | 2 | 6% |
| Not at all | 5 | 0 | 0 |

The interviews showed that teachers found the awareness-raising exercise on the CoP was beneficial and raised confidence levels. They stated that prior to the study, ICT usage in class was low and merely an add-on. The CoP helped the teachers remove fears towards ICT use in class whilst gaining ideas on effective usage. As one teacher stated,

[94] Appendix 10 shows that one of the notes given was on the interactive whiteboard on the CoP.

the CoP gave the teachers ideas, suggestions, direction and ways of organising ICT activities in a lesson. One interviewee claimed that she had never used ICT in class before and the CoP gave her an awareness and knowledge through the suggestions and concrete ideas. Another interviewee stated that participation on the CoP encouraged her to make use of the assignments she had done involving ICT as a resource, whilst following the ITE programme. These were previously standing idle. She stated that on the CoP teachers were being asked to trial the ICT activities in class and thus she started to use her own. One teacher stated that following the experience on the CoP, she is now aware that ICT helps in class and her recent experience has shown her that ICT helps students of a low ability.

The interviews also indicate that the CoP helped in the 'how-to' knowledge. One teacher stated that she did not think that ICT would work in class, yet when she trialled it out after her experience on the CoP, she thought differently. Another teacher said the sharing of ideas showed her that other teachers were trialling ICT and this gave her ideas and reduced fear. A significant comment was that even though this particular teacher was familiar with ICT skills, this experience showed her how ICT could be *'integrated into the curriculum and put into practice'*. Another teacher stated, *'the CoP widened my knowledge in ICT as I had a very basic knowledge previously. I learnt a lot and am now using ICT in my lessons. I am not young in years and new to ICT so this was a real help for me'*. The CoP was a good start for the integration of ICT in class and all the participants felt better equipped to teach with ICT, having expressed a marked improvement.

This confirms research by the NCET (1994) that ICT has benefits for the learning experience and teachers in this study were experiencing this through the trialling that they may have been doing in their own classrooms. This means that they were confirming the research through their own trials. All this indicates that support is needed from subject specialists who are knowledgeable in subject content and methodologies and technology innovations. As Dexter, Doering and Riedel (2006) indicate, there is the need to help pre-service teachers understand how to flexibly incorporate new technology resources

into their knowledge of a content-area in ways that enhance learning. Their study involved a college-wide support model which focused on taking a content-area specific view of technology integration through a faculty wide approach. In my study, had schools been involved as a whole in the project, this may have improved the effectiveness of the innovation integration.

Online communities too need to be slowly embedded into a teacher's culture or mentality. Technology integration will take time to reach full adoption where technology will be used intelligently to create higher order learning experiences. Teaching is still a solo pursuit and renewed teaching relies on generating new ideas and examining one's own practices (Vavasseur and MacGregor, 2008). Thus online communities can offer the long term flexible medium which could bring about this reflective practice and offer peer mentoring and collaboration to improve practices. Vavasseur and MacGregor (2008) state that teaming allows teachers with common daily planning times to collaborate and grow professionally.

### 5.3.5 Application of ICT in HE

Teachers, especially those at the beginning of their career, often find themselves overburdened with high workloads and teaching classes for which they are totally unprepared (Herrington, Herrington, Kervin and Ferry, 2006), whilst being faced with many pressures to implement instructional reform which requires new knowledge and skills (Vavasseur and MacGregor, 2008). From my research here it is clear that teachers are only just becoming aware of what ICT integration and lack the ideas for use in class. It is not easy for teachers to create pedagogies with ICT and immerse these within the subject syllabus and hence they cannot transform their pedagogic practices into ones which will suitably integrate technology effectively.

> *'The problem with transformation is that it always seems out of reach, conceptually far removed from the everyday classroom realities of forming relationships with pupils, organising learning and teaching, managing behaviour and so on.'* (Burnett et al, 2006)

Burnett et al. (2006) identified two contrasting paradigms which characterise the current UK curriculum policy, one based on the idea that new technology will 'transform' pedagogy in the future and the other based on the assumption that it can 'enrich' what is already taking place. Hence, as the authors imply, the difference is between radical changes or just enrichment which will only involve some new equipment and appropriate re-training. In my research it seems that without support the teachers are not capable of transforming pedagogic practices. It is as if there is a complete ignorance or lack of awareness due to inappropriate training which is inhibiting effective use of ICT in HE classrooms.

## 5.4 THE TEACHERS' STAGES OF DEVELOPMENT ACCORDING TO ROGERS' (2003) FRAMEWORK

Most of the teachers interviewed said they were simultaneously at different levels of development in the innovation-decision process. Teachers come to teaching with ICT at different rates of adoption and readiness. As indicated in the literature review, teachers can be at different stages along the process of diffusion, gaining knowledge, being persuaded to use it, deciding to adopt it, implementing it and eventually confirming it. The excerpts below from different interviews show these differences. Teachers seem to acknowledge that technology is vast and daunting, since most stated that they need more knowledge and training whilst at the same time trialling and implementing. This might have had implications regarding the amount of interaction of the participants on the CoP. Teachers may have not felt confident enough to comment on the CoP and to give feedback because of this lack of compatibility between the participants, although it did not seem apparent that there was this feeling.

> 1) *'I am in two stages in this innovation process. I need more 'how-to' knowledge in some aspects of technology integration, but I want to implement ICT with the students as I found it really works. The CoP gave me a lot of knowledge which managed to persuade me to use ICT in class'.*
>
> 2) *'I could be in the implementation stage but I feel I need more training. I think the CoP was effective in giving me more knowledge. It would have been more*

*effective had more teachers met together in hands on activities. The CoP did persuade me to use ICT as there were a lot of fresh ideas'.*

3) *'I am definitely in the implementation stage. I tried ICT following the knowledge and suggestions shared on the CoP. I had a good response from the students and so was persuaded to use ICT. I use PowerPoint presentations and technology for notes distribution and for information searching and use it for reinforcement as an add-on.'*

These responses indicate that technology cannot be integrated overnight. Teachers take time and can be at different stages. Some teachers are still at a basic stage of technology use in class. Technology integration[95] is a multi-level process. As seen from the above, the technology integration experienced in the CoP is only part of a much longer process. It is positive for this teacher who is one of the oldest teachers on the CoP and had never used a computer before, to state that she is implementing technology in class, even if still at a basic level. It shows that there is a start but the need to be guided and supported into making better use of technology and extending their activities so as to maximise on as many benefits of ICT as possible.

The fourth teacher that was interviewed was a student-teacher during the first phase of this project. She has since been teaching for a year and stated,

*'I think I am trying to implement. I think confirmation still has to come because the lack of resources in the school hindered me from integrating technology. The CoP was effective in giving knowledge and especially in getting teachers together. I was definitely persuaded to use ICT in class and now, after having trialled some of the activities I can say that in the future I will add more lessons using ICT. The CoP made a difference because it has become an aim for me to use ICT'.*

The next interviewee, also a student-teacher stated:

*'I feel I am in the knowledge phase for a few years as there is a lot to learn, but I am in the adoption stage of those activities I have managed to trial out in my teaching practice. The CoP was effective not only in the knowledge that was passed on to us but also because it showed us how. I found this very useful and user friendly.'*

[95] Effective uses of technology by teachers and students in education

This reinforces the relevance of the 'how-to' knowledge in the teachers' subject area. As indentified in the literature (Becker and Riel, 2000) collaboration and professional engagement with other teachers helps them teach in different ways to those with only minimal professional contact. Collaboration facilitates technology integration as teachers benefit from knowledge-building learning communities where the teachers share ideas and build on each other's knowledge. (Carney, 1998).

The final interviewee who was a student-teacher too, stated,

> *'The CoP persuaded me to use ICT and therefore I made more use of it during my teaching practice. There are many advantages when using ICT in class'.*

One student-teacher in the interview claimed that she preferred to observe rather than contribute as she felt she lacked teaching experience. Online communities of practice need to be spread over a long period of time as this will give participants time to acquire enough knowledge and move in to the central part of the community, thus moving from novice member to a more experienced one. This is what Lave and Wenger (1991) term 'legitimate peripheral participation' in which participants have different roles depending on their level of participation or position on the community of practice.

## 5.5 CLASSROOM PRACTICE AND ICT

### 5.5.1 Adoption of ICT as A Teaching Method in Class

According to Sandholtz et al (1997), teachers move from the entry into the adoption phase when they show more concern about the use of ICT in the daily lesson plans. The classroom is still organised in a traditional lecture manner. In class students are encouraged to use technology for drill-and-practice activities, word processing and computer-assisted instruction (Dias, 1999). Twenty-five (75%) of the respondents of the questionnaire stated that they adopted ICT as a teaching method in class whereas seven (21%) said they had not and one (3%) did not answer. The explanations given from those that did not adopt ICT show that five (15%) found it difficult to integrate ICT due to lack

of resources and equipment in school. One (3%) found it difficult to include ICT in nutrition even though there were numerous examples shared on the CoP. This could be because the topics covered on the CoP were not in sync with what was needed for this teacher at that point in time. It could also be that this teacher requires more time to accept ICT to enrich or transform the pedagogic practices she utilises. One (3%) other was a student-teacher and another one (3%) had only just graduated. Adoption of ICT in this case includes basic PowerPoint presentations, video clips, searches for information on websites and use of CD-ROMs mostly, hence used as a tool similar to traditional practices and not transforming pedagogically.

Notwithstanding the seven respondents who stated they had not adopted ICT, there was a satisfactory take up by the rest of the respondents of ICT. One still has to maintain a contact with teachers in order to act as a catalyst in technology integration and assist teachers to progress from one phase of integration to another until they are ready to go through the process independently. Teachers have to realise that once the innovation diffusion project is over they will have to maintain the cyclical reflection process.

Teachers found the observations inspiring. The interviews show that the teachers were using what was shared on the CoP and were encouraged even further when other teachers trialled the activities out. Most also said that they took ideas and adapted them according to the students' needs or to be appropriate for the topic. One interviewee stated, *'I did observe and then would reflect and choose according to my needs and the students I had. It also depends on the syllabus'.*

In Sandholtz et al's (1997) study, the five stages of technology integration each have a particular pattern of change and support requirements. Following the entry stage and adoption, teachers learn to adapt and then reach a stage of appropriation before coming to the final stage – invention. During this first phase of the project I attempted to take teachers from the entry stage to adoption whilst still focusing Rogers' (2003) model. Through the use of the two models teachers were given the necessary opportunity to

share experiences and build on activities together through the time allotted for trialling, observation and feedback.

There are varying degrees of adoption within the much wider process of technology integration. Exposure, sharing, collaboration, online communities and hands on activities will all provide the necessary support and stimulus to give teachers the experience in technology and how this can be adapted to their subject content and methodologies. The respondents of the questionnaire claimed to have achieved a 'confident adoption' (fourteen respondents or 42%) or 'partial adoption' (sixteen respondents or 48%). None claimed to be reluctant or have rejected ICT. Three (9%) did not answer.

From the interviews it was evident that in certain aspects of integration and with a limited type of ICT activities they had reached what Sandholtz et al., (1997) would term the adaptation stage. During this stage teachers begin to develop their own strategies for the effective use of ICT in class. All the teachers interviewed stated that the ICT activities shared on the CoP were useful and proved to be a good prototype for technology integration in other topics. One example was when I shared a PowerPoint presentation which was purposely designed to involve students, reach different abilities and give tasks such as quizzes for consolidation. Teachers found this to be a good example which they then adapted for different topics. It is through examples such as these that teachers will take up technology in ways which will enrich practice. Hence the retraining of teachers to teach with ICT must be done in association with subject-specific content knowledge.

Sandholtz et al (1997) claim that adaptation of technology is demonstrated when students start to use computer-assisted instruction packages for 30-40% of the lesson time. The students need to be central to the learning experience where productivity and involvement is central. Thus a flexible schedule should be planned to permit such a methodology. The teachers participating in this CoP do not appear to be at this stage. They are not yet aware that technology integration means more flexibility in the classroom arrangement, the lesson plans and a constructive learning approach. The activities on the CoP were aimed at guiding the teachers to reach this stage. Alternative pedagogies were introduced

and discussed. The HE participants have favourable attitudes towards ICT use in class and understand technology's usefulness, however, maximising ICT through the use of project-based instruction, collaboration and co-operation and creative student-driven schedules is still to be grasped. This wider perspective of technology integration is the reason why I continued contributing on the CoP beyond the six months.

### 5.5.2 The Understanding of Technology Integration

The data from the interviews showed that teachers have not conceptualised technology integration and have not made the pedagogical shift where teachers not only maximise on ICT but invent and create new methodologies with technology to extend the curriculum and engage students. None of the interviewees could give a good explanation of what technology integration is. As Dias (1999 p.11) states, *'teachers are often expected to teach with technology without having a working definition of the concept'*. The most encouraging reply from one of the interviewees was the following:

> *'Technology integration is including the computer and IT resources in your lessons and students have more opportunities for hands on rather than just teacher talk. They're involved!'*

Other replies indicated misconceptions about technology integration. Besides stating that she wants to use more ICT with other schools, one teacher stated that she integrated more with teachers on the CoP than at school on issues regarding ICT in class. Two interviewees stated they were uncertain and so gave examples instead. The examples as stated by the teachers were, *'I used a PowerPoint presentation in class for a general overview and then show them some realia'*. Another example was, *'it is different ways....emm...using technology to help different abilities. You integrate technology to integrate more people'*.

### 5.5.3 Trialling of the ICT Activities

Trialling or experimenting with the innovation is one of the attributes which Rogers' (2003) states are important for the uptake of an innovation. New ideas that can be trialled are generally adopted more rapidly than innovations that are not (Rogers, 2003).

Trialling gives the individual the possibility of experiencing the innovation and to find out how it works under one's own conditions. The easier the innovation is to trial, the faster is the rate of adoption (Rogers, 2003). Adoption also fluctuates according to personalities and attitudes towards the innovation. Being a totally voluntary online community was a disadvantage especially because no professional awards were accredited as a result of participation. This may have given rise to a lack of interest or commitment to trial the activities and return with feedback. One could only tell from the questionnaire and interviews that there was an element of trialling which differed amongst the participants. As stated in the interviews some reflected upon the activity being suggested and then customised it more closely to one's own teaching needs. As Rogers (2003) states, an innovation may be changed during its trial.

Twenty (60%) said they had used ICT in class before whereas thirteen (39%) had not. Out of the twenty who said they had used ICT in class before, sixteen said they had used PowerPoint presentations, ten made use of the internet, five made use of a CD-Rom, four made use of a DVD or video, another four made use of ICT for homework purposes and/or gave students a PowerPoint presentation to do. Three used software, two used interactive games and one made use of a music clip. Another made use of vox pops and another used slides. It is positive to see that there is usage of ICT amongst some of the participants. It is difficult to say whether others who did not respond did make use of any technology in class. Technology may be enriching these classrooms but it is not transforming them and is therefore being underutilised.

In the questionnaire, the respondents indicated that the ICT activities preferred or trialled from the CoP were the PowerPoint presentations. Both student-teachers and teachers identified the presentation on cereals; the one on diet-related disorders and one on fats as the most trialled activities, all three being PowerPoint presentations. Teachers seem to have adopted PowerPoint presentations much faster than other technologies by far. This may because PowerPoint is a complete presentation tool which is compatible with teachers' day-to-day presentation methods. PowerPoint can make the lesson more visual and stimulating and replaces a teacher's charts, overhead transparencies, slides or realia.

It is user friendly, easy to create and merges well with the subject content of any area. Teachers may not have adopted other forms of technology as these require a pedagogic and paradigm shift. When a particular kind of software is purchased, its underlying educational philosophy and pedagogies need to be understood and put into practice. Thus the software requires a learning and familiarisation period and then needs to be adapted to the content syllabus and methodology. This needs a paradigm shift, whereas PowerPoint does not.

Websites were almost as popular as PowerPoint presentations amongst the teachers as they are easy to use as a visual add-on to a lesson or to search for information. Thus teachers have found sites accessible and convenient as students are also familiar to these sites. For many teachers this is teaching with technology and in fact quite a few of them suggested useful websites. This low level use of technology further supports that training and hands on experience with subject specialists and technology integrationists is necessary to help teachers transform practices.

Other activities or materials adopted from the CoP by the student-teachers were video clips on food and practical sessions, games, music clips, handouts and information. The teachers mentioned trialling a presentation to help students through their investigative course work, activities for use with the vitamins and minerals topic, interactive CD-ROMs which I had advised them to buy, articles, information and new research, music clips, quizzes and puzzles.

Only three teachers (9%) said they encountered problems when trialling whereas twenty-one (63%) said there were no problems. Two student-teachers, two lecturers and an HE teacher who works in a seminar centre said this question was not applicable to them, although ideas and material were taken. Three teachers who claimed the same mentioned that it was due to lack of resources and equipment. One student-teacher stated she had made use of the interactive PowerPoint presentation on cereals but had to print the slides as she did not have a computer and projector in class.

Teachers listed logistical reasons, lack of equipment in HE room, lack of support and a feeling of great responsibility when using such equipment as the barriers to trialling the activities.

### 5.5.4 Teacher Perceptions of ICT in Class

The participants listed a number of advantages and disadvantages associated with the use of ICT in class, as outlined in table 18.

**Table 18**

**Advantages and Disadvantages associated with the use of ICT in class for teachers**

| Advantages | Disadvantages |
|---|---|
| Motivates students in class | Time required for preparation |
| Captures and maintains students' attention | Lack of accessibility |
| Visual and stimulating | Logistical problems |
| Helps students understand more | Lack of technical support |
| Students more keen to work and participate | Lack of resources |
| Teaching and learning is more creative and innovative | Fear of not covering syllabus if one uses innovative pedagogies |
| Excellent means to reinforce content knowledge | The need for preparation time |
| Students love ICT and show enthusiasm | The possibility of technical problems or power failure |
| Helps students of all abilities | Disciplinary problems may arise |
| Offers opportunities for a variety of pedagogies | ICT may not be appropriate for all students or topics |
| | Will be a time waster if not planned well |

Student-teachers also provided a substantial list of advantages and disadvantages despite their limited experience. This information could thus be a reflection of how they see ICT working in class for them personally, either as students or when on teaching practice. Besides motivation, student-teachers saw ICT as being more visual, colourful and dramatic whilst being an excellent tool to maintain students' attention span, reinforce content and enhance lessons. Like teachers, student-teachers also mentioned that ICT in class is a pedagogic practice which students love and show a lot of enthusiasm for since it provides for an interactive experience which facilitates learning. It raises level of interest

and enthusiasm for work, makes teaching more creative, fun, interesting and innovative and is easy to use and stimulating. Students claim ICT is environmentally friendly as fewer charts need to be produced. Student-teachers claim that teachers can do a vast range of activities with ICT and move away from chalk and talk lessons whilst claiming that ICT can provide differentiated resources making lessons appropriate for all abilities. Finally, student-teachers also mentioned that with ICT, learning can go on at home where technology is available.

Student-teachers also saw ICT as time consuming when searching for information and appropriate software and felt that it could be expensive. Two problems faced by HE teachers are a lack or inappropriate software and a lack of support from agencies such as BECTA. Teachers also claimed that HE rooms are not adequately set up for ICT and in turn suggested that ICT would be a waste of time if not used efficiently to obtain specific learning outcomes.

Overall, this shows that both teachers and student-teachers feel that ICT improves the classroom experience and has many benefits. During the interviews, teachers had positive comments towards the CoP stating that it helped in encouraging and motivating them to use ICT and new pedagogies in class. One teacher said,

> *'I had lesson plans prepared but changed them to include something innovative like a DVD or online videos which I have found to be very effective. I think that because of the CoP many teachers were trying to use ICT. The CoP promoted new pedagogies and my colleagues and I used to take a lot of ideas from it. I also shared a lot with other colleagues in my school who were not participants of this CoP. It made me try a lot of things'.*

This comment was echoed by another teacher who also said the ideas on the CoP inspired her to change her lesson plans to include ICT. One teacher claimed that a PowerPoint presentation which I had shared was so effective that students asked to have a copy of it for revision purposes at home, thus extending the use of ICT. Another said that since lessons in HE are double the time of a typical lesson, ICT helps to make the lessons more

stimulating and less boring. The third teacher who was interviewed who was older than the rest, stated:

> *'I had not used ICT at all before in class and didn't have a computer either. I started to use PowerPoint presentations in class because of the CoP. I used ICT for homework too. I gave the students research to do and then we discussed their research in class. I even asked them to do a presentation utilising PowerPoint which they thoroughly enjoyed and found very useful. ICT can make things very visual and my students enjoyed this. I also use games now, quizzes and use ICT to explain practical skills. Even the way I hand out notes is different and I know ask the students to give me their pen drives and we save the notes on their pens.'*

This teacher is now interested in using Moodle as a platform for uploading notes and maintaining a contact with her students. This teacher goes on,

> *'I feel more confident and use ICT more. My classroom is now different, it is more modern. The students comment about this too. Lessons are more interesting and colourful and students are stimulated even in the afternoons when it is difficult to teach as they are usually tired or hot. I found ICT helps you reach students that don't normally understand English even when topics are difficult. They understand better and remember more.'*

A young teacher stated, *'I now use the computer in almost every lesson.....the students have taken to it a lot, especially those of a low ability. They really enjoy something interactive.* A student-teacher related her experience with ICT whilst on teaching practice following her participation on the CoP.

> *'I saw many advantages when using ICT in class. Students are more focused and it is possible to bring colourful realia back into class. Lessons are more visual and this helps students. Lessons are not static, students interact. I learnt technology from the students themselves too.'*

In the questionnaire this student-teacher stated she is a confident user of computers and yet the level of technology integration she has managed to put into practice is still at a basic level. She stated,

*'I used video clips during a practical and demonstration lesson as I would not have had time to include the whole demonstration in the lesson. Sometimes I use ICT as an extra part, so I would have the resource with me and see if I have time for it or if the students are ready for the activity. I'll do the other activities first and then use ICT for recapitulation.'*

Whilst most of the above comments are encouraging, the quote above reinforces the fact that integration is still at a basic level, in what Sandholtz et al (1997) would acknowledge as being the initial stages of the adoption phase for technology integration in general. The CoP did improve the learning experience and classroom practice in the above mentioned ways. It helped encourage teachers to include ICT in class and to change some traditional activities to ones utilising ICT[96]. However, they have not yet embraced the whole concept of ICT integration which would make them change their pedagogic practices too.

This is a positive beginning, however Sandholtz et al. (1997) give a five year time plan for integration which shows that the process must be slow and long term. One teacher added that one year on she finds many advantages in utilising ICT over traditional classroom practices since her students find lessons with ICT much more motivating and fun. They are even teaching her technology and this is making the lessons more student-centred and student-driven.

### 5.5.5 Interest in Using ICT In the Future

Through the CoP I wanted this study to help teachers grow professionally in the use of ICT as a pedagogic practice. Twenty-six respondents (78%) showed an intention to use ICT the following year, two (6%) said that it would be difficult, another two (6%) stated that they were unsure and three (9%) did not answer. Reasons given as to why one would not use ICT in the near future were: no computer access, working in a tough school or teaching in a seminar centre where the ICT activities shared may not be relevant.

[96] See Appendix 13 for a detailed description of one of the ideas launched: general ideas to carry out internet projects and one specific one for use in HE.

Similarly, thirty (90%) teachers claimed that after the experience on the CoP they felt motivated to seek more information and learn more ICT pedagogies and activities to ultimately adopt more of these pedagogies in class. Thirty-two (96%) were keen to use ICT in the future. Three (9%) said they were somewhat motivated to learn more about ICT pedagogies and activities for use in HE. When asked whether the respondents were now motivated to use and teach with this innovation in class and to seek more information on ICT in HE more than prior to participating in this CoP, thirty (90%) replied that they were 'very much' motivated, whereas three (9%) said 'not really'. One of these replied in this way because she already used ICT in class. When asked whether they felt unsure about the value of ICT in teaching, the thirty-one (93%) replied that they were not unsure and only two (6%) said they were unsure. This shows that this awareness has exposed teachers to new pedagogies and with more support or through personal effort, these teachers will try to include more ICT in their classroom practice.

## 5.6 DISCUSSION

This research demonstrated that an online community of practice can have a positive impact on the participants despite the constraints discussed. The results from the questionnaire and interviews indicate that the participants were engaged in reflection and change even if this did not result in collaboration. The online community was successful in what Burnett et al. (2007) claim to be essential ingredients for the transformation of pedagogic practice in the curriculum: raising the confidence levels in the understanding and use of ICT and in recognising the impact of ICT on the curriculum in terms of content and pedagogy. The teachers and student-teachers may have not reached high levels of ICT integration or the invention stage as demonstrated in Sandholtz et al's (1997) model. This indicates the need for a longer community of practice or the need for other measures such as whole school policies for technology integration with time allotted for preparation and professional development, face-to-face hands on meetings or projects on a wider level. It is evident that professional development in technology use requires a length of time until teachers transform their pedagogies and embrace ICT effectively, as stated by Hunter (2001).

Apart from a lack time and accessibility of computers and internet connectivity in schools, other factors such as personality traits, overload of material on the site, adult learning styles which may not be in sync with the online medium, group dynamics and a lack of ownership of the CoP may have influenced participation and professional development. Lack of resources did have a direct impact and it also seems that the CoP was being treated as a professional and formal medium, as one individual stated in the interview, whereas teachers may have preferred a diversion from work-related affairs at home.

Participants did not develop a sense of belonging and responsibility towards the growth of the CoP which was dedicated to solely offering them professional development and collaborative work in ICT pedagogies. The CoP did not manage to engage them in obtaining a sense of ownership. This reflects a lack of appreciation of continuing professional development amongst these teachers[97]. Online learning is fragile when it is voluntary and brings with it difficulties which can go by unnoticed in face-to-face meetings, but this does not mean that learning or understanding is better in traditional methods.

Although one could not assess the quality of discourse towards the end of the six month period of the project because of the inconsistency and increase in lurking, feedback was still obtained from the interviews. This feedback gave insight into the stage the teachers were at in technology integration and hence the usefulness of the CoP. All teachers and student-teachers stated that they felt they were in the implementation phase but also felt they needed more knowledge, so claimed to be in the two phases. The interviews in fact, showed a more positive picture of the success of the CoP than the perception obtained from the participation level.

[97] In Malta continuing professional development is compulsory only once a year and is organised by the Education Division during the scholastic year.

Following the first six months, the activities on the CoP progressed with quite a number of ideas suggested. After a few months a newsletter was launched so as to maintain professional contact and share ideas with the participants. The newsletter proved to be popular as substantial positive feedback was received following the launch of the first one, reinforcing the idea that the teachers still prefer to remain in isolation and receive ideas rather than contribute and interact.

When considering the applicability of Rogers' (2003) model for the diffusion of innovation amongst HE teachers and student-teachers, one must analyse whether this was the most appropriate to use. At the start of this research I did not expect to reach Rogers' final stage in the innovation-decision process, confirmation, as this would have been impossible to reach due to the vast array of different technologies one would need to tackle. Focus was mostly on knowledge and persuasion and particularly the perceived attributes. This would support the participants up to the decision stage from where they would then be in a position to respond creatively to opportunities in ICT in the HE curriculum. The fact that feedback was limited hindered the extent to which knowledge was constructed and the HE syllabus was explored in order to collaborate. This would have helped teachers experiment with ICT as pedagogy. The teachers, however, seemed positive about the fact that they had started to use ICT in class or had improved the frequency of use since the CoP. There is a difference in the participant's perception of the success of the CoP and the process used. It was stated that collaboration could have been better and yet the data collected shows engagement albeit in isolation and predominantly through emails. The data indicate that the participants found the information useful and interesting and looked forward to the postings and therefore with more commitment this indicates that the online CoP activity could have improved if it was not voluntary and if it spanned for a longer period of time. The fact that this online community was a first of its kind for teachers in Malta may have impacted on the teachers' commitment to the CoP as a professional development medium. In addition, the fact that there was very limited involvement by the education officer or a teaching administrative superior and thus no observation or assessment may have indicated this was an informal or unofficial set up. It may have also been detrimental that at one time

the education officer attempted to stop a good discussion which had been started off by a teacher on a particular assessment paper which was set nationally. This could have discouraged potentially comfortable participants who were becoming accustomed to the community.

The analysis of this research has reinforced my concern about the limited use of technology in class in the local context. In hindsight one may say that I may have been too dependent on the participation of teachers in order to proceed with further discussions and ideas. It could be that I was expecting too much both in terms of participation and in pedagogical application. If technology integration is not a curriculum policy and is not driven by central education administrators and planners, we may be expecting too much of teachers. Vavasseur and Mac Gregor (2008) indicate that teachers believe that their principal's involvement was pivotal to their success in an online community and state that the pressure applied by a principal during the experience was consistently seen as positive. Without the necessary backing, team work and support teachers will take up technology very slowly and may even end up misusing it. Technology is so vast that teachers will find it difficult to take isolated initiatives to search for appropriate technologies and apply to pedagogy without support.

## 5.7 CONCLUSION

The CoP was a successful medium in bringing teachers together and offering opportunities for discussion, social networking and knowledge building. The inconsistency between the values and beliefs and the performance on the CoP may be a result of a tension that exists between integrating ICT in the HE class and other existing barriers such as lack of equipment and resources or technical support. The situation in schools varies widely, some being moderately equipped whereas others are poorly equipped. One could also argue that since the HE syllabus encourages hands on approach to teaching and learning, teachers might not feel the need adopt new pedagogies in exchange for existing successful practices. On the contrary, HE subject methodologies are most appropriate for ICT use. Thus the importance of subject-knowledge expertise in

HE related ICT products should not be underestimated. Besides a longer span of time, supportive authorities are required to go on with such an endeavour in order to encourage the use of ICT and encourage knowledge exchange and knowledge building as a basis for the transformation of the pedagogies. Heads of schools and higher authorities in education should drive technology through for teachers to take it up as long as this is accompanied by adequate ongoing training. If schools are not going to give more time and technological resources to teachers, technology will not be integrated in a seamless manner into teaching and learning. Teachers had not yet internalised technology as a pedagogic practice and it for this reason that the scaffolding was not completely removed after the six month period.

The process that evolved in the professional development exercise supported teachers through a process of change from traditional forms of teaching to the use of more innovative pedagogies. The HE teachers may not have reached full technology integration, however progress was registered. Teachers showed they felt more confident, were more aware of the different technologies which may be adapted for their teaching needs and had started using ICT more in class whilst experiencing ICT as pedagogy. The evolution of this process indicated acceptance of ICT but has emphasised the need for more information on ICT, new skills and more concrete ideas, hence more professional development. Participants were willing to learn and seek more ideas individually, yet technology is so complex that teachers require more than just professional development through an online community of practice.

ICT integration implies a certain degree of product application discovery. It has an inherently constant evolving characteristic. An online community of practice is necessary to inculcate the culture for continuous self learning in ICT. Teacher networks can be innovative professional development tools because of their flexibility and social and constructivist orientation to teacher learning and because they are organised for purposes related to professional learning, inquiry, support or school improvement (Niesz, 2007). Thus Niesz suggests, these communities for professional development should build on teachers' knowledge and experiences, foster sharing of practice and

understandings and provide opportunities for critical dialogue and inquiry. These networks are thus examples of communities of practice as developed by Lave and Wenger (1991).

The CoP was an exciting experience for me and an innovative approach to professional development and ability to reach teachers asynchronously and flexibly. One assumption in the conceptualisation of a community of practice is that learning takes place through socialisation and thus the engagement in social practice is fundamental in the process through which learning takes place, (Niesz, 2007).

In much the same way as Wenger's (1998) model for communities of practice I wanted the CoP to offer participants a sense of belonging and identity, learning by doing and experience. As a professional development medium the CoP offered opportunities to engage in the activities presented and initiate others in order to allow teachers to create their own space on this learning network. Since the participants showed enthusiasm and interest, the shortcomings lay in lack of provision found in the schools. Teachers are not accustomed to ongoing professional development in Malta and may lack the commitment to engage fully since they were voluntary participants. This lack of engagement should not be considered as a shortcoming of the CoP as a CPD[98] medium. Teaching is one of the only professions in which one is practising pedagogies which one experienced when young. We may need many generations of teachers in order to reach technology integration. Engaging in such an innovative practice is contrary to the concept of teaching. It is also evident that new technology is not easily assimilated with short inputs or courses. A community of practice of a few months was not sufficient. Results could have been totally different had the CoP been monitored or assessed with professional awards and ran for a longer span of time.

The fact that this CoP required teachers to own and at times take initiatives may have been a radical shift in practice and this may have disengaged the participants. The CoP may require an environment which complements this innovative medium, where

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discussion about ICT issues is the norm. Such an environment, besides also having the resources and necessary equipment, would definitely foster a propensity for trialling. Regular trialling should lead to further appreciation of the advantage or effectiveness of ICT in class, thus resulting in the implementation and adoption of technology as pedagogy. Since the participants trialled but did not respond, this can indicate that the CoP was not considered to be a bridge between classroom practice and professional development.

Normally professional development is associated with an institution or accrediting bodies and professional requirements. In this case, I was monitoring but not assessing and was not an institution and therefore this may have minimised the sense of obligation to participate fully and conclusively. The CoP was also free and this could have been of detriment to its success. Teachers saw this as a medium which was convenient and practical for them to receive new knowledge from but not as a professional development tool. Thus the informal manner in which this CoP was run makes it difficult to answer whether a community of practice is an effective tool for professional development. However, the participants did show appreciation towards the CoP as an effective tool for knowledge dissemination and reported that it improved classroom practice, which seems to indicate that an online community of practice in which the results of the participants are formally assessed could be an effective medium.

The teachers' and student-teachers' cultures and milieu may have not been in tune to make the CoP a social and constructivist learning environment. Teachers were still working in traditional settings and in isolation. I do not think that a lack of time was a real issue, but was more of an excuse. Most of the participants kept a distance as they may not have been ready to accept the need for commitment and energy required in such a professional development exercise, which could have taken place after school hours. They may have been unsure about the expectations and collaborative work required and therefore preferred not to express them. They needed to be more trusting in order to share any good practice, although I felt they were reluctant or unprepared to do this and preferred to keep their resources to themselves.

# CHAPTER 6

# CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

## 6.1 GENERAL COMMENTS

> *'The innovative use of online technologies to deliver collaborative support and professional development could help to remove the sense of professional isolation felt so acutely by many teachers.'* (Herrington et al, 2006, p. 129).

As suggested by Evans and Powell (2007), in this study I tried to create a balance between that which is designed and prescriptive and that which allows the participants to develop in the CoP to provide individual and collective growth. In line with these authors, I have tried to remain committed to knowledge generation, participation and social interaction.

If a teacher is to successfully integrate ICT in class, then teacher training needs to give teachers basic ICT skills for personal productivity but also show teachers three main components to make the innovation a familiarity. Training is required in 1) application of ICT to content knowledge which can then lead to ICT constructivist approaches, 2) pedagogical knowledge showing also the paradigm shift in the philosophy behind effective ICT use and 3) knowledge of educational technology where teachers can become aware of what kind of technology is available for educational purposes and how this could be used if appropriate for the respective subject areas. Isomorphic approaches where teacher trainers themselves would adopt ICT in their own classroom practice would further strengthen the compatibility of individual teachers. Incompatibility with a preceding idea can retard the rate of adoption of the new idea. Teachers will be dealing with a new idea with the mental tools of an 'old idea', thus having a standard by which to interpret or value the innovation (Rogers, 2003).

These three approaches to training for effective ICT integration will give teachers:

- a sound knowledge of the content within the subject area (subject content knowledge);

- knowledge of all subject methodology issues associated with the given subject area (subject pedagogic knowledge);
- familiarity with all issues associated with the use of ICT in that subject area (technological pedagogic knowledge).

## 6.2 THE RESEARCH QUESTIONS

The main research question of this study was to explore how online interaction and collaboration can provide professional development by helping teachers acquire new knowledge and explore new practices (through collaboration and the sharing of ideas) in ICT in order to integrate technology in the HE curriculum more effectively. The aim was to promote the use of ICT as a new pedagogic skill and to then analyse this CoP as a potential tool for professional development. The following questions have been used to explore the above research question in different ways and stages:

4. How effective is an online CoP in developing teachers' and student-teachers' knowledge about ICT in the curriculum?
5. How effective do teachers and student-teachers feel an online CoP is in improving their classroom practice?
6. How effective is the medium itself (the CoP) in contributing to professional development in ICT?

### 6.2.1 Impact on knowledge acquisition

The data which emerged from the questionnaires and interviews suggests that the CoP was an effective medium for the dissemination of awareness and 'how-to' knowledge. The CoP was seen as a valuable, informative and an innovative medium which brought HE teachers together in an online community for the first time. The sharing of experiences and new ideas for using ICT in class encouraged teachers to use ICT in HE much more than they had ever used it before and in better ways. In fact, participants claimed to be more confident in ICT usage after experiences on the CoP and this impacted positively on ICT usage. However, the participants were more intent on gaining

knowledge and ideas rather than sharing and showed they were keen on learning but not on giving feedback, thus reinforcing isolation. The lack of engagement on the CoP made it difficult for me to monitor the amount of knowledge being constructed by the participants. The CoP therefore was not fully successful as the breadth and depth of knowledge that I had planned to impart could not take place. The plan was to take the participants from Rogers' (2003) knowledge phase to the confirmation phase in order to support them in making a paradigm shift in pedagogic practice. Individually the participants did claim that their knowledge increased and indicated that they had progressed from the knowledge to the implementation phase. However, effective implementation and confirmation of ICT can only be achieved when teachers internalise ICT as pedagogy, are ready to seek information for enhancement of the HE curriculum and learning and can assimilate new technologies within this new way of teaching. The concept of the implementation phase in teachers is still far from what implementation should really be. As Cuban (2001) states, teachers meet too many contradictory objectives in class and this discourages real transformation to different teaching and learning practices. In this research the implementation phase is still shallow and narrow and indicates that the teachers' and student-teachers' values and beliefs are still not that inclined towards transformed ICT usage. The CoP is an important professional development tool but external factors may be stronger. One has to also examine the messages being given in schools, through policy and in the ITE programmes. It seems that these have not managed to contribute to building a strong propensity towards the assimilation of ICT in learning and therefore in this context teachers and student-teachers are not that ready to assimilate new technologies. As stated in the literature, teachers need to be involved in design and structural constraints should be removed where time for planning and professional development are allotted (Cuban, 2001). Logistical problems in schools may discourage innovative practices or teachers are in a state of inertia and still bound to traditional practices.

### 6.2.2 Impact on classroom practice

The ultimate outcome of a change in classroom practice should be the improvement of the learning experience. It was decided at the outset of this research that only teachers'

perception and practice are evaluated. An evaluation of the learning experience through observations or otherwise would have necessitated an equally challenging study as much as this thesis. In future, if a community of practice is to be adopted as a formal professional development medium, some classroom observations from colleagues or mentors should be integrated into the process.

The teachers' responses indicate that the CoP did help in improving classroom practice as the participants discovered many benefits. Most had adapted a good number of the ideas that were shared on the CoP and were mostly keen on the interactive PowerPoint presentations and use of websites. This indicates that although the teachers' perception of ICT use in class was very positive, they had adopted that which was familiar and hence mostly for teaching purposes and not as part of the learning process. Students were still not the focus in the learning experience where productivity and involvement are central. Since the outcome of the CoP is effectively what happens in class, this was very difficult to observe online without the necessary feedback. In addition, around fifty per cent of the participants were student-teachers and thus not regularly involved in classroom practice. Teachers' sharing of good practice on the CoP rarely took place, probably indicating lack of confidence to participate, a preference to remain isolated and to receive and not contribute. The questionnaires and interviews gave a better picture of what was actually taking place. Participants including the lurkers, stated they were trialling and had gained an awareness of technology which contributed to the use of ICT in HE. Participants saw themselves as doing things in new ways yet as Cuban (2001) states, this would still not be a satisfactory form of technology integration. My original intention was for the participants to experience the five attributes of Rogers' (2003) model with the hope that the more of the attributes the participants assimilate, the faster the rate of adoption. The data indicate success in this regard in that the participants saw that ICT had an advantage in class over more traditional methods and they trialled the ICT activities as these lacked complexity and were compatible. The CoP had an impact on classroom practice because the activities had persuaded them to use ICT. As was also stated by Cuban (2001), they claimed to have experienced benefits of ICT such as increased student motivation since students are keen on using ICT, increased

understanding and teaching and learning became more creative. ICT also helped students of all abilities and offered new opportunities for a variety of pedagogies. The participants themselves in fact, felt satisfied with their experience on the CoP and their usage of ICT in class. They felt more confident and more comfortable when using ICT in class.

### 6.2.3 Impact on professional development

This study sought to examine the online medium itself and whether the online community of practice contributed to professional development. As suggested by Lebec and Luft (2007) the medium provided consistent opportunities for reflection and sharing. I also addressed Leeder et al.'s (2004) list of should do's as identified in the literature by putting the participants' needs and interests first, being practical and hands on and not complex when communicating and promoting discussion and sharing, whilst making the experience stimulating and engaging. Professional development in technology integration implies a process which imparts more content knowledge, pedagogic knowledge and other related skills. In this CoP, awareness knowledge of ICT was noted; however, the outcome which is most desired is that the CoP would help teachers become self-directed learners and technology integrationists. One cannot say this was achieved in this CoP. Respondents of the interviews seemed to appreciate the online exercise but one expressed the need for hands on workshops too. Moreover, responses considered central to this question such as 'what is technology integration for you?' were very disappointing. The culture of professional development in Malta is not well ingrained and mostly takes place through obligatory annual seminars on three consecutive mornings. The shortcomings in the effectiveness of the CoP as a professional development tool might reflect more on the lack of culture for professional development or the online medium than the validity of the research itself. Lebec and Luft (2007) state that an informal feeling fails to give a sense of responsibility and commitment and this can be confirmed by this study where the lack of formality or use of assessment in this online CoP may have been a set-back and it is thus difficult to answer whether a community of practice is an effective tool for professional practice.

One can state that a teacher's work practices are very well established and defined. The parameters of a formally published syllabus and legally established working day (very often coupled with strong syndicate control) contribute to this routine culture resulting in teachers' lack of awareness for the need to establish new practices or solve problems. In other professions the systems and working life parameters are much less defined, resulting in a consciousness to search for new practices. The rationale behind this study was to create a CoP that had the potential to arrive at high levels of knowledge construction and discourse and a variety of new pedagogic ideas. The fact that this kind of professional development did not materialise may raise questions about the fundamentals of teacher formation and training. Evans and Powell (2007) states that the isolation of teachers begins in pre-service and this can be confirmed here where even student-teachers were reluctant to participate actively on the CoP. The culture of continuing professional development and lifelong learning are not ingrained in teachers who may not be capable of participating in an open ended forum. There were no complexities in this CoP and therefore no impediment for taking this professional development exercise on.

## 6.3 COMMUNITIES OF PRACTICE IN PROFESSIONAL DEVELOPMENT ONLINE LEARNING SCENARIOS

Many of the findings in this thesis confirm other studies on technology integration or communities of practice and professional development. In line with Lebec & Luft's study (2007), this research shows that there are a myriad of reactions to online forms of learning which reflect diverse inclinations and preferences towards different forms of learning such as self-directed learning with flexible arrangements. Further findings in this research indicate that the CoP was successful in that:

- It had a significant influence on knowledge and persuasion towards ICT in education on the participants and therefore strengthens the growing recognition of the importance of using online communities of practice for professional development as indicated by Kirschner and Lai, (2007).

- Teachers moved through stages of adoption in ICT integration as stated by Sandholtz et al, (1997) and UNESCO (2002). Following this study the participants felt they had reached the implementation phase in Rogers' (2003) framework and were also confirming that they would use ICT more in the future, however, felt the need for more knowledge. In fact they stated they had increased their use of technology even if this is still tied to the computer or internet only.
- The CoP helped the participants to reflect and progress through the stages of Rogers' (2003) framework, and progress was recorded even by the participants, thus challenging some of the existing practice as indicated in the UNESCO guide (2002).
- As with the study by Demetriadis et al, (2003), teachers showed a great interest in learning how to use technology in class but need consistent support and training in order to integrate ICT effectively since as Cuban (2001) states, teachers are still using ICT as a tool.
- Teachers' perceptions in the questionnaire and the interviews show that there were changes in classroom practice, increasing the ICT usage in class, even if this was not using it as a cognitive learning tool (Chan, 2006) and not necessarily embracing it as a new pedagogy in line with constructivist elements as stated also by Jonassen et al. (1999). This also confirms Ertmer's (2005) findings that high-level technology usage is still in the minority and Cuban's (2001) who found that not even enthusiasts use the computer well in class. This strengthens the claim for a shift in teacher training, in isomorphic approaches and concrete examples embedded in the subject curricula.
- Following some classroom practice with ICT, all the participants indicated that ICT improved the classroom experience and had positive comments about the CoP improving ICT use in class as they specifically stated students find it motivating and fun
- The CoP raised motivation levels and built a familiarity with ICT through substantial awareness and 'how to' knowledge. It removed some fears associated with the use of ICT in class as it raised confidence levels in ICT use as a teaching tool and gave suggestions for effective integration in the HE curriculum

- Teachers and student-teachers were keen to use ICT in the future and to use the activities shared on the CoP as examples and prototypes for future ICT adaptations
- Teachers and student-teachers found the CoP convenient and flexible
- CoP was successful in introducing the participants to online communities and communities of practice as a tool for professional development.

Despite all these positive findings, the nature of the interactions on the CoP and the participant's roles towards an online community for professional development moved at a much slower pace. They seemed to be more intrigued with the discussions on HE content rather than innovative pedagogies. As Teo and Webster (2008) highlighted teachers might have been unsure of whether to participate and what issues to discuss or might have been unmotivated by the topics. Despite favourable attitudes, teachers might still be struggling with the big change in practice. This study confirms there are still many barriers which teachers must be intrinsically experiencing as those stated by Cuban (2001) in the literature review. As Ertmer (2005) states, teachers tend to struggle to negotiate a foreign and potentially disruptive innovation into their familiar environment. One has to respond to the feedback within the CoP, which was forthcoming but also to the implications of the feedback, which was lacking. In addition, this study is an opportunity to learn from the reasons behind low participation levels in order to improve the interest, challenge participation levels and retain the momentum of the community in future online communities.

Wubbels (2007) stated that it might be an illusion to think that teachers will become active participants in communities of practice as were my expectations, as this, he states, is still an extraordinary phenomenon. Thus, since virtual learning environments are an alternative or complimentary professional development tool to traditional practices, this culture must be embedded early on. Online practices need to be embedded in ITE programmes to inculcate this online culture and new pedagogies in teachers from pre-service training. The culture to seek more knowledge and assimilate new technologies must be at the core of pedagogy training for teachers.

The CoP may not have been that successful in the following:

- Professional engagement and interaction was lacking, hence also breadth and depth of discussions
- Supporting the participants to reach stages which involve more effective integration of technology, hence reaching Sandholtz et al's (1997) appropriation or invention stage and Rogers' (2003) confirmation stage
- Having a better plan in which to provide forums which can motivate participants to be more active and remain long-term members
- Decreasing the discomfort or lack of trust participants might have hand in online interactions for professional development. This might have led to a depriorisation (Lebec and Luft, 2007) of the online course.

## 6.4 LIMITATIONS

I had a good idea of the breadth and depth of programme at the outset of the CoP. However, this was not formalised in order to allow its evolvement according to the discussions and developments on the CoP. The progress registered at the end of the six month period did not match my desires in terms of the breadth and depth of knowledge of the participating teachers. As indicated earlier the pedagogies used to encourage participation were pervasive in this community, some of which emerged from research by Leeder et al., (2004), Lewis and Allan (2005), McConnell (2006) and Evans and Powell (2007).

The fact that no knowledge builders or innovators dominated this community and no real collaboration emerged raises questions as to whether the targets were too optimistic and whether the online CoP was the ideal tool. One may also ask whether the time frame was too short. The postings, examples and forums given on the CoP were in my opinion sufficient to take the participants through all the stages of Rogers' (2003) model for the diffusion of innovation. As recommended by Leeder et al. (2004), I tried to address the

real needs and was practical when communicating whilst promoting discussion and sharing and fostering a culture of inclusion. Yet, the mindset of the participants might have been too conservative and tied to existing practices, thus making them not very willing to access the CoP from their home and preferring to only use the simplest form of communication (email) to receive postings from the CoP.

Lurking for individuals may have been positive but not for the processes in a community. There were more lurkers than the thirty per cent of any online group as stated by the Open University (Salmon, 2002) or as in Lewis and Allan's (2005) study and therefore these could have been addressed more in ways which would engage them more actively in the CoP. I used to notify them through instant messaging through Moodle itself of anything which had been posted in order to encourage them to access the site. However, the participants still remained quite isolated and thus more needs to be done to address the passive members. I could have had a mid-term short questionnaire which would have given me feedback on the effectiveness of the CoP and that could have given me more direction for the rest of the project. However, as stated by Takahashi et al. (2003) there were a considerable number of lurkers who had an influence outside the online community.

As stated by Nonnecke (2000), there are many different participants' styles and the disparity between the participation levels and the lack of a structure from schools for support made it difficult for the CoP to have been more effective. In the Mirandanet project, Preston (2007) noted that participation levels increased after a long number of years and particularly following a trip to Prague by the members. The lack of accessibility and voluntary non-assessed participation without any superiors or employers made this study too informal. A professional development exercise is on the other hand more finite – it is meant to inculcate skills and knowledge within a definite framework. The online medium is fragile and participation is crucial. It is however, convenient for many and therefore a more structured training programme may have achieved better results in integration, especially when the local teachers of HE are getting used to virtual learning environments for professional development purposes.

The lack of classroom observations also hindered the assessment of the extent of changes in classroom practice as a result of the CoP. This coupled with the fact that participants were not willing to share good practice hindered the assessment of the CoP's effectiveness to impact classroom practice. The culture for professional development itself is also an important issue. One cannot say that the culture for CPD is well engrained in Malta. In addition, community of practice are not common in Malta even for professional development. There is no other community of practice used amongst Maltese teachers. This makes it difficult to benchmark for good practice in our local context.

## 6.5 CONTRIBUTION TO KNOWLEDGE

This study has shown that this CoP has contributed positively to professional development in technology integration of this group of Maltese HE teachers and student-teachers. Despite certain shortcomings this cohort was impacted by the innovative virtual learning environment which served particularly as an effective medium to convey knowledge and improve classroom practice even if teachers were not adopting high quality technology intensive lessons that engage students and improve the learning experience. This thesis however also confirms my original hypothesis that teacher training, current classroom practices and continuous professional development have not evolved enough to maximise on the potential of this innovative pedagogy. For a community of practice to be beneficial for professional development in the educational community, participants must recognise their role in this community and that their contributions are crucial for the success of the community of practice. A paradigm shift in effective ICT pedagogies or constructivist learning approaches requires much more commitment and time.

This indicates that with ICT in education, professional development has become necessary. With ICT as pedagogy there is now a need for a new culture for professional development in teachers which is mostly associated with a shift towards autonomous

learning and self-directed learning in order to assimilate new technologies and search for ways of identifying how ICT can be integrated in one's own subject area to maximise on the benefits of ICT. Schools which are mobilised for the integration of ICT with robust implementation and full support will create an atmosphere conducive to technology and teachers will learn from other teachers and the take up can be more successful in this environment.

### 6.5.1 HE Methodologies and ICT

The report on Science Education and the role of ICT (Osborne and Hennessy, 2003) identifies aspects of pedagogy for using ICT effectively. I have adopted their suggestions in order to identify explicit ways of how technologies can be use effectively in HE. This type of higher order discussion and knowledge construction is the type of discussion I had hoped to reach and collaborate on in the CoP but I did not reach this stage with the participants. The newsletters that I had started posting after the first phase of this project were received with an encouraging acceptance and this shows that this might be part of the transformation process. Teachers are at a stage where they need to receive rather than contribute, they will then trial in their own time and when they have gained enough experience may be able to reach a stage of interaction on the community of practice. To this effect I feel that at this stage it might be useful to write and publish a workbook for students and an accompanying teachers' book which would include ICT ideas for the HE curriculum. This would be integrating the subject content knowledge, subject pedagogical knowledge and the technological knowledge which teachers need in order to not only enrich their content with a touch of low level ICTs but to also transform to utilising it as an effective pedagogy. This would support teachers in their own niche classrooms to integrate technology. Table 23 in Appendix 14 shows the suggestions that I have created for effective use of ICT in HE as a result of my own professional development during this study.

## 6.6 ROGERS' DIFFUSION OF INNOVATION MODEL

Rogers (2003) identifies four main elements in the diffusion of new ideas: the innovation, time, communication channels and the social system. As a conclusion to this study I would like to emphasise the importance of all these elements but in the educational community confirm that the social system plays an important role. In this study heads of school were contacted and asked to encourage teachers to participate. For a community of practice to succeed in professional development amongst teachers, the subject co-ordinators or higher ranked individuals must be more engaged in ways in which they can become change agents themselves. This may be crucial to the whole process. Their involvement can be critical to the success and outcomes of the community. In all probability, communities of practice in the educational setting must be formalised and monitored in order to succeed. Thus Rogers' (2003) model may need some adjustments to emphasise this point.

The model must also take into account the diversity and disparity that may exist amongst the participants. In this study the model did not work to the desired effect. Reasons for this could be because the disparities between the participants were not ironed out, the lack of resources remained a problem and teachers arrived at a certain stage but not at the breadth and depth that I had expected. I therefore think that the model should address the disparities or such consequences which can arise. I would suggest a model which would be a wider model to include a multi-speed process sensitive to diverse individuals. Alternatively one could consider other models and see if these can work better in the educational community and which address all of the above disparities. Participants might have responded differently had another model been used.

If communities of practice are to be more structured and monitored, they can be an effective medium for professional development. Since ICT diffusion is to take place over a long span of time, an online community (not necessarily a community of practice) is definitely appropriate for this kind of professional development, since this involves knowledge dissemination, time for reflection, flexible access, adaptation, knowledge

construction, trialling and observation of skills. The time factor must also be addressed in more depth in order to focus more on the suggestions by Rogers (2003) in the innovation-decision process. Having now carried out this study one can claim that the time dimension by which an individual passes from the knowledge to confirmation is a crucial factor. This implies that one must plan for the diversities in the group as well as the collective rate of innovation adoption by the members. I would also suggest that the whole school environment is participant in technology integration and this would include giving teachers specific time slots to prepare for teaching with ICT, having the administration communicate with teachers and parents through email and internet, encourage teachers to communicate with parents and students in the same way where appropriate and encourage a whole school policy toward ICT integration, which would also include the provision of adequate resources.

## 6.7 IMPLICATIONS FOR FUTURE RESEARCH, POLICY AND PRACTICE

Online communities of practice are interesting spaces for participants and can be used for pedagogic professional development even for subjects like HE. As stated earlier, a holistic environment is required, with strong support from administrative leaders. A school-wide approach is probably the best scenario where teachers of same subjects are engaged online in professional and pedagogic discourse with teachers in different schools and hence the exercise would be happening in a number of different subjects. This would need to include a robust implementation which provides reliable and easily accessible technological resources across schools. There are implications also for ITE programmes as ICT integrations calls for teachers to make a paradigm shift in their approach towards professional development. Innovative scenarios for education and training have to be conceived as mentioned earlier with virtual learning environments which need to be utilised to transform ITE programmes from merely the acquisition of knowledge and skills to participating and contributing in learning communities. With technology, teachers have to constantly remain abreast of developments and new hardware or software. They then have to adapt these to their pedagogies and their content area. This culture should be inculcated in programme for the formation of teachers. Teachers

should be able to assimilate new technologies even years after their ITE programmes. The need for self-development must be embedded in a teacher's mentality and therefore ITE programmes should support learner-directed training and this could be accomplished through a flexible, customised and technology-intensive approach. In order to be able to make a paradigm shift in pedagogy teachers need to be able to extend themselves pedagogically.

It may also be a good idea if communities of practice might involve a diverse set of members. Lave and Wenger (1991) state that members on a community of practice come together to the group because of the same interest or need. An enriched community of practice which aims to be a professional development tool for education purposes could involve a mix of people, not just those from the same profession, in order to provide different forms of expertise and contributions where necessary especially in ICT integration where IT experts can enrich the community. Teachers need to be involved in communities of practice early enough so as to respond to their needs and formulate the appropriate performance objectives.

Communities of practice must be formalised and in ICT integration may also include some face-to-face meetings, assessment or awards, observations or hands on sessions if teachers do not engage in these communities to the extent where they could offer to be video-taped and podcasts of these sessions could be uploaded for comments and professional growth.

The twenty-first century classroom requires easy access to computers and other reliable technological equipment which could offer the curriculum a balance of uses of different technologies; collaborative learning possibilities for teachers through online communities or communities of practice, time for preparation, empowered or persuaded teachers with confidence in ICT and the financial backing from policy makers and authorities. Hence one has to emphasise the need for ongoing professional development with focus on 'how-to' integrate technology in the daily curriculum practices; starting off with easy to learn and easy to use technologies in order to eventually maximise on different kinds of

technologies and offer support to teachers showing respect for the demands of their daily lives.

Future research could also focus on a number of issues which have arisen from this study such as the need to identify lurkers and create specific programmes which could engage them more in the process. One can also research the effectiveness of the community of practice on the learners or on the participants where a study could be carried out through a more structured online learning community and which would include more key players which could be involved in the social system. A study could also test an online community of practice which would have a more definite structure and not rely too much on the interests or needs of the participants. The same context could be used in future for a similar study but which could be driven by a different framework or different routes to the one used here in this study. Additional research needs to be done with teachers who follow a policy-driven prolonged professional development online community which would be longer than the six months utilised for this study. Technology integration needs more extensive and intensive training. Finally, research can be carried out with participants who are given time for preparation of ICT material and access to the right type of equipment and see if integration is adopted faster.

## 6.7 CONCLUSION

Communities of practice have a great potential for disengaging teachers from their isolation and can be a means of creating a new culture for collaborative and co-operative professional development. There could be ongoing opportunities for new learning experiences through the professional engagement of the key implementers of technology integration in the classroom. Unless we observe or share good practice little do we know of the teaching and learning that goes on inside the classroom walls where hardly anyone enters but the teacher and the students. It is high time that the walls are broken through dialogue and sharing in order to improve the learning that takes place and to focus the attention on the students and the learning rather than the teachers and the teaching. Learning communities, teacher networks or collaborative experiences provide organised

social spaces for collegial dialogue and teachers' professional talk about classroom practice (Prestridge, 2002).

This study immersed me in a deep personal learning journey and has contributed in no small means to my own professional development in ICT integration. In trying to provide guidance and examples to the participating teachers and student-teachers, I have discovered the difficulties which the teachers face, not only the logistical difficulties but more importantly pedagogic ones. My own personal transformation or paradigm shift into more effective use of ICT in the HE curriculum and constructivist approaches to learning only resulted after this rigorous study and the consequential awareness for the need to find effective ICT pedagogies which will benefit the HE learner. I can therefore empathise with the teachers who keep encountering difficulties to move beyond the familiar practices. The need for time and pervasive support, training and stimulation within schools and through online communities cannot be underemphasised.

# BIBLIOGRAPHY AND REFERENCES

## BIBLIOGRAPHY AND REFERENCES


Abbott, C., (2001) *ICT: Changing Education,* UK, Routledge Publishers.

Alimisis, D., (2007) *Education to Promote Constructivist Use of ICT: A Study of a Logo-based Project.* Available online at http://www.di.unito.it/~barbara/MicRobot/AttiEuroLogo2007/proceedings/P-Alimisis2.pdf (accessed on 31/1/08)

Annetta, L., Murray, M., Gull Laird, S., Bohr. S., and Park, J., (2008) *Investigating Student Attitudes Towards a Synchronous, Online Graduate Course in a Multi-User Virtual Learning Environment,* In Journal of Technology and Teacher Education, Vol. 16, No. 1.

Ashcroft, K., and Foreman-Peck, (1994) *Managing Teaching and Learning in Further and Higher Education,* London, Falmer Press.

Austin, R., and Anderson, J., (2008) *E-Schooling: Global Messages from a small island,* London, Routledge.

Bai, H., and Ertmer, P., (2008) *Teachers Educators' Beliefs and Technology Uses as predictors of Preservice Teachers' Beliefs and Technology Attitudes.* In Journal of Technology and Teacher Education, Vol. 16 (1) (pp.93 – 112).

Balanskat, A., Blamire, R., Kefalla, S., (2007) *The ICT Impact Report: A Review Of Studies of ICT Impact On Schools,* [online] Available at: http://life.eun.org/ww/en/pub/insight/misc/specialreports/impact_study.htm (accessed on 28/5/08)

Barab, S.A., MaKinster, J.G., and Scheckler, R., (2004) *Designing System Dualities: characterising an online professional development community,* (pp.53 – 90), In Barab, S.A., Kling, R., and Gray, J.H., (eds.,) Designing for virtual communities in the service of learning, New York, Cambridge University Press.

Becker, H.J., (2000) *Findings from the teaching, learning and computing survey: Is Larry Cuban Right?* [online] Available at: http://www.crito.uci.edu/tic (accessed on 11/11/2008).

Becker, H.J., (2001) *How are teachers using computers in instruction?* Paper presented at the annual meeting of the American Education Research Association, Seattle, April. [online] Available at: http://www.crito.uci.edu/tlc/findings/special3/ (accessed on 11/11/2008)

Becker, H.J., and Riel, M.M., (1999) *Teacher professionalism, school work culture and the emergence of constructivist-compatible pedagogies.* Centre for Research on

Information Technology and Organisation. [online] Available at: http://www.crito.uci.edu/tic (accessed on 11/11/2008)

Becker, , H.J., & Riel, M.M., (2000) *Teacher Professional Engagement and Constructivisit-Compatible Computer Use*. Centre for Research on Information Technology and Organisation, University of California, Irvine. [online] Available at: http://www.crito.uci.edu/tic/findings.html (accessed on 31/1/08)

BECTA (2003) *What research says about ICT and motivation,* [online] Available at: http://partners.becta.org.uk/upload-dir/downloads/page_documents/research/wtrs_motivation.pdf (accessed on 16/1/09)

BECTA 2nd edition, ICT research report (2004), *What research says about portable ICT devices in teaching and learning,* [online] Available at: http://www.partners.becta.org.uk/page_documents/research/wrts_porticts.pdf (accessed on 16/1/09)

Borg, N., (2003) *Constructivist Elements in Primary Level Software,* In Gatt, S & Vella, Y., (ed.) (2003) Constructivist Teaching in Primary School. Malta, Agenda.

Borg Conti, C., & Sciberras, M., (1996) *Teachers' Attitudes towards computer use in primary schools,* Unpublished B.Ed (Hons.) dissertation, University of Malta.

Bradshaw, L.K., (2002), *Technology for teaching and learning: Strategies for staff development and follow-up support,* In Journal of Technology and Teacher Education, Vol 10 (1), (pp. 131 – 150).

Bray, B., (1999) *Eight Steps To Success: Technology Staff Development That Works,* in Learning and Leading with Technology Vol 27 No. 3 pp 14 – 20, US.

Bruner, J., (1986) *Actual Minds, possible worlds.* Cambridge, MA: Harvard University Press.

Burnett, C., Dickinson, P., Myers, J., and Merchant, G., (2006), *Digital Connections: Transforming literacy in the primary school,* In Cambridge Journal of Education, 36: 1, pp. 11 – 29.

Burnett, C., Merchant, G., and Myers, J., (2007) *English and ICT: Moving Towards Transformation of the Curriculum,* In Cremin, T., and Dombey, H., ed., Handbook of Primary English in Initial Teacher Education, [online] Available at: http://www.nate.org.uk/ (accessed on 10/1/09).

Candace Chou, C., (undated) *Technology Integration with Standards-Based eFolio for K-12 In-service Teachers,* [online] Available at: http://www.pt3.org/technology/21century_learners.html (accessed on 10/11/2008).

Carney, J.M., (1998) *Integrating Technology into Constructivist Classrooms: An Examination of One Model for Teacher Development*, in Journal of Computing In Teacher Education, Vol 15, pp. 7 – 15.

Carr, W., & Kemmis, S., (1986), *Becoming Critical – Education, Knowledge and Action Research*, UK, Falmer Press.

Chan, D., (2006) *The role of ICT in a Constructivist Approach to the Teaching of Thinking Skills*, Singapore, Ngee Ann Polytechnic [online] Available at: http://www.learnerstogether.net/role-of-ict-in-constructivist-teaching-of-thinking-skills/15 (accessed on 22/10/08).

Cogill, J., (2003) *The use of interactive whiteboards in the primary school: Effects on pedagogy.* BECTA Reports (Coventry, Becta). A Paper presented at the BECTA Research Conference 2003.

Cohen, L., Manion, L., & Morrison, K., (2000) *Research Methods in Education*, London, Routledge Falmer.

Cole, J., ( 2005) *Using Moodle: Teaching with the popular open source course management system*, Cambridge, O'Reilly Press.

Collis, B., and Jung, I., (2003) *Uses of Information and Communication Technologies in teacher education*, In Robinson, B., & Latchen, C., (ed.,) (2003) Teacher Education through open and distance learning. London, Routledge.

Conlon, T., (2004) *A Failure of Delivery: the United Kingdom's New Opportunities Fund Programme of teacher training in information and communications technology*, In Journal of In-service Education, Vol 30 (1) (pp. 115 – 138).

Cordes, C., & Miller, E., (2000) *Fool's Gold: A Critical Look at Computers in Childhood*, US, Alliance for Childhood.

Cox, M., Preston, C., Cox, K., (1999) *What factors support or prevent teachers from using ICT in their classrooms?* [online] Available at: http://www.leeds.ac.uk/educol/documents/00001304.htm (accessed on 13/12/09).

Creswell, J.W., (1998) *Qualitative Inquiry and Research Design: Choosing Among Five Traditions*, London, Sage Publications.

Crockett, M.D., (2002) *Inquiry as professional development: Creating dilemmas through teachers' work*, In Teaching and Teacher Education, Vol. 18, (pp. 609 – 624).

Cuban, L., (2000) Taking Stock: What does the research say about technology's impact on Education? Interview June 15, 2000 [online] Available at:

http://www.techlearning.com/search.aspx?q=larry_cuban_interview_2000 (accessed on 10/11/08).

Cuban, L., (2001) *Oversold and Underused: Computers in the Classroom,* USA, Harvard University Press.

Daniel, B., Schwier, R.A., and Ross, H.M., (2005) *Intentional and incidental discourse variables in a virtual learning community.* In Proceedings of the World Conference on E-Learning in Corporate, Government, Health Care, and Higher Education 2005, (pp. 1953 – 1965) Norfolk, VA: Association for the Advancement in Computing in Education.

Daniel, B., Schwier, R.A., and Ross, H.M., (2007) *Synthesis of the Process of Learning through Discourse in a Formal Virtual Learning Community.* In Journal of Interactive Learning Research, Vol 18 (4) (pp.461 – 477).

Darmanin, M., (2005) *A Case Study: The Implementation of ICT in Malta,* A Paper presented at a EUNEC Conference May 2005: Implementing Change through Education and Training 2010 [online] Available at: http://www.vlor.be/webEUNEC/06Seminars%20and%20conferences/2005%20Conference%20Implementing%20change%20_Malta_.pdf (accessed on 9/1/09).

Davis, N., (2003), *Technology in Teacher Education in the USA: what makes for sustainable good practice?* In Technology, Pedagogy and Education, Vol 12, No. 1.

Davis, N., Desforges, C., Jessel, J., Somekh, B., Taylor, C., and Vaughan, G., (2004) *Can Quality in Learning be enhanced through the use of IT?* In Somekh, B., and Davis, N., (2004) Using Information Technology Effectively in Teaching and Learning, London, Routledge.

Dawes, L., (2001) *What Stops Teachers Using New Technology?* In Leask, M., Issues in Teaching Using ICT, London, Routledge Falmer.

Demetriadis, S., Barbos, A., Molohides, A., Palaigeorgiou, G., Psillos, D., Vlahavas, I., Tsoukalas, I., & Pombortsis, A., (2003) *"Cultures in Negotiation": Teachers' acceptance/resistance attitudes considering the infusion of technology into schools,* In Computers and Education, Vol 41, Issue 1, August, pp. 19 – 37.

Denzin, N., & Lincoln, Y., (ed.,) (2005) *The Sage Handbook of Qualitative Research,* UK, Sage Publishers.

Dexter, S., Doering, A., and Riedel, E., (2006) *Content Area Specific Technology Integration: A Model for Educating Teachers,* In Journal of Technology and Teacher Education, 14 (2) pp. 325 – 345.

Dias, L., (1999) *Integrating Technology,* in Learning and Leading with Technology Vol 27 No. 3 pp 10 – 21, US.

# MISSING PAGES ARE UNAVAILABLE

*preservice teacher training,* In Technology, Pedagogy and Education, Vol. 16, No. 2, (pp. 199 – 214)

Flick, L.B., (2002) *Technology And A Course For Those Thinking About Teaching: A Response To Henriques,* in Contemporary Issues In Technology And Teacher Education [Online serial], 2(2), pp. 127-135.

Fosnot, C.T., (1989) *Enquiring Teachers, Enquiring Learners,* New York, Teachers College Press.

Fosnot, C.T., (2005) *Constructivism: Theory, Perspectives and Practice,* New York, Teachers College Press.

Fosnot, C.T. & Perry, R.S., (2005) *Constructivism: A Psychological Theory of Learning,* (pp. 8 – 38). In Fosnot, C.T., (2005) Constructivism: Theory, Perspectives and Practice, New York, Teachers College Press.

Garrison, D.R., and Anderson, T., (2003) *E-Learning in the 21st century: A Framework for Research and Practice,* London, Routledge Falmer.

Gatt, S., (2003) *Constructivism: An Effective Theory of Learning,* In Gatt, S & Vella, Y., (ed.) (2003) Constructivist Teaching in Primary School. Malta, Agenda.

Gatt, S & Vella, Y., (ed.) (2003) *Constructivist Teaching in Primary School.* Malta, Agenda.

Genishi, C., Mc Carrier, A., & Nussbaum, R.N., (1988) *Research Currents: Dialogue As A Context For Teaching and Learning.* In Lanuage Arts, 65, pp. 182 – 190.

Gibson, J.J., (1997) *The Ecological Approach to Visual Perception,* Boston, Houghton Mifflin.

Glaser, B.G., (1992) *Emergence vs. Forcing: Basics of grounded theory analysis.* Mill Valley, CA, Sociology Press.

Glaser, B.G., & Strauss, A.L., (1967) *The Discovery of Grounded Theory: Strategies for Qualitative Research,* USA, Aldine Transaction.

Glazer, E.M., & Hannafin, M.J., (2006) *The Collaborative Apprenticeship Model: Situated Professional Development within School Settings,* In Teaching and Teacher Education, 22, pp. 179 – 193.

Green, M., and Cifuentes, L., (2008) *An Exploration of Online Environments Supporting Follow-Up to Face-to-Face Professional Development,* In Journal of Technology and Teacher Education, Vol. 16, No. 3, pp. 283 – 306.

Hammond, M., (2005) *A Review of Recent Papers on Online Discussion in Teaching and Learning in Higher Education,* In Journal of Asynchronous Learning Networks, Vol 9, Issue 3 – October, USA, Sloan Consortium.

Hammond, M & Wiriyapinit, M., (2005) *Learning through Online Discussion: A Case of Triangulation in Research,* in Australian Journal of Educational Technology, 21 (3), pp. 283 – 302.

Hawkins, R.J., (2001), *10 lessons for ICT and Education in the Developed World,* In The Global Information Technology Report 2001. [online] Available at: http://unpan1.un.org/intradic/groups/public/documents/APCITY/UNPAN008676.pdf (accessed on 26/1/09).

HE state school syllabus, (2008) [online] Available at: http://www.curriculum.gov.mt/docs/syllabus_home_economics_07_08.pdf (accessed on 12/12/08).

Henriques, L., (2002) *Preparing Tomorrow's Science Teachers to Use Technology: an Example from the Field,* In Contemporary Issues in Technology and Teacher Education [Online serial] 2(1), pp. 3 – 18.

Herrington, J., & Oliver, R., (2000) *An Instructional Design Framework For Authentic Learning Environments,* in Educational Technology Research and Development, 48(3), pp.23 – 48.

Herrington, A., Herrington, J., Kervin, L., and Ferry, R., (2006) *The Design of an online community of practice for beginning teachers.* In Contemporary Issues in Technology and Teacher Education, 6 (1), pp. 120 – 432.

Hill, C., (2008) *Teaching with e-Learning in the Lifelong Learning Sector,* UK, Learning Matters.

Hoadley, C.M., & Kilner, P.G., (2005) *Using Technology To Transform Communities of Practice into Knowledge-Building Communities.* SIGGROUP Bulletin, 25, 1, 31 – 40.

Hobsbaum, A., Peters, S., & Sylva, K., (1996) *Scaffolding in Reading Recovery,* In Oxford Review of Education, 22, 1 pp. 17 – 35.

Hruskocy, C., Cennamo, K., Ertmer, P.A., & Johnson, T., (2000) *Creating a Community of Technology Users: Students Become Technology Experts For Teachers And Peers,* In Journal of Technology and Teacher Education, Vol. 8 pp. 69 – 84.

Hughes, J. (2004). *Technology learning principles for preservice and in-service teacher education.* In Contemporary Issues in Technology and Teacher Education [Online serial], 4(3). Available at: http://www.citejournal.org/vol4/iss3/general/article2.cfm (accessed on 8/4/08)

Hunter, B., (2001) *Against the Odds: Professional Development and Innovation Under Less-Than-Ideal Conditions,* In Journal of Technology and Teacher Education (9) 4, pp. 473 – 496.

Impact2 BECTA report (2002), [online], Available at: http://www.becta.org.uk/impact2/ (accessed on 16/01/09).

ISTE (1999) *National Educational Technology Standards for Students – Connecting Curriculum and Technology* [Online] Available at: http://www.iste.org/standards/index/html (accessed on 12/12/06).

ISTE (2000) *National Educational Standards For Teachers* [online] Available at: http://www.iste.org/standards/ (accessed on 12/12/06)

Jonassen, D.H., & Colaric, S., (2001) *Information Landfills contain knowledge; searching equals learning, hyperlinking is good instruction and other myths about learning from the Internet.* In Computers in Schools, Vol 17(3/4), Part 1, pp. 159-170.

Jonassen, D.H., Peck, K.L., & Wilson, B.G., (1999) *Learning with Technology: A Constructivist Perspective.* New Jersey: Prentice-Hall.

Jonassen, D.H., Howland, J., Moore, J., & Marra, R.M., (2003) *Learning to Solve Problems with Technology: A Constructivist Perspective,* New Jersey, Pearson Education Inc.

Kanwar, A., (2008) *Signs of the times: change or be changed,* Unpublished speech at the Third Convocation of the Tamil Nadu Open University, India, [online] Available at: http://www.col.org/colweb/site/cache/bypass/pid/5072?print=1 (accessed on 31/10/08)

Kelly, P., Gale, K., Wheeler, S., & Tucker, V., (2007) *Taking a stance: promoting deliberate action through online postgraduate professional development,* In Technology, Pedagogy and Education, Vol. 16, No. 2, pp. 153 - 176.

Kent National Grid for Learning website, *ICT Integration definition,* [online], Available at: http://www.kented.org.uk/ngfl/ict/ (accessed on 10/10/08).

Kerr, S. T. (Ed.) (1996). *Technology and the future of schooling: A critical perspective.* 95th NSSE Yearbook, Part 1. Chicago: University of Chicago Press.

Kirschner, P., & Davis, N., (2003) *Pedagogic Benchmark for Information and Communications Technology in Teacher Education,* In Technology, Pedagogy and Education, Vol. 12, No. 1, pp. 125 – 147.

Kirschner, P.A., & Lai, K.W., (2007) *Online Communities of Practice in Education* In Technology, Pedagogy and Education, Vol. 16, No. 2, pp. 127 – 131.

Knafl, K.A., Pettengill, M.M., Bevis, M.E., and Kirchhoff, K., (1988) *Blending Quantitative and Qualitative Approaches to Instrument development and data collection.* In Journal of Professional Nursing, 4 pp.30 – 37.

Korte, W.B., and Husing, T., (2006) *Benchmarking Access and Use of ICT in European Schools 2006: Results from Head Teacher and Classroom Teacher Surveys in 27 European Countries,* [online] Available at: http://europa.eu.int/information_society/eeuropa/i2010/docs/studies/final_report_3.pdf (accessed on 10/9/09).

Kvale, S., (1996) *Interviews,* London, Sage Publications.

Kvale, S., & Brinkmann, S., (2008) *Interviews: Learning the Craft of Qualitative Research Interviewing,* London, Sage Publications.

Laurillard, D., (2002) *Rethinking University Teaching: A Framework for the effective use of learning technologies,* London: Routledge Falmer Publ.

Lave, J., & Wenger, E., (1991) *Situated Learning: Legitimate Peripheral Participation.* UK, Cambridge University Press.

Leask, M., & Pachler, N., (2001) *Learning To Teach Using ICT In The Secondary School,* London: Routledge Falmer Publ.

Lebec, M., & Luft, J., (2007) *A Mixed Methods Analysis Of Learning In Online Teacher Professional Development: A Case Report.* In Contemporary Issues In Technology And Teacher Education, 7(1), pp. 554 – 574.

Leeder, D., McLachlan, J., Rodrigues, V., Stephens, N., Wharrad, H., & McElduff, P., (2004) *Universities' Collaboration in E-Learning (UCEL): A Virtual Community of Practice in Health Professional Education,* In IADIS Web-based communities 2004 (pp. 386 – 393) Ed., by: Kommers, P., Isaias, P. & Nunes, M B. IADIS Press.

Lewis, D., & Allan, B., (2005) *Virtual Learning Communities: A Guide for Practitioners,* UK, Open University Press.

Li, Q., (2007) *Student and Teacher Views About Technology: A Tale of Two Cities?* In Journal of Research on Technology in Education, Eugene Vol. 39, Iss. 4; pp 377.

Lim, C.P., and Khine, M.S., (2006) *Managing Teachers' Barriers to ICT integration in Singapore Schools,* In Journal of Technology and Teacher Education, Vol. 14 (1) (pp. 97 – 126)

Lock, J., (2006) *A New Image: Online Communities to Facilitate Teacher Professional Development,* In Journal of Technology and Teacher Education, Vol 14, No. 4, (pp. 663 – 679).

Loucks-Horsley, S., (1996) *Professional Development for Science Education: A Critical and Immediate Challenge,* In Bybee, R., National Standards and the Science Curriculum, Iowa, Kendall/Hunt Publishing Co.

Loveless, A., DeVoogd, G.L., and Bohlin, R.M., (2001) *Something old, something new... Is pedagogy affected by ICT?* In Loveless, A., and Ellis, V., (ed.,) ICT, Pedagogy and the Curriculum, London, Routledge Falmer.

MacDonald, R.J., (2008) *Professional Development for Information Communication Technology Integration: Identifying and Supporting a Community of Practice through a Design-Based Research,* In Journal of Research on Technology in Education, 40 (4), (pp. 429 – 445).

Matzen, N.J., & Edmunds, J.A., (2007) *Technology as a Catalyst for Change: The Role of Professional Development,* in Journal of Research on Technology in Education, Vol. 39, Iss. 4; pp. 417 – 427.

McCarney, J., (2004) *Effective Models of Staff Development in ICT* in European Journal of Teacher Education Vol 27, No. 1, pp. 61 – 72. Carfax Publishing.

McCrory, R., Putnam, R.T., & Jansen, A., (2008) *Interaction in Online course for teacher education: Subject matter and pedagogy* In Journal of Technology and Teacher Education, 16 (2), (pp. 155 – 180).

Mc Cloat, A., (2008) *The Integration of ICT in the Teaching of Home Economics in order to facilitate the Constructivist Approach to Teaching and Learning,* In Jahrbuch Junge Haushaltswissenschaft, Berlin, Schaltungsdienst Lange o.H.G.

McKenzie, J., (1999) *Scaffolding for Success (an excerpt from McKenzie's Beyond Technology)* In The Educational Technology Journal, Vol 9 No 4 December 1999. [Online] Available at: http://fno.org/dec99/scaffold.html (accessed on 14/12/2006).

McConnell, D., (2006) *E-Learning Groups and Communities,* UK, Open University Press.

Mc Winney, M.G., (2002) *The Design, Implementation and Evaluation of A Home Economics CAL Resource.* MA in Education, University of Limerick, Ireland, In Murchu, D., & Freeman, E., (2003) *Best Practice in Designing Interactive On-Line Materials in Home Economics for Second Level Students in Ireland,* [online] Available at: http://www.editlib.org/index.cfm?fuseaction=Reader.ViewAbstract&paper_id=18089 (accessed on 9/10/08).

Merchant, G., (2006) *Identity, Social Networks and Online Communication,* In Journal of E-learning, Volume 3, No. 2, (pp. 235 – 244).

Merkley, D., Dufflemeyer, F., Beed, P., Jensen, S., and Bobys, A., (2007) *Using the R2D2 Model for Creating Collaboration Among Participating Teachers and Preservice Teachers During Reading Assessment Preparation at Four Universities,* In Journal of Technology and Teacher Education, Vol. 15, No. 4, (pp. 463 – 482).

Moore, J., & Chae, B., (2007) *Beginning teachers' use of online resources and communities,* In Technology, Pedagogy and Education, 16: 2 (pp. 215 – 224).

Moseley, D., & Higgins, S., (1999) *Way Forward With ICT: Effective Pedagogy Using ICT for Literacy And Numeracy In Primary Schools,* London: Teacher Training Agency.

Mugliett, K., (2008) *A Brief for an ICT Policy: Vision and Strategy at the Convent of the Sacred Heart,* (unpublished report)

Mugliett, K., (2008) *Integration of Technology: An Ongoing Support Course for Teachers: Ideas and More,* (unpublished report)

Mumtaz, Sh., (2000) *Factors Affecting Teachers' Use of Information and Communications Tecnology: a Review of the Literature.* In Journal of Information Technology for Teacher Education, Vol. 9 (3)

Murchu, D., & Freeman, E., (2003) *Best Practice in Designing Interactive On-Line Materials in Home Economics for Second Level Students in Ireland,* [online] Available at: http://www.editlib.org/index.cfm?fuseaction=Reader.ViewAbstract&paper_id=18089 (accessed on 9/10/08).

National Board of Professional Teaching Standards, (2006) *Five Core Propositions,* [online] Available at: http://www.nbpts.org/about/coreprops.cfm (accessed on 30/10/08).

National Council for Accreditation of Teacher Education (1997) *Technology And The New Professional Teacher: Preparing for the 21st Century Classroom* [online] Avaliable at: http://www.ncate.org/accred/projects/tech/tech-21.htm (accessed on 19/2/08).

National Council for Accreditation of Teacher Education (2002) *Professional standards for the accreditation of schools, colleges and departments of education.* [online] Available at: http://www.ncate.org/documents/unit_stnds_2002.pdf (accessed on 19/2/08)

National e-Learning Strategy for Malta 2008 – 2010, (2008) *Smart Learning,* published jointly by the Ministry of Education and the Ministry for Investment, Industry and Information Technology, Malta.

National ICT Strategy for Malta 2008 – 2010, (2008) *The Smart Island,* Ministry for Investment, Industry and Information Technology, Malta.

National Council for Educational Technology, (NCET), (1994) Information Technology Works! Stimulate to Educate, Coventry, NCET

NCET (1994) *Information Technology Works! Stimulate to Educate.* Coventry: NCET.

Niesz, T., (2007) *Why Teacher Networks (Can) Work,* In Phi Delta Kappan, Vol. 88, Iss. 8; (pp. 605 – 610), Bloomington.

Nonnecke, B., (2000) *Lurking in email-based discussion lists.* Unpublished Ph.D., South Bank University, London.

Ormrod, J.E., (1999) *Human Learning.* Upper Saddle River, NJ: Prentice-Hill [online] Available at: http://teachnet.edb.utexas.edu/~lynda_abbott/Social.html (accessed on 19/3/08)

Ornberg, T., (2003) *Why Computers? Constructivist Language Learning On The Internet,* unpublished degree assignment for the Department of Modern Languages, Umea University, Sweden.

Osborne, J., and Hennessy, S., (2003) *Report 6: Literature Review in Science Education and the Role of ICT: Promise, Problems and Future Directions,* [online] Available at: http://hal.archives-ouvertes.fr/docs/00/19/04/41/PDF/osborne-j-2003-r6.pdf (accessed on 26/1/09).

Pajares, M.F., (1992) *Teachers' Beliefs and Educational Research: Cleaning up a messy construct.* In Review of Educational Research, 62, (pp.307 – 332).

Passey, D., (2006) *Technology enhancing learning: analysing uses of information and communication technologies by primary and secondary school pupils with learning frameworks,* In The Curriculum Journal, Vol 17 No 2 (pp. 139 – 166).

Pearson, J., (2003) *Information and Communications Technologies and Teacher Education in Australia,* In Technology, Pedagogy and Education, Vol. 12, No. 1, pp. 39 – 57.

Pedretti, K.A., Smith-Mayer, J., & Woodrow, J., (1999) *Teaming Technology Enhanced Instruction in the Science Classroom and Teacher Professional Development,* In Journal of Technology and Teacher Education, Vol. 7 pp. 131 – 143.

Pincas, A. (2006). *Innovation within Traditional Boundaries: An Exploration of the Role of New Media in Education.* Paper presented at the Institute of Education, University of London conference on 'Preparing Teachers for a Changing Context', London, May 3-6, 2006. [online] Available at:

http://www.ioe.ac.uk/May2006/Papers/AnitaPincas_Paper.doc. (accessed on 12/8/06)

Piscopo, S., (2006) *Home Economics in Malta: when it started, how it grew, where it's at,* In Consumer Studies Today, Spring 2006, Vol. 7 No. 1

Prensky, M., (2005) *Adopt and Adapt: School Technology in the 21st Century,* [online] Available at: http://www.marcprensky.com/writing/Prensky-Adopt_and_Adapt-Edutopia-01.doc- (accessed on 10/1/09).

Preston, C., (2007) *Social Networking between Professionals: What is the Point?* [online] Available at: http://www.mirandanet.ac.uk/preston/ (accessed on 2/12/2008).

Prestridge, S., (2002) *Constructive dialogue in ICT professional development for the transformation of teachers' pedagogical beliefs and practices.* [online] Available at: http://www.aare.edu.au/07pap/pre07376.pdf (accessed on 24/1/09).

Ramsden, P., (1992) *Learning to Teach in Higher Education,* London: Routledge.

Richardson, V., (2003) *Preservice Teachers' Beliefs.* In Advances in Teacher Education, 6 (1), (p. 22).

Robinson, B., (2006) *Using ICT to improve teacher quality: dimensions of change and challenge in the context of rural China,* (unpublished paper at the Conference: Preparing Teachers for a Changing Context, Institute of Education, University of London, UK, May 2006).

Rogers, E., (2003) *Diffusion of Innovations,* New York, Free Press Inc.

Russell, T.L., (1999) *The No Significant difference phenomenon,* Chapter Hill, NC: Office of Instructional Telecommunications, North Carolina State University.

Salmon, G., (2002) *E-Moderating,* London, Kogan Page.

Sandholtz, J., Ringstaff, C., and Dwyer, D., (1991) *The Relationship between Technology Innovation and Collegial Interaction (Report 13 of the Apple Schools for Tomorrow),* [online] Available at: http://images.apple.com/nl/images/pdf/acotlibrary/rpt13.pdf (accessed on 27/12/2008).

Sandholtz, J., Ringstaff, C., and Dwyer, D., (1997) *Teaching with Technology,* New York, Teachers' College Press, pp 37 – 47.

Schkudlara, S., (2008) *E-learning 2.0 applied to language learning market,* [online] Available at: http://www.dailynet..de/InternetWeb/28269.php (accessed on 2/11/2008).

Schon, D.A., (1987) *Educating the Reflective Practitioner: toward a new design for teaching and learning in the professions.* San Francisco, Jossey-Bass, Inc.

Scrimshaw, P., (2004) *Computers And The Teacher's Role,* In Somekh, B., & Davis, N., Using Information Technology Effectively in Teaching And Learning, London, Routledge.

Sherry, L., Billig, S., Tavalin, F., and Gibson, D., (2000) *New Insights on Technology Adoption in Schools,* In THE journal, Vol 27, Issue 7 (pp. 42 – 46).

Sherwood, S., (1999) *A Formula for Transformation: From Computer Lab To Technology Class,* in Learning and Leading with Technology Vol 27 No. 3 pp 28 - 31, US.

Strauss, A., & Corbin, J., (1998) *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory,* USA, Sage Publications.

Sutherland, R., Armstrong, V., Barnes, S., Brawn, R., Breeze, N., Gall, M., Matthewman, S., Olivero, F., Taylor, A., Triggs, P., Wishart, J., and John, P., (2004) *Transforming teaching and learning: embedding ICT into everyday classroom practices,* In Journal of Computer Assisted Learning, 20, (pp. 413 – 425).

Takahashi, M., Fujimoto, M., and Yamasaki, N., (2003) *The Roles and Effects of Active Lurking in In-House Online Communities,* [online] Available at: http://portal.acm.org/citation.cfm?id=958162 (accessed on 10/11/2008).

Teo, Y.H., and Webster, L., (2008) *Acquiring Knowledge from Asynchronous Discussion,* In Journal of Technology and Teacher Education, Vol. 16, No. 3, pp. 265 – 281.

UNESCO (2002), *Information and Communication Technologies in Teacher Education: A Planning Guide,* France, Division of Higher Education, UNESCO.

Urdzina-Deruma, M., & Selvaha, L., (2007) *Application of Information Technology in H E and Technologies,* In ICT in Education: Reflections & Perspectives, Bucharest. [online] Available at: http://bscw.ssai.valahhia.ro/pub/bscw.cgi/d257199/Paper15_M_Urdzina_18_125.pdf (accessed on 8/10/08)

US Department of Education (2003) *Federal funding for educational technology and how it is used in the classroom: A summary of findings from the Integrated Studies of Educational Technology,* Cited in Ertmer, P., (2005) *Teacher Pedagogical Beliefs: The Final Frontier in our Quest for Technology Integration?* In Educational Technology: Research and Development, Vol. 53, 4, (pp. 25 – 39)

Vassallo, E., (2004) *An Evaluation of the Laptops for Teachers Programme in Malta,* unpublished dissertation for an M. Ed study, University of Exeter.

# APPENDICES

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# MISSING PAGES

**APPENDIX 1**
**Table 1A**

# TABLE 19 (1A – 1G)

| ACTION | TAKE UP | SHARING EXPERIENCES | UNINTENDED DEVELOPMENT | SUMMARY OF OUTCOME | ASSESSMENT OF OUTCOME | NEXT STEP |
|---|---|---|---|---|---|---|
| Discussion. 1: what are my feelings about ICT in the classroom. Trying to get teachers to explore and share their pedagogic believes and views on ICT in class. | 2 postings by 2 people | KM wanted to test attitudes of teachers towards ICT and whether they believe that it can work. KM posted a long contribution from a paraticipant on 8 reasons why she favours ICT for classroom use. Other participants confirmed the immense opportunity provided by technology where it enhances the learning experiences | Only 2 postings. Could be that the information posted by KM said too much and left no room for further discussion. No discussion emerged on feelings and attitudes | 1 Researcher, 1 Participant, 50 Observers | No conclusive picture on how teachers feel about ICT in HE or their attitudes. | A Survey on ICT Equipment in schools and a Continuum to try to see where teachers are in terms of feelings towards ICT. |
| ICT Equipment Survey. Week 3 to make teachers aware of existing equipment and know what other schools have. | 6 answered, 5 teachers and 1 student teacher. | Filling in of Survey. Healthy discussion going on on ICT and positive attitudes towards it. No reference to survey. | Few answered survey, yet used this section to express themselves on ICT. Gave rise to one of the best discussions on ICT in this CoP. | 1 Researcher, 6 answered Survey, 20 postings, 10 participants, 41 observers. | Good discussion on ICT developed here. Did not discuss equipment in schools though. | Sent a reminder to participants to answer survey |
| ICT Continuum Survey. Week 3 To share teachers' attitudes towards ICT at present and where they hope to be in 3 years' time. | 3 answered | No discussion | Only 3 submitted the continuum despite repeated reminders so there will be very little information to process. | 1 Researcher, 3 answered survey, 4 postings, 4 participants, 48 observers. | Not enough information to give a general picture, however these teachers still have a voice. | Sent a reminder |
| Discussion 2 - Week 5 Utilising Roger's Diffusion of Innovation - first percieved attribute - Relative Advantage - Is the Innovation better than what it replaces? | 39 postings, 14 participants | To support I posted information and gave the teachers a list of homework examples using ICT, alternatives for those that do not have ICT access and examples of technology tools that one can use. Good discussion but not on actual question and not on the homeowrk suggestions. One student teacher who was working on the last part of her dissertation on ICT and non-ICT lessons, As a result we received 22 postings, although these contain other topics as well. One teacher gave information on her visit to the UK, and applied technology there. 4 gave homework ideas and their own examples. | I tried to show there are equipment and resources in schools which can be used, despite the logistical problems. Feedback from another teacher regarding informal information she gathered shows there are positive attitudes towards ICT as this increases motivation, enhances students' behaviour and improves it and aids class management. No one gave feedback on any of the examples I gave. | 1 Researcher, 39 postings, 14 participants, 4 of which gave homework ideas. 38 observers. | Lots of participaton but not directly on Rogers' first step - although I used the student-teachers dissertation on ICT and non ICT lessons to try to bring out more discussion. Other things mentioned which are worth noting include: collaboration, sharing, lots of resources in schools, how to use these resources,suggestions to each other on ICT and on Nutrition. Asked teachers for list of nutrition topics teachers not yet done that year. | Will try to provide activities on those topics still required by teachers. To provide section for feedback on homework ideas using ICT to facilitate answering. |
| Week 6 - Feedback session for homework ideas given in previous discussion. | Nil | Questions asked to facilitate and prompt feedback No sharing. | No sharing and no feedback given elsewhere, however, other ideas were shared in above mentioned discussion. | | Participants have ignored this posting or maintained observer status. | To give some informed knolwedge on ICT trends in education. |
| Note 1 - Why Teach With ICT? What is the Potential? | Nil | Participants cannot give feedback in this section. I listed some of the 27 assertions published by the NCET, 1994 | | | | Felt the need to start giving concrete ideas but want to start with a simple idea: Webstories. |

**Table 1B**

| | | | | | | |
|---|---|---|---|---|---|---|
| Webstories 1 Webstories 2 | | | | | | This is now one and a half months into the CoP functioning. Felt the need for hands on activities, so no more discussions for now, so as to test response too. |
| Week 7 - ICT Activity 1. Teaching the Concept of Portion Size using the Internet. Here introducing technology as a tool to appreciate its value only. | Nil - this was not a forum | I posted a fun and interactive url of a site which allows students to compare present portion sizes to portion sizes of 20 years ago. This is done in the form of a quiz. There is also a homework activity. | | 1 Researcher | To allow time for testing this activity is class-based and asks for feedback of outcome. | At this point it would be a good idea to allow the participants to post any ICT ideas they use and share their good practice. |
| Sharing of Good Practice 1 by teachers in schools | 15 postings | Postings included are text based eg - discussions, handouts, urls, pdf file, more information on serving sizes, classwork and hw on excel, PowerPoint presentation on HE investigation work, article. | Good sharing but would have liked much more to share or at least to comment. | 1 Researcher, 15 postings, 8 participants, 9 postings were ICT activities, 43 observers | Responses were encouraging and did show that ICT is being used by some teachers although a high percentage only lurked - one has to see if it could be because of lack of ICT use, confidencce, time or not wanting to share. | To open up this sharing of good practice to student-teachers too. These can present some exceptional work which would have been presented for assignments during the ITE courses. |
| Sharing of Good Practice 2 by student-teachers | 28 postings, 9 participated, 5 were studying | Some good websites were suggested eg: a PowerPoint of a demonstration - made by a student herself using Illuminatus, photos of this presentation being used, a database of software available for the HE curriculum, a pop song on table manners, PowerPoint presentation on diet-related disorders - uploaded later by a student, names of books sold with CD-Roms. There were lots of exchanges here especially in the posting to discuss a student's presentation of a demonstration. Most were exchanges between myself and this student though. Other postings included:statements which show that we owe students interesting and fun lessons where understanding takes place, the importance of visuals, ICT, hands on approaches, constructivist learning, use of media, experiments and problem-solving situations. Other discussion included info on ways of how student teachers have used ICT in class but not shared as resources. eg ppt, video clips, etc. | | | | |
| Week 8 - ICT Activity 2 - Food Labelling - making it fun and interactive. | This was not a forum, therefore no feedback here. | Activity was on Food Labelling. KM gave an information sheet on the topic, a website with an excellent reference on food labels and relevant lesson plans, questions to aid rflection and feedback on relative advantage. | No sharing | None | Participants here received this information which was listed in the form of an assignment and either chose not to participate or were observing and taking in the information. Topic may have also been covered. | Decided to keep on posting some more ICT activities. |

**Table 1C**

| | | | | | | |
|---|---|---|---|---|---|---|
| Week 9 - ICT Activity 3 - Horrible Science - CD-ROM to make use of available resources | | These were a set of 4 CD-ROMS available with cereal packets from local supermarkets. The CD-ROMS were useful and so I suggested the possibility of buying them to the particiants. 1 teacher did say she then bought them. | | | | |
| Week 9 - ICT Activity 4 Sugar using constructive learning approach (CLA) and ICT: Constantly exploring ICT. | | This activity included ICT and a constructive learning approach. It included a teacher's part, a students' part, an ICT activity, HW which involved discovery and extension work. Also gave urls to search more information on sugars, sweeteners. Ask for feedback even if just to comment on the constructive activities, even if not tried out? | | | | |
| Week 10 - ICT Activity 5 - Computer Generated Dietary Analysis programmes: one to buy and one for free to move teachers away from manual methods. | This was presented in the form of an assignment. | | | | | |
| ICT Activity 6 - Fast Food Restaurants and Calories using ICT merely as a tool but involving comparative techniques. | This was presented in the form of an assignment | A url of a website which lists the nutritional information for several fast food restaurants was given. Several ideas for comparative tasks and use of the websites were given. | | | | Now feeling the need to go back into discussions and supporting research material on ICT in Education - therefore will post Note 2 on Feeling Good About Innovation. To create a forum with same title as note so as to prompt a discussion. |
| Week 11 Note 2 - Feeling Good About Innovation | Note: saw no feedback here but a forum will be created with same title to allow discussion. | Emphasis in this note was on the need to try out ICT and that using a computer for personal use is not the same as using a computer in class. Teachers need to feel the need for innovation and need to see that the innovation is relevant. The innovation needs to be consistent with attitudes and beliefs. In this CoP I am trying to create an awareness, hence generating an interest and then a need: first through knowledge of innovation, then creating a motivation for learning more and finally adopting it. An innovation comes with 3 questions: What is the innovation? How does it work? Why does it work? Link to forum with the same title to give space for discussion. | | | | |

**Table 1D**

| | | | | | | |
|---|---|---|---|---|---|---|
| Discussion 3 - Feeling Good About Innovation | 5 postings, 1 Researcher, 3 participants incl. the researcher. | Posted questions here to help give feedback on attitudes towards ICT, knowledge, CoP involvement and contributions, adopting the work. Is ICT an important innovation in our curriculum? Another participant gave feedback on ICT after having spoken to a number of teachers. Are teachers feeling the need for innovation? Is ICT relevant to students' needs? CoP is excellent for this; unfavarouble attitudes could be linked to limited or lack of availability of ICT equipment in food labs. | Some good information shared here giving also an insight into some perceptions which local teachers have on ICT. The note above seemed to be taken well so I posted some more information on ICT research such as teachers do not feel adequately prepared to integrate technology due to lack of training or concrete examples: tech instruction in ITE usually involves teaching about technology not with tech; trying to give concrete examples through CoP; ultimate aim is for teachers to integrate ICT in a way in which students will also be involved in ICT experiences that contribute to their learning. Can't blame teachers for not using ICT. | Good discussion but from a very limited number of teachers. It seems that teachers prefer to absorb, observe and reflect in silence. Some good leaders in these discussions probably say it all too, so others do not feel the need to elaborate or confirm. | Feel the need to discuss teachers' difficulties and expose as many technology opportunities as possible. Teachers can then choose the medium and method they prefer. Hence Discussion 4 will be on: Getting comfortable with the Innovation. | |
| Note - Listing the Professional Preparation for Technology Integration - Professional Performance Profiles (ISTE 2000) | Nil | Technology is not a one course recipe - there are many requirements - see Professional Preparation Performance Profiles (ISTE 2000). Teachers need a shared vision, access, skilled educators, prof. developemnt, technical assistance, content standards, curriculum resources, student centred teaching, assessment and communities. | | Asked teachers to take these standards to school. | | |
| Week 12 discussion 4 - ICT Ideas: Get Comforatble with Innovation | 8 postings, 5 participants | This forum asked the participants to list ideas of how they think they can integrate ICT in HE, especially now following this exposure on the CoP. I started the ball rolling by listing 15 ICT ideas. | | From all the 8 postings only 1 gave me feedback on the ideas I listed and extended the discussion. She praised the ideas and commented on 2 in particular. Also stated that resources should be sensible, activities varied and stated that ICT helps motivation. | | Will now be posting some more ICT activities together with some more research to help the teachers develop professionally and gain knowledge on technology in education. |
| ICT Activity 7 - The Virtual Cafeteria: Students constructing meals virtually and reflecting on practice. | | This is a website of a virtual cafeteria which allows the participants to select food as if in a cafeteria and then calculate the nutrition status, evaluate choices, etc. | | | | |
| ICT Activity 8 - Vitamins and Minerals to demonstrate student activity, CLA and ICT use | | 5 different activities were listed here about Vitamins and Minerals and the use of ICT to deliver these usually dificult topics. | | | | |
| Week 13 - Note 3 connecting Technology Learning to Professional Knowledge (Joan Hughes' 2004 work). | | Note 3, 4, 5, 6 are all taken from Joan Hughes' (2004) principles for Technology Integration. | | | | |

**Table 1E**

| | | | | | | |
|---|---|---|---|---|---|---|
| Note 4 Subject Matter and Technologic Pedagogic Connections | | Isomorphism. Hear and experience ideas in subject matter and technology. | | | | |
| Week 14 - Note 5 Using Technology to Challenge Professional Knowledge. | | This principle helps teachers to reflect upon their present practice and challenge it. | | | | |
| Note 6: Teaching Many Technologies | | Principle 4 - Follows on what I presented in Discussion 4 and gives examples of technology opportunities. | | | | |
| ICT activity 9 - Enhancing PowerPoint presentations through an interactive presentation - Cereals. | 12 postings, 7 participants | Feedback showed that this presentation,made by myself and which included ideas which will make presentations more child-centred & interactive. Feedback showed that the ppt was seen to aid understanding, very visual, the inclusion of activities in ppt showed teachers a new idea and this was found to be very useful. Students in class even asked to have a copy of the ppt to use as revision. | One participant in fact stated that although she was not active in the CoP, she always reads emails and stated that she will be using the ppt the following week together with another two activities I posted which seem to be very interesting activities. Others shared some other resources - ppt, urls on food images, website giving access to a good video. So even though the space for sharing good practice was presented earlier in the CoP and can still be accessed, the participants feel free to post elsewhere. | 7 participants, 44 observers/lurkers. | Good feedback on the PowerPoint with remarks on what the teachers liked and some suggestions too. This was almost the only ICT activity which I received feedback on as a result of the participants trying it. Unfortunately it is always a few people participating however, the contributions are good. | |
| Week 15 - ICT Activity 10 - Weight Management | | Teaching about weight management through Constructivist Learning Approach and technology | | | | |
| Week 16 - ICT Activity 11 - Articles/websites and reproducible handouts on Childhood Obesity Low-level use of the Internet. | | ICT was here being used to transfer ideas and information on Nutrition and pass on reproducible resources. The internet is being presented in ways similar to how teachers use it in their existing practice. | | | | |
| Week 17 - ICT Activity 12 - A student - teacher's ppt on Diet Related disorders - sharing ICT. | 2 postings | Thanking for this CoP and this ppt. Fresh ideas by student-teachers can be an inspiration to other more experienced teachers. | | | | |
| ICT Activity 13 - Nutrition Educsites at your fingertips. | | Link to go to numerous sites related to Nutrition Education with lots of fun ideas on how to present nutrition to children. | | | | |

**Table 1F**

| | | | | | | |
|---|---|---|---|---|---|---|
| Week 18 - ICT Activity 14 - 2 other activities: Pop it (CLA) and Rap it (Using Music in lessons). | 2 Feedback postings | Used these two interactive activities with students. They were found to be very interesting and the students loved them. | | | | |
| Note 7 - CLA - Scaffolding | | Note to explain the scaffolding process to use in class | | | | |
| Note 8 - Problem-Solving - another constructivist technique. | | | | | | |
| Week 19 - ICT Activity 15 - Problem-Solving ppt on FATS | | Using ICT and a constructivist approach | | | | |
| Great software sites for Food and Textiles | | | | | | |
| Week 21 - Notice on Interactive Whiteboard (Wbd) Demonstration | | | | | | |
| Note 9 on Interactive Wbd and url for more information | | Was returned to in 2008-09 by student-teachers up-loading their ICT assignments using Interactive Wbd. | | | | |
| Week 22 - Discussion 5- ICT in HE - What type of technology fits in with HE subject methodologies | 3 postings, 2 people | Discussing the drive to include ICT in H E. Are we convinced? Do we really feel ICT will help? Is this uncertainty stopping us? Are we convinced? Do we really feel ICT will help? Feedback showed that those actively participating feel convinced, motivated, ICT seen as a powerful tool, enhances the lessons, important to plan well. Non-ICT lessons can also be good if planned well. | Little participation but since these postings are received via email as well, participants who are less active may still be reading the postings. There is a difference when the forum is on a nutrition topic as many more participants answer. | 3 postings, 1 Researcher, 2 participants, 49 observers | | |
| ICT Activity 16 - Use of a Spread-in HE to achieve higher-order student participation | | | Testing the ground - are teachers ready for this when they are not yet really responding to the other low-level ways of using ICT here? | | | |
| Week 23 - ICT in online professional development (OPD) | Nil | Here I shared findings from different studies of online professional development. I asked the participants to then respond to the statements according to how they felt in this CoP. | Not so happy with the participation. It's more an exercise in distributing material and occassionally they would comment. Tried many different things to encourage participation. | | Trying to emphasise the fact teachers need to find a medium they prefer and that there is the need for professional development so in Discussion 7 I will be including more information on professional development and particularly - 'finding a medium'. | |

**Table 1G**

| | | | | | | |
|---|---|---|---|---|---|---|
| Week 24 - Discussion 7 - OPD Finding an online medium which suits teachers best. | Nil | Moodle, Email, Blackboard - What type is prefered? What are the benefits of any of the above? | | | | |
| From here on uploading ideas without assessing take up, etc. | | | | | | |
| Week 24 - ICT Activity 17 - Making Movies. ICT Activity 18 - Making Images with Bubblr and Flickr. ICT Activity 19 - Make the students perform - using Internet to enhance learning. ICT Activity 20 - An Internet Project for the topic of Housing | | | | | | |
| Week 25 - Discussion topics launched on all main section in HE left for the summer months: Nutrition, Family, Childcare, Consumer Education, The Home, Management of Resources, Environment and ICT Matters | | | | | | |
| Week 26 - ICT Activity 21 - Mediterranean Foods PowerPoint presentation | | | | | | |

## APPENDIX 2

## THE MOODLE SITE – SOME SAMPLE PAGES FROM THE CoP SITE

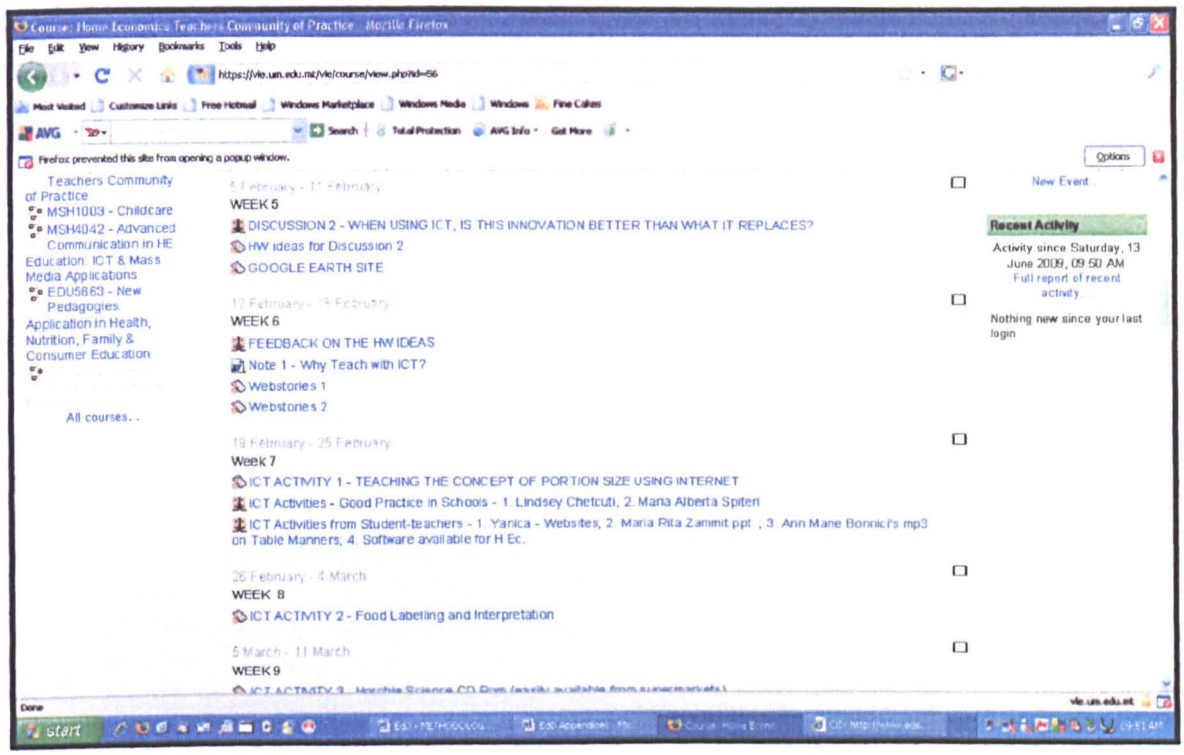


Figure 5

This shows a variety of discussion forums, ICT notes and activities that were emerging in weeks 5 to 8 of the project. One can also note in week 7 the space allotted to the sharing of good practice from teachers in schools as well as from the student-teachers.

**ICT ACTIVITY 2 - Food Labeling and Interpretation**

Below is shows an example of one of the first activities uploaded by me on the CoP which shows important aspects of the topic of food labeling in HE as well as simple and familiar ways of using ICT.

**SOME INFORMATION FIRST.....**

What Must Food Labels include:

1. Common or usual name of the product
2. Name and address of manufacturer, packer or distributor
3. Net contents in terms of weight, measure or count
4. Nutrient contents (panel) of the product
5. Ingredients in descending order or predominance by weight

Large packets/labels must provide all the information listed above.
Smaller packets/labels provides some of the information above in abbreviated form.
Tiny labels may only provide the phone number.

Some labels may also have:

1. Health claims - food constituents with disease risks
2. Nutrient claims - claims used to describe the nutrient values of foods, eg "high in..." or "low in...."
3. Nutrition facts - appears on almost every label stating nutrition information of the product
4. Structure-function claim - a legal claim permitted on labels of dietary supplements and functional foods.

The Nutrition Facts Panel

The top portion of a Nutrition Facts Panel conveys the information specific to the food inside the package. The bottom portion is identical on every label and is a reminder of the Daily Values.

The panel would include:

1. Serving size
2. Servings per container
3. Calories and calories from fat
4. Nutrient amounts and percentages of Daily Values
5. Total fat with a breakdown showing grammes of saturated fat and trans fat per serving
6. Cholesterol - mg per serving
7. Sodium - mg per serving

8. Total carbohydrate - per serving including starch, fibre and sugars
9. Protein
10. Also a label must state the contents of other nutrients expressed as % of the daily values: Vitamin A, C, Calcium, Iron and other nutrients.

In addition you can view the excellent reference:

http://www.cfsan.fda.gov/¬dms/fdnewlab.html

This reference below includes a nice overview of the food label suitable for use in lesson plans.

http://www.cfsan.fda.gov/¬dms/foodlab.html

**The ICT Activity:** The following link has a fun and interactive quiz students can take to test their food label knowledge. You can try it out yourself first.

http://www.cfsan.fda.gov/¬dms/flquiz1.html

If you can't do this at school, make sure you try it out yourself before to know the site well and then assign this quiz for HW. Pupils will then report back their results, findings and you can discuss all with them.

After this activity post your feedback:

1.How did the links above improve your interest in food labelling?

2.Did this kind of preparation help you deliver the lesson well and in a more innovative way?

3.Did the ICT activity motivate the pupils more and did it improve their understanding of food labels, their components and value?

4.Do you think this activity and lesson will help them read labels more?

Karen Mugliett
24/2/07

**APPENDIX 3**

**THE FINAL VERSION OF THE QUESTIONNAIRE FOR THIS RESEARCH**

ONLINE TEACHERS' PROFESSIONAL DEVELOPMENT

BY KAREN MUGLIETT

Please fill in, underline or circle as appropriate in the spaces provided.

Personal Information

1. Name .....
2. Age .....
3. Gender FEMALE / MALE
4. Subjects taught in present school .....
5. Teacher Qualification UNIVERSITY / COLLEGE / OTHER
6. Do you own a computer at home? YES / NO
7. Do you have internet access at home? YES / NO
8. Do you have a computer at school (or access to one)? In office/staffroom: YES / NO and/or in Home Economics room: YES / NO
9. Do you have internet access at school? In office/staffroom: YES / NO and/or in Home Economics room: YES / NO
10. Did you access the CoP from: HOME / SCHOOL / BOTH?
11. How would you rate your computer aptitude and skills:

Very confident Quite confident Not very confident Not confident at all

12. Did you look forward to the weekly postings? YES / NO

Why/Why not?

.....

.....

13. How valuable do you think these postings were?

Very Valuable Valuable Not very valuable Not valuable at all

14. Did you gain an understanding of how ICT can be used or can be part of the Home Economics (H Ec) curriculum?

YES / MORE OR LESS / NO

15. Did you just rely on what you received via email or did you access the CoP site?

ONLY VIA EMAIL / ACCESSED SITE TOO

16. How do you rate your activity on the CoP? – Underline one of the following:

Leader/Innovator
Active
Moderate Participation
Observer with little participation
Passive.

Give reasons for your answer .....
.....
.....

17. On a scale from 1 to 5, how do you rate your attitude towards technology in general?

Very comfortable Very uncomfortable
1 2 3 4 5

18. On a scale from 1 to 5, how do you rate your attitude (or describe) towards technology in schools?

Very comfortable Very uncomfortable
1 2 3 4 5

19. Did this CoP satisfy an interest or a need you felt towards technology?

YES / NO

If yes, how?
.....
.....

20. Did you select what to read from the postings and contributions?

YES / NO I READ ALL

If yes, what criteria did you use in this selection? .....
.....
.....

21. Do you feel the need for this innovation (ICT) in Home Economics?

YES / NO / NOT REALLY

22. Did you find the ICT activities relevant to your teaching?

YES / NO / SOMEWHAT RELEVANT

Why? .....
.....

23. If you did not find the activities appropriate or timely this year, will you try and use next year?

YES I WOULD LIKE TO USE NEXT YEAR / NO I THINK IT WILL BE DIFFICULT TO USE ICT NEXT YEAR / NOT SURE

If not, why not? .....
.....

24. Had you previously felt the need to introduce ICT into your teaching?

YES / NO

25. Do you feel the need of an input of new pedagogies in teaching?

YES / NO / NOT REALLY

26. Have you discovered new pedagogies through this CoP?

YES / NO

27. Did you feel motivated to learn more ICT pedagogies/activities to ultimately adopt in class or not?

YES / NO / SOMEWHAT MOTIVATED

28. Would you say that you had an awareness of ICT use in class and then the CoP created a need for you to learn more from it or was it vice versa, that is you felt the need to utilise innovation and then wanted to participate in the CoP to gain some knowledge?

FORMER / LATTER

29. How far do you feel the CoP has given you an awareness towards ICT use in Home Economics and a range of desirable new ideas?

| Very Much | | | | Not at all |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

30. Are you motivated to use and/or teach about this innovation now in class more than before you participated in the CoP, or not?

VERY MUCH / NOT REALLY / NOT AT ALL

31. Do you feel that ICT in class does make a difference to the teaching and learning?

YES / NO / NOT REALLY

Why? .....
.....

32. Will you be looking out for more ICT ideas beyond the CoP?

YES / NO

33. Did you use ICT in class before?

YES / NO

Give some examples .....
.....

34. Where would you rate yourself regarding ICT and your:

"awareness-knowledge" -

| CONFIDENT | | | | NOT CONFIDENT |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

"how-to-use it correctly" knowledge -

| CONFIDENT | | | | NOT CONFIDENT? |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

35. Do you feel you have reached an adequate level of how-to-use it correctly knowledge now?

YES / NO

36. Do you feel you now know how to use ICT in class better than before, or not?

YES / NO / SOMEWHAT

Why? .....
.....

37.Do you feel you have formed a favourable attitude towards ICT?

# MISSING PAGES ARE UNAVAILABLE

45.Can you list a few advantages and disadvantages of ICT use in class?

| ADVANTAGES | DISADVANTAGES |
|---|---|
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |

46.Have you adopted ICT as a teaching method in class?

YES / NO

If NO, why .....
.....

47.Where would you position yourself vis-à-vis "adoption of ICT in class" in the following criteria? -

CONFIDENT ADOPTION - PARTIAL ADOPTION - RELUCTANCE – REJECTION.

48.Can you list the ICT activities or other material that you made use of from the CoP?

.....
.....
.....
.....
.....
.....
.....
.....

49.Did you find any problems with the implementation of these activities?

YES / NO / NOT APPLICABLE

If YES, what were the difficulties:
.....
.....
.....

50.Did you face any of these problems (PLEASE TICK WHERE APPROPRIATE) :

discipline in class
logistical
availability of computer lab
technical and lack of technical support
uncertainty
apprehension
lack of confidence
other (please state) .....

51. What other forums/discussions or activities attracted you to the CoP?

.....
.....
.....
.....

52. What made you keep on accessing the CoP?

.....
.....
.....

53. Did you prefer receiving the discussions via email as so happened with the discussion forums or not?

YES / NO

Thank-you very much for taking the time to complete this questionnaire. Kindly send this questionnaire back to me via email, the CoP or by post.

Email: karen.mugliett@um.edu.mt
Post: Mrs. K Mugliett
89, Villino Tarxien,
St. Mary Street,
Tarxien, TXN 7101

Thank-you very much for your time!

Karen Mugliett

**APPENDIX 4**
Table 1 - Step 1

**TABLE 20 (1 – 5)**

| | Diffusion of Innovation | Constructivist Scaffolding Approach | Hughes' (2004) Principles | Sandholtz et al's., (1997) Stages | Online Activities | Subject Specific Technology Tasks |
|---|---|---|---|---|---|---|
| | **Step 1:Knowledge** | **Clarity and step by step instruction** | | | | |
| **Week 1** | | | | | Introduction to the Online Environment | Aim:<br>Familiarisation with Moodle<br>Familiarisation with the Online System of discussion |
| **Week 2** | | | | | Discussion 1: - What are my feelings about ICT in the classroom? | |
| **Week 3** | | | | | Discussion 1A: ICT equipment in schools survey - a discussion to start interaction<br>Where do I belong? A structured continuum on ICT use in class where teachers had to rate their knowledge and aspirations | |

**APPENDIX 4**

Table 2 - Step 2

| | Diffusion of Innovation | Constructivist Scaffolding Approach | Hughes' (2004) Principles | Sandholtz et al's., (1997) Stages | Online Activities | Subject Specific Technology Tasks |
|---|---|---|---|---|---|---|
| | **Step 2:Persuasion** | | | **Phase 2 - Adoption** | | |
| **Week 8** | **5 Observability**<br><br>Results of the innovation become visible to others, through the sharing of good practice. | Scaffolding offers a platform to clarify expectations, through sharing and collaboration, | **Step 3 Using technology to change teaching and learning** | | ICT Collaborative Activity - Sharing of Good Practice by teachers and student-teachers | |
| **Week 9** | | | | | | ICT Activity 3: Horrible Science CD-ROMS<br>ICT Activity 4:Sugar (exploring ICT through a constructivist learning approach idea). |
| **Week 10** | | | | | | ICT Activity 5: Computer Generated Dietary Analysis |
| **Week 11** | | | | | Note 2 Feeling good with Innovation?<br>Discussion Forum 3:Feeling Good about Innovation? | ICT Activity 6: Fast Food Restaurants |

**APPENDIX 4**
Table 3 - Step 3

| | Diffusion of Innovation | Constructivist Scaffolding Approach | Hughes' (2004) Principles | Sandholtz et al's., (1997) Stages | Online Activities | Subject Specific Technology Tasks |
|---|---|---|---|---|---|---|
| | **Step 3:Decision** | | | **Phase 2 - Adoption** | | |
| **Week 12** | **Adoption or Rejection** | Try and test lessons using ICT to eliminate frustrations | **Allow the technology to inspire the discussion into contemporary issues with teaching and learning**<br><br>Teach many technologies - what are technologies and how do they serve students' learning. | | Discussion Forum 4: ICT ideas: Get comfortable with Innovation. 15 ideas were posted for use of ICT in HE. Teachers encouraged to list more ideas. | ICT Activity 7: The Virtual Cafeteria<br>ICT Activity 8: 5 Different ICT activities for use in the topic on Vitamins and Minerals. |
| **Week 13** | | | | | Note 3 connecting Technology learning to Professional Knowledge to suit differenct teachers and different needs. | |

**APPENDIX 4**
Table 4 - Step 4

| | Diffusion of Innovation | Constructivist Scaffolding Approach | Hughes' (2004) Principles | Sandholtz et al's., (1997) Stages | Online Activities | Subject Specific Technology Tasks |
|---|---|---|---|---|---|---|
| | **Step 4: Implementation** | | | **Phase 3 - Adaptation** | | |
| **Week 13** | **Continued Adoption or Late Adoption: Discontinuance or Continued Rejection.** | PowerPoint should show effective integration of technology even if this may be low-level integration | **Include many different technologies so that they fit into the different needs of teachers. Technology options should not be limited.** | | Note 4 Subject Matter and Technological pedagogic Connections | ICT Activity 9: Cereals - an interactive Power Point presentation |
| **Week 14** | | | | | Note 5 Using technology to challenge current professional knowledge<br><br>Note 6 Teaching Many Technologies | |

**APPENDIX 4**

Table 4 - Step 4cont

| | Diffusion of Innovation | Constructivist Scaffolding Approach | Hughes' (2004) Principles | Sandholtz et al's., (1997) Stages | Online Activities | Subject Specific Technology Tasks |
|---|---|---|---|---|---|---|
| | **Step 4: Implementation** | | | **Phase 3 - Adaptation** | | |
| **Week 15** | | | | | | ICT Activity 10: Weight Management Programmes through CLA and ICT |
| **Week 16** | | | | | | ICT Activity 11: Articles on childhood obesity |
| **Week 17** | | | | | | ICT Activity 12: Student-teacher's PowerPoint representation on Diet Related Disorders - more sharing of ICT resources by a student-teacher<br>ICT Activity 13 Nutrition Education Sites at your fingertips |
| **Week 18** | | | | | Note 7 - constructivist Teaching Approach - Scaffolding Techniques | ICT Activity 14: Using Music:Pop It (using CLA) and Rap it (using music) |

**APPENDIX 4**

Table 4 - Step 4cont

| | Diffusion of Innovation | Constructivist Scaffolding Approach | Hughes' (2004) Principles | Sandholtz et al's., (1997) Stages | Online Activities | Subject Specific Technology Tasks |
|---|---|---|---|---|---|---|
| | **Step 4: Implementation** | | | **Phase 3 - Adaptation** | | |
| **Week 19** | | | | | Note 8 - Problem Solving using constructivist Approach | Great Software sites for textiles |
| **Week 20** | | | | | | ICT Activity 15 - Problem-solving PowerPoint for FATS |
| **Week 21** | | | | | Note 9 - The interactive whiteboard - a powerful pedagogical tool. | Invited the participants to a demonstration on the use of an interactive whiteboard |

**APPENDIX 4**

Table 5 - Step 5cont

| | Diffusion of Innovation | Constructivist Scaffolding Approach | Hughes' (2004) Principles | Sandholtz et al's., (1997) Stages | Online Activities | Subject Specific Technology Tasks |
|---|---|---|---|---|---|---|
| | **Step 5: Confirmation** | | | **Phase 4 - Appropriation** | | |
| **Week 22** | **Create a Momentum**.Focus on ICT in HE and teachers' ongoing professional development in this area - try to get teachers to contribute an avalanche of thoughts | | | Aim here is to support the teachers to be fully confident in the use of computers in order to integrate technology regularly into daily routines and pedagogic practices | Discussion 5: ICT in HE | ICT Activity 17 - Making Movies<br><br>ICT Activity 18: Making image files with Bubblr<br><br>ICT Activity 19: Making students perform - using internet to enhance learning |
| **Week 23** | | | | | Discussion 6: ICT IN Online Teacher Professional Development | |

**APPENDIX 4**

Table 5 - Step 5cont

| | Diffusion of Innovation | Constructivist Scaffolding Approach | Hughes' (2004) Principles | Sandholtz et al's., (1997) Stages | Online Activities | Subject Specific Technology Tasks |
|---|---|---|---|---|---|---|
| | **Step 5: Confirmation** | | | **Phase 4 - Appropriation** | | |
| **Week 24** | | | | **Phase 5 - Invention** Teachers experiment with new ways of networking with students and with colleagues and use project based instruction and interdisciplinary approaches | Disccussion 7 - Online Professional Development - Finding a medium which suits teachers best. | |
| **Week 25** | | | | | Opened up discussion forums in the different areas of HE. Therefore site not exculsive to ICT in Nutrition Education from now on. This is meant to keep an ongoing interest. Discussion Forum 8 ICT Matters! - invited all participants to contribute, share, query and discuss ICT Matters here. | ICT Activity 20 - an Internet project for the topic of Housing |

**APPENDIX 5**

**Table 21**

**Description of the ICT activities posted after the first six months of the project.**

| TYPE OF ACTIVITY IN THE ICT MATTERS FORUM | DESCRIPTION |
|---|---|
| Content-free software information | Creating awareness on content free software and claiming that it is a means to involve students in the learning activities. |
| News about new ICT equipment to Secondary school teachers in state schools and in HE rooms | News about teachers receiving laptops and computers being installed in HE rooms. Used this as a means to encourage more teachers to join the CoP or become more active so that HE teachers will be prepared to use ICT as pedagogy in class. |
| Interactive Whiteboard latest innovations podcast and information | A podcast and a classroom experience on the use of the interactive whiteboard in class.<br>B.Ed (Hons.) 4th year students (2008-2009) upload their assignments on work on HE and the use of the interactive whiteboard. Therefore, interactive PowerPoint presentations suitable for use on the interactive whiteboard available on the CoP. |
| An interesting read on IT | Snippet on the way non-computer students see IT careers. |
| Ideas for more ICT integration | 1)Introduced the use of digital photography by pupils in HE eg as in food preparation or step by step instruction of a skill and ultimately getting students to photograph their own preparations, steps, etc.<br>2)Use of Hot Potatoes to build exercises<br>3)JCloze Procedure Computer Exercises |
| Online publications from teachernet.com | Gave link to the site teachernet.com |
| The Design and Technology Syllabus in the UK | Information on the status of HE in the UK in relation to the situation of D&T syllabus |
| The Story of the Liver as told by the Liver | Interesting ready-made power point presentation where the liver itself give information to the viewer |
| Using the knife demonstration and information | Good demonstrations and information from licencetocook.com |
| The Sucking Eggs Community of Practice to help teachers teach with technology | Informative community of practice which gives lots of ideas on integration. |

**Table 22**

**List of the discussion forums which were created on the CoP after the first six months of the project**

| TYPE OF ACTIVITY | DESCRIPTION |
|---|---|
| Discussion 9 – Internet Projects | Description of the advantages of the Internet and its use in education, particularly for resources, communication, networking, interpretation of different perspectives and data, project-work and real artefacts. |
| Discussion 10 – Getting Acquainted with the tools of the Internet | Links to some good sites on information on the Internet particularly focusing on targeting pedagogy, pedagogical considerations and more information. |
| Discussion 11 – Google Online Tools | Describing ways of how Google can be used for email, groups, docs, Web space, blogs and calendar. Main aim is to get teachers used to these opportunities to then use them in class. |
| Discussion 12 – Google Blogs | Information about how to make a blog and how one can use it in class or for communicating one's thoughts to students. |
| ICT Activity 21 – Mediterranean Foods | A ready-made audio-visual stimulating power point presentation |
| 3rd yr student-teachers sharing their ICT practices whilst on teaching practice | Description of how and where they used ICT in their teaching practice. |
| 4th yr student-teachers (2007-08) upload Digital Stories on different topics in H E | An assignment on digital stories was given as part of an ICT pedagogy unit in HE. |
| 4th yr student-teachers (2008-09) upload their Internet projects focusing on different topics in HE | An assignment on Internet projects was given as part of an ICT pedagogy unit in HE. |
| ICT Newsletters | Newsletters were issues as from May 08. There are three others: Summer 08, October 08 and November 08. Lots of information was given in these newsletters with the main emphasis being effective technology integration and use of ICT as a pedagogic practice and not simply a tool. |
| Wiki on Proteins with contributions by the 4th yr student-teachers (2008-09). | Information on how a wiki can be used to build up a project in class – 4th yr student-teachers demonstrating this through the topic proteins. |

**APPENDIX 6**

**INTERVIEW QUESTIONS FOR INTERVIEW**

1. How did you find this web-based method of learning and sharing? Was it convenient for you?
2. Did you feel there was sufficient **collaboration and sharing?**
3. Did the online interaction and collaboration help teachers **share and expose good practice** and promote use of new pedagogies and integrate ICT in the curriculum?
4. Do you feel that the CoP helped to **contribute to new pedagogies and utilise ICT in class** or not?
5. If so how or why not?
6. How far do you feel the **ICT activities** that were proposed helped in raising an awareness of ICT?
7. How far did the CoP manage to engage participants in a forum?
8. How did it affect your knowledge in ICT?
9. How did the online learning process affect your pedagogies if at all?
10. Do you feel better equipped or adequately prepared to teach with ICT and integrate technology into teaching?
11. How would you define technology integration?
12. Do you feel more technical at all?
13. One year on, where do you place yourself in ICT usage and would you say that the CoP has helped you in this respect? Was it effective in developing your classroom practice?
14. Did the CoP investigate appropriate technological tools in Nutrition Education?
15. Why did you/didn't you respond to the many questions/forums provided?
16. Did the CoP provide professional development and help you gain what you didn't know before?
17. Do you think it is a good medium to use for the professional development of teachers?

18. Did it help you to keep abreast with new developments in teaching with ICT or not?
19. If so, how and if no, why not??
20. In a process of: KNOWLEDGE, PERSUASION, DECISION and IMPLEMENTATION AND CONFIRMATION, where would you state you are at?
21. How effective is an online CoP in developing teachers and student-teachers knowledge about ICT in the curriculum?
22. Did the CoP manage to give you attributes which would **persuade** to take a decision to use ICT?
23. Did you see any advantage in the use of ICT over traditional methods?
24. Do you feel ICT may be more complex to use in class?
25. Is ICT compatible with past experiences or your existing values?
26. Did you trial anything?
27. Did the CoP help you observe anything?
28. Did you engage in activities that led you to a choice to adopt or reject the innovation?
29. Was the online medium a good means of communication or would you have preferred a different channel?
30. Was your involvement on the CoP a result of your attitude towards online learning or was it subject to other factors such as time and accessibility?
31. What was the relationship you had between attitude towards online learning and usage?
32. Did you feel comfortable with the medium used?
33. Was it an interesting and useful experience or not?
34. Why?
35. Do you confirm or commit yourself to adopting ICT as pedagogy?

## APPENDIX 7

## PARTICIPANT CONSENT FORMS

### Participant Consent Form for Interviews

I, ....., hereby give consent for Mrs Karen Mugliett to make use of any of my contributions to the HE Community of Practice in her analysis and discussions of the workings of this same Community of Practice, as well as the information shared here in this interview.

I understand that I will not be identified in any way in the final report.

Name.....

May ....., 2008

### Participant Consent sent back via email or through the CoP for use of the discussions and online contributions

Dear Ms Mugliett,

I hereby give consent for Mrs Karen Mugliett to make use of any of my contributions to the HE Community of Practice in her analysis and discussions of the workings of this same Community of Practice. I understand that I will not be identified in any way in the final report.

Regards[1] 6th May 2008

[1] Name has been deleted for confidentiality purposes.

**APPENDIX 8**

*'I think most of educators are in unison re. use of ICT in lessons! I am totally in favour myself. From my personal experience and research which I came across I think that; besides HE being in line with NMC objectives which continuously promote ICT across the curriculum, I also feel that ICT is crucial in education:*

- ***Because the future is here***
  *ICT is the learning and teaching tool of the 21st century. By teaching pupils using ICT, we're not only helping them learn better & providing a more motivating learning experience; we're also preparing them for a workplace – a world – already dominated by the computer. This is today's technology, not tomorrow's.*
- ***Because pupils love it! So a great tool to promote HE!***
  *Incorporating ICT and multimedia resources into our lessons is a great way to reach our students – using technologies, devices and applications that they already love to use in the rest of their lives.*
- ***Because it helps develop teaching professionals too***
  *Teaching using ICT offers us the chance to inject new passion into Home Economics, to adopt fresh approaches to familiar material, and to develop new skills to expand our own career potential.*
- ***Because we will attract students interest and enhance their motivation***
  *I believe ICT leads to a positive relationship between the learner and the environment plus will increase students' interest in our subject*
- ***because it is so flexible...broad range of learning activities***
  *we can use it for games, power point...simplification of lessons, internet links, research, investigations, use of movies & media play-ins, educational DVD's, interactive CD's, photos and pictures...you know list is endless!*
- ***because students expand their ICT and networking skills***
- ***to enhance the involvement of exciting, challenging and engaging modern technologies in HE***

- ***Oh! And because it's fun...***

*many other reasons come to mind...but the ones above are just a couple! We hear a lot about ICT even in school SDP's, media etc & about the investment of ICT in Maltese education...however, we must also try to make use of it...it's not always possible as if there is no ICT access in most Food labs, then obviously it is more challenging. However, my experience (even of most HE colleagues I talk to) is that most schools have Media rooms which one can book & used every now & then...I guess a taste of ICT every now and then in our lessons will make a BIG difference..that is my experience obviously!*

*I do understand that the picture is not all rosy...time factors, accessibility, students' behaviour & our own familiarity with ICT all play a role.'*

(Excerpt taken from the Discussion Forum 1A ICT Equipment in Schools Survey – posted by a participant, 19/01/07)

**APPENDIX 9**

**EXCERPTS FROM FORUM 1 AND 1A**

Interactions to show types of knowledge dissemination in order to assess the knowledge of participants on ICT

ICT...
by KM-
Thursday, 18
January 2007,
09:38 PM

Hi...

I am someone that would love to use ICT in the classroom... either for presenting lessons, or making students use this important tool either to look up some interesting topic or encouraging them to set up presentations for their classmates... I think that this would really boost their moral..and also encourage those students who tend to keep back and feel shy..

ICT would solve the handwrithing problem... especially were teachers are concerned... the reason being that if a teacher has some sort of untidy handwrithing... s/he would be saved by ICT☺

I think that ICT would work a great deal in the classroom!☺

K

Delete | Reply

Rate...

What do we think of ICT in the Home Economics curriculum?
by KAREN MUGLIETT - Saturday, 20 January 2007, 10:01 AM

If I wasn't convinced that ICT could contribute to any subject and all teaching and learning I wouldn't be doing this project. However, in order to get to this position I have obviously read a lot of research in the field and have seen how important and beneficial it is for us teachers to be using ICT in our teaching. It is not going to solve all learning problems, it is not a panacea, it will not necessarily lead to understanding especially if we do not have aims and objectives of what learning we want to take place. It cannot take the place of traditional forms or learning or other pedagogies eg hands on experiences. I believe in **blended learning**. I believe we

should choose the appropriate pedagogies that would suit the topic we want to teach and blend them with traditional forms of learning.

- ICT can offer the opportunities and the resources for learns in Home Economics lessons to have fantastic media rich experiences and utilising methods that will suit the range of learning styles that pupils might have.
- ICT allows pupils to access and achieve wondrous possibilities, from seeking for information, communicating with an expert to creating theri own presentations and multimedia products.
- ICT can enhance teaching and learning as research shows even when it does not involve complex technologies or procedures.

**What do you feel?**
Teachers may feel at a loss sometimes. There may be a gap between what is researched and known about ICT and what is actually found or practiced in schools. Teachers may not be sure of what can be achieved with ICT and are not sure all the trouble is worth the time and money spent. On the other hand pupils seem to take to it immediately and it is their language today. The computer has become part of the family as much as the TV has in most families. It is our future and we need to move our teaching on using technologies and new pedagogies in order to be "speaking" the same language as our pupils are.

Karen Mugliett
20/01/07

ICT and the classroom
by KAREN MUGLIETT -
Tuesday, 23 January 2007, 11:31 AM

The discussion on ICT in Schools goes on throughout this week and can also be found in the forum ICT in Schools.

I'd like you all to participate in the discussion by answering these questions or contributing by posting a short paragraph.

What are your feelings about ICT in the Home Economics curriculum?

Are you aware of what kind of ICT equipment there is in your school?

Do you really think ICT can work in the class?

Can Home Economics and ICT blend together to give an exciting experience of learning?

Karen Mugliett
23/01/07
Show parent | Split | Delete | Reply


Re: ICT and the classroom
by AA - Wednesday, 24 January 2007, 08:50 PM

Hi, i agree with the inclusion of ICT in the HE curriculum as nowadays we r surrounded by ICT and it is an asset to include it. I must say that my school is quite equipped with ICT equipment as we have 3 laptops and projectors, a media room, 4 computer labs and one of them has an interactive board.

I use ICT quite often to do power point presentations about various topics, and i also use some websites to do revision and online games. The students show much more interest as it is quite interactive and appealing because you can add sound, colour, pictures etc which make the lesson very interesting. I also encourage students to use it when doing their HE investigation and sometimes they do posters or banners or even power point presentations to share in the class. I think ICT is a powerful tool as it helps us to teach in a different and better way. It increases our motivation let alone that of our students who spend most of the time sitting down listening to the teacher!

good luck ☺

Show parent | Split | Delete | Reply

Rate...


Re: ICT and the classroom
by KAREN MUGLIETT - Wednesday, 24 January 2007, 10:00 PM

Brilliant, I will be delighted to hear more about your good practice Alison.

When I started on this project and started visiting schools and the ICT Department I was surprised with how much investment there has been in order to give ICT equipment to schools. There are also numerous and very useful courses organised after school hours by the Education Division's ICT Department. These can all be viewed on www.skola.gov.mt

This week I would like all to fill in the ICT Equipment in Schools survey and also the Continuum, then we will discuss this together so that all share what practices there are at their own schools vis a vis ICT equipment. If we learn what is going on in other schools we may be encouraged by what others are doing or have achieved.

We will then discuss good pedagogies and practice as you have mentioned above and move on from there.

I hope we can be seen as a group of "technology integrationists" as Hughes (2004) calls it. You seem to be doing quite well also since you are involving pupils and asking them to present etc. So keep it up and let us know more.

Karen Mugliett
Show parent | Split | Delete | Reply

Re: ICT and the classroom
by AB - Thursday, 25 January 2007, 11:04 AM
Long time no see (my emails☺) because of the exams but at last I have some time to catch up. It is really great to know that ICT in schools is getting much stronger both from the Division and also as a framework of mind among teachers. It seems that the ICT 'fever' of the new century is being positively spread at least.

Regarding my views about ICT especially in Home Economics I believe that it is an excellent way of incorporating interactive learning whilst becoming more technical oriented in our subject. This will sure remove the odd thoughts about Home Economics about being a simplistic or all about cooking subject.

At the same time I believe that ICT is an effective way of passing on knowledge while making the students enjoy it and therefore engage more in the lesson. Students like it since it is something they are more than accustomed to, therefore they enjoy using such activities.

I also believe that thanks to technology we can use a variety of pedagogies both for the actual lesson and as revision, maybe in the future also as exams (more interactive and less stressful and quicker to correct as well☺) When using ICT in the classroom you can add myriad of activities...from games, to PowerPoint, to quizzes and also video clips which would otherwise be quite difficult and more time consuming to carry out. Let's keep moving with the technology era...it's just a click away!!!

I know that sometimes time, the curriculum, lack of resources or a very disturbing class can be our challenges to adopt ICT in our class but I can see it work through planning before and booking media rooms or switch the lesson to the computer rooms which many of the schools (if not all) have nowadays. If we push the ICT area forward maybe we will be lucky to have an ICT element in our rooms and that would make it easier.

My final word on ICT is that we should include ICT in our classrooms, its good for the name of the subject, it makes our lessons interesting and effective for us and the students and it entitles us to use a variety of activities other then the usual pedagogies. Its all up to us to incorporate the 'holistic aspect' of the NMC in

our subject.

That's all till now.....GOODLUCK for the exams☺

AM

## APPENDIX 10

**Notes 1 to 9 which were posted on the CoP with information on ICT and constructivist approaches**

### NOTE 1

### TEACHING WITH ICT

### WHAT IS THE POTENTIAL OF ICT FOR TEACHING AND LEARNING?

Information and Communication Technologies (ICT) are known as the innovative or new pedagogies. They are not a solution to education, but claims and studies have shown how beneficial they are. In 1994 the National Council for Educational Technology (NCET) published 27 assertions with supported references from research to show how IT works. Here I will list a few of these assertions:

- IT has the flexibility to meet the individual needs and abilities of each student.
- Students who have not enjoyed learning can be encouraged by the use of IT.
- Computers give students the chance to achieve where they have previously failed.
- Computers can reduce the risk of failure at school.
- IT allows students to reflect on what they have written and to change it easily.
- Using a computer to produce a successful piece of writing can motivate students to acquire basic literacy skills.
- IT gives students immediate access to richer source materials.
- IT can present information in new ways which help students to understand, assimilate and use it more readily.
- Difficult ideas or concepts are made more understandable when information technology make them visible.
- IT motivates and stimulates learning.
- IT gives students the power to try out different ideas and to take risks.
- Computer simulations encourage analytical and divergent thinking.
- IT is particularly successful in holding the attention of pupils with emotional and behavioural difficulties.
- Students with profound and multiple learning difficulties can be encouraged to purposeful activity and self-awareness by IT.
- Using IT makes teachers take a fresh look at how they teach and the ways in which students learn.

- Computers help students learn when used in well-designed, meaningful tasks and activities.
- IT offers potential for effective group working.
- Giving teachers easy access to computers encourages and improves the use of IT in the curriculum.

The Department for Education and Employment (DfEE) in the UK, states that:

"ICT is more than a teaching tool. Its potential for improving the quality and standards of pupils' education is significant. Equally, its potential is considerable for supporting teachers, both in their everyday classroom role, and in their continuing training and development."

(DfEE, 1998, p. 17)

**REFERENCES**

DfEE (1998) *Teaching: High Status, High Standards. Requirements for courses of Initial Teacher Training. Annex B: Initial Teacher Training Curriculum for the use of ICT in subject teaching.* Circular 4/98, pp, 17 - 31.

NCET (1994) *Information Technology Works! Stimulate to Educate.* Coventry: NCET.

**NOTE 2**

## FEELING GOOD ABOUT INNOVATION

> "One must learn by doing the thing, for though you think you know it, you have no certainty until you try." Sophocles, 400BC

Without doubt all of us on this Community of Practice were aware of computers and internet and technology before this project started. Undoubtedly many of us use computers in our daily lives mostly for emailing purposes, use of the internet, CD-ROMs and word processing. A few of us may be more proficient and using technology much more than this, possibly using software to design programmes. We have felt a need for technology in our lives even though we did not grow up with it. We all have our own predispositions, personality variables and communication behaviours and these will all influence our behaviour towards the innovations and its effects. Individuals may avoid messages that are in conflict with their existing predispositions and accept those that conform or are consistent with our existing attitudes and beliefs.

Individuals need to:

1. feel a need for an innovation
2. need to see that the innovation is relevant to the individual's needs
3. the innovation needs to be consistent with the individual's attitudes and beliefs.

Through the sharing of ideas and the uploading of some ICT activities on this CoP we are creating an awareness, we're generating an interest and then a need for innovation in class. One may look at it in 3 simple steps:

1. Knowledge of the existence of innovation
2. Create a motivation to learn more about it
3. Adopt it.

An innovation comes with 3 questions:

1. What is the innovation? - (information that an innovation exists)
2. How does it work? - (how to use the innovation properly and appropriately)
3. Why does it work? - (the effectiveness of an innovation)

**After reading this brief note - go to the forum with the same title and answer the questions there.**

**NOTE 3**

## CONNECTING TECHNOLOGY LEARNING TO PROFESSIONAL KNOWLEDGE

Joan Hughes (2004) outlines 4 main principles for technology learning which I will unfold here so that teachers on this CoP will be aware of the theory behind the technology integration we are experiencing here.

The first principle as outlined by Hughes (2004) is that technology learning should be closely connected to teachers' professional knowledge. Teachers need to understand fully the potential for technology in their daily professional lives. Teachers need to learn about technology "in the context" of their subject matter.

Hughes (2004) states that teachers can make these connections in two ways: 1)a scaffolded connection (as we are experiencing in this CoP) occurring when another teacher offers preliminary connections for teacher-learners or 2)a self-identified connection when a teacher independently identifies the technology-teaching connection through reflection and learning.

In the *Scaffolded Connection* method as with this CoP, the instructor (preferably one who knows the teachers' subject matter very well, may make explicit connections between the technologies and professional knowledge. Methods and topics are introduced during learning activities. So teachers can learn technology tools and strategies that support an approach to the subject matter. These guided workshops or activities will help the teachers connect the technologies with the concepts within the subject. This may have a big impact on the teachers' own learning and hence make them realise the impact on the students' learning.

These connections will offer ways for teachers to concetpualise the role of technology in education. Without these connections, unless teachers are intrinsically interested in technology they will not appreciate the use of technology for learning. In the absence of self-identified learning, scaffolded connections in a team are an important aspect of the learning experience and will provide a basis to encourage teachers to identify the connections between technology and professional knowledge.

Hughes, J., (2004) Technology learning principles for preservice teachers and in-service teacher education. In Contemporary Issues in Technology and Teacher Education, 4 (3), 345 - 362.

Karen Mugliett
31/3/07

**NOTE 4**

**SUBJECT MATTER AND TECHNOLOGICAL PEDAGOGIC CONNECTIONS**

As outlined in a previous note technology must play a role in student-teachers' subject matter learning. If we are to expect teachers to integrate technology into subject matter learning in the Home Economics curriculum we have to train teachers in isomorphic ways (teaching in ways we would like them to teach). This is still not being done throughout the whole faculty of education, however, we must try to overcome this within our subject but also as teachers who are already in schools. Through courses offered by the ICT Department and this CoP we can try to receive the training we require or need to still be able to integrate technology.

Teachers need to hear and experience ideas of how technology can support their subject content and pedagogies. Teachers tend to know a little about how technology can support subject matter learning and instruction of students in learning the subject matter. It is this kind of activity that will strengthen educational technology uses in schools. (Hughes, 2004) Understanding the roles that technology plays in a student-teachers' own learning may provide a useful backdrop for understanding technology's potential role for their own students' learning. So preservice teachers have to experience technology-supported content learning during their training to really recognise how technology and content can merge.

Practising teachers with years of experience also need to experience this connection between subject matter and pedagogic content to appreciate the use of ICT.

Karen Mugliett
31/3/07

**NOTE 5**

**USING TECHNOLOGY LEARNING TO CHALLENGE CURRENT PROFESSIONAL KNOLWEDGE**

Hughes' (2004) Principle 3 for Technology Integration addresses the issue that on using technology teachers may reflect on their current teaching and learning practices and this may lead to reform over time. "Introducing new technologies - especially those that are reflective of current curriculum and instructional goals has the potential to challenge teachers' beliefs." (Hughes, 2004). This principle shows that teachers may benefit from an expanded awareness of advancements in educational theory and subject matter. Research shows that teachers usually develop assumptions and practices about teaching and learning based on their own experiences as learners that do not reflect current practices in the field. Technological innovations that may be used to bring out newer trends in teaching and learning may in fact, help teachers reflect and acknowledge the use of newer methods.

This change of beliefs will take time to emerge. To really produce a change one has to develop ongoing learning experiences, ongoing discussions and examples.

Karen Mugliett
31/3/07

**NOTE 6**

## TEACHING MANY TECHNOLOGIES

Hughes (2004) 4th Principle emphasises the need to teach about different technologies, to help teachers understand what technologies are and how these technologies can best serve students' learning of subject matter. Thus, teachers must understand how technology fits in within their professional knowledge and activities. We all come from different schools, backgrounds and have very varied technological aptitudes. Thus it is very unrealistic for one or two technologies to suit all teachers and all professional activities. Therefore to increase the likelihood of finding technologies that will match with the teachers who will use them, we must present teachers with as many technological opportunities as possible. Preservice teachers or in-service teachers on a technology course must experience a wide range of technologies for use in their subject. Technology must be put into the hands of teachers for their own learning purposes. Offering a few technology options will only reduce the number of technology users in schools. Technologies must also match the teachers' needs. It must be emphasised that teachers may not use technology or may not find a suitable tool, not due to lack of interest in technology but due to limited technology options.

A wider choice may encourage more teachers to use technology in education.

Examples of different technologiy opportunities:

1)Different hardware

2)Different software - (for a comprehensive list go to my students' ICT assignment presentation of software in H Ec which has been uploaded above. Alternatively go to the ISTE NETS-T site for a detailed list on Educational software.)

3)Internet

4)Email projects, discussion, meeting an expert, parent-to-teacher communication, etc

5)CD-Roms

6)DVDs

7)Video

8)Radio - recording, vox pops, listening in, etc

9)Audio

10)Microphone

11)Diskette

12)Online activities

13)Digital photography

14)MP 3s, music, use of lyrics.

15)CAD for designing

ETC - Feel free to list others in this forum.

Karen Mugliett

31/3/07

NOTE 7

## CONSTRUCTIVIST APPROACHES TO TEACHING

## THE SCAFFOLDING APPROACH

Throughout this project we have been the scaffolded approach for both us teachers and the introduction of ICT in the Home Economics class as well as for the activities which are being suggested throughout. A constructivist approach is often the teaching and learning approach which is synonymous with research and use of ICT in education. The use of Constructivism as an approach to teaching is being encouraged. ICT brings along quite a few challenges in class. Teachers have to adjust their own personality to this innovation. They will also need new technical skills and different pedagogic methods. There is a state of progression in the development of these new skills and a constructivist approach is often used to give a framework to this.

Constructivism is one of the central learning theories on which many teaching approaches are being based. The central idea is that of having **the child think actively during the learning process.** This is what I have tried to do in all the activities that I have suggested, unless they were activities meant for the teacher only. In constructivism there is often the **social dimension** too, hence also focusing on the social context in which learning takes place. Vygotsky said that teaching and learning could not be separated from the social context.

The list of the various strands of constructivism is long. In particular I have chosen to focus on one of them for this study: the **scaffolded approach** which has specific features to develop a lesson constructively. Whatever strand or scheme within this theoretical framework we must always think of the **learner as an active participant in the construction of knowledge.** Children should be active participants in the process of learning. Vygotsky is the psychologist who advocated scaffolding. He saw the teacher as the mediator of learning who provides support during the learning process through a scaffolding approach. Teachers will create supportive situations through a series of steps to help students extend their knowledge and reach higher levels of knowledge. Students can for example be asked to complete a task. The support can be withdrawn once the teachers are confident that the students have grown in competence. In this project we are doing the same thing. We are growing together in the use of ICT in the Home Economics classroom. We are following the scaffolding process as I will spell out below. Once I feel that we have grown in the technological competence I will then be able to make a gradual withdrawal and this task will be completed. Even if we keep the Community of Practice going my study per se has to stop somewhere to be analysed.

The Scaffolding Process

The term is borrowed from those structures which are thrown up alongside buildings to support builders as they go up a development. The key word therefore is **"structure".**

**In class without a clear structure, steps and expectations students are left lost in a chaos of words which they have not understood.** Students will be very vulnerable in this lost situation. We need to support the student in such a way without actually stifling him/her. In your teaching you can also follow the steps I have been following for us in this study which were meant to help us develop our personas into ICT pedagogues, particularly in Home Economics.

These are the eight steps:

1. Provide clear directions
2. Clarify the purpose of the task or topic
3. Keep students on task through outlining the steps extensively
4. Offer assessment to clarify expectations from the very start by giving examples of other's work or by giving specifications
5. Point students towards worthy sources through identifying the best sources for them to research from
6. Reduce, uncertainty, surprise and disappointment through testing of tasks. Refine tasks before presenting them to students. Know they will work.
7. The approach must be efficient - have the steps focused, make sure they are clear, time on task must be well calculated and channel students.
8. Create momentum - the well scaffolded lesson or topic will have students concentrated and full of energy for the next task. Children will engage in reflection and thinking and be ready to move on.

I hope this helps you and will inspire you in your uptake of ICT in class as well as in all other teaching that you do.

Karen Mugliett
7/5/07

## NOTE 8

## PROBLEM SOLVING: A CONSTRUCTIVIST TECHNIQUE

The Constructivist Approach advocates children as being active participants in the thought processes. In applying constructivism to the classroom once must keep in mind that knowledge is actively constructed by the learners, rather than being transmitted by the teacher. Teachers need to encourage students to represent a problem in a variety of ways. The teacher needs to get students to discuss ideas, think aloud and articulate their ideas through the spoken word, a written task, a drawing or a model. The teacher needs to help to clarify and discuss sequence of thoughts or procedures and needs to start off the lesson with simple concepts and problems to foster motivation. Students need to be questioned and encouraged to form their own problems. One can start off with "who, what, when and where." Students should be challenged and learning needs to be stimulating.

Problem solving is still a controversial issue among researchers and one can identify two different approaches which define it:

1. A series of skills that children can learn through directed instruction
2. A process that children go through when presented with a particular situation.

ICT can be used very effectively to encourage problem solving approaches in the classroom. Teachers can create software of presentations with situations which will guide students through a thinking process to solve a situation. Some examples of these will be given in the next ICT activity. Whatever the software package or presentation, the main premise should be to ALWAYS INCLUDE SOME KIND OF ACTIVITY WHICH WILL INVOLVE THE STUDENTS AS WITH OPEN ENDED OR DIRECTED ACTIVITIES. As an example of open ended activities one may ask students to write a letter, planning physical activities for elderly people or drawing up a programme of activities for a Healthy Food Day in one's village. Directed activities would involve completing sentences, brainstorming, filling in.

### Guiding Students through the problem-solving

Problem solving is a multi-step task and in order to be successful one has to proceed through a series of steps towards a solution. Students need to be guided through this progression so as to learn to organise their thoughts and actions, be sequential and logical. The more proficient a student become the more quickly will he move through the steps and the more effective will the learning process be.

A suggested problem-solving process is:

1. Understand the question
2. Choose a plan
3. Try the plan

4. Check the answer
5. Reflect on what has been done

I would suggest:

1. Jot down ideas, a plan listing the important information or draw a diagram of the problem.
2. Restate the problem in your own words especially if unsure how to begin. Make sure you are understanding the problem.
3. If there is anything that is confusing you cross it off.
4. Use everyday objects to try and represent the items in the problem.
5. Talk out loud, try to verbalise the problem in your own words to yourself or to someone else. Listen to yourself talk and see if you are making sense.
6. Think of similar situations and how they were solved or how you yourself solved this problem.
7. Ask yourself - is there a different option or way of doing this?
8. Formulate ideas. Discuss them with peers or write them down.
9. Make a plan of action if necessary.
10. Draw, write, plan or build.
11. Test.
12. Modify
13. Evaluate.
14. Repeat strategies - students need repeated strategies with each experience and strategy. Give multiple opportunities so student will easily start to connect one problem with another and apply similar procedures.

Teaching problem solving strategies is teaching students to think in an organised manner. It is the process of getting students to think in clear, logical terms. Use techniques such as thinking aloud and expressing oneself, collaborating with peers and talking through a process, co-operative learning activities, visual demonstrations and hands on activities. Students are kept engaged when an abstract activity is transferred into a visible activity. Hearing thoughts of other students is valuable as students will expand their ideas. Their understanding is strengthened and they will gain the skills they need to become clear organised thinkers.

Karen Mugliett
11/5/07

**NOTE 9**

## THE INTERACTIVE WHITEBOARD – A POWERFUL PEDAGOGIC TOOL

All State schools now have at least one interactive whiteboard each. Other schools may also have so it is high time that teachers get to use them in the most effective way. I have seen these whiteboards being used for a language class, geography, textiles and Spanish amongst other subjects. The tool is very versatile and can be linked to a website where pupils will there and then find out some information and fit it in to a power point being shown. The tool can be sued with software applications made specifically for the interactive whiteboard and so will have animations, sound, tests, workings, questions and answers, etc..... The resources should be exciting and engaging and this tool will really help in optimising whole-class teaching as well as improve the classroom experience for all students.

This is really an exciting time in education and I feel we should really take this opportunity and try to develop our skills in the use of the computer for the interactive whiteboard. Basically this is a touch sensitive screen which can operate the computer and all its applications from the screen.

For more information on how to use the interactive whiteboard, some downloadable software and clear tutorials go to this brilliant site:
http://www.fsdb.k12.fl.us/rmc/tutorials/whiteboards.html
I really do encourage you to acquire these skills and use the whiteboards as it is the only way we can eventually get them into HE rooms. When schools were given an interactive whiteboard each, they were only placed in Science labs as this is where it is thought they would be used. If HE teachers had pounced on them they may have got them into their rooms. So go on use them!!!! Demand their use!

Karen Mugliett
30/5/07

## APPENDIX 11

## EXCERPTS FROM DISCUSSION FORUM 2 – WHEN USING TECHNOLOGY, IS IT BETTER WHAT IT REPLACES?

## AIM: TO PROVOKE REFLECTION ON RELATIVE ADVANTAGE

### My Posting

Technology is a rapidly developing and changing phenomenon, resulting in great challenges and changes for educators and education. There is a strong emphasis today on computer integration into the classroom with a focus on technologies available. There is also a challenge for classroom teachers to use and incorporate technology into their classroom activities. Bringing technology into the classroom will/can change teaching methods. Technology can be a meaningful, active component of the entire curriculum.

Teacher and pre-service teachers may have heard all this before but may not be convinced that learning can be enhanced. I'd therefore like us to keep to this subject and discuss the following question:

IS INNOVATION (USING ICT) BETTER THAN WHAT IT REPLACES (IE MORE TRADITIONAL FORMS OF TEACHING AND LEARNING)?

To support our discussion I'd like teachers participating in this forum to give their pupils a piece of HW they would normally give in a more conventional way. Give them this piece of HW with the possibility of using ICT - eg internet, a digital camera, a presentation on computer, use of the word processor to help build analytical thinking or writing skills or categorising and sorting, data handling, for help and support.....etc

Alternatives for those pupils who may not have access to computers at home may be:
1)Do the work in pairs
2)Use the computers at school during break if the school allows this
3)Give alternatives to the use of internet and computers eg digital cameras
4)Work on a presentation in groups so that some work on the computer and others get realia to school to accompany the presentation

Then use this hw as a support to answer/reflect and discuss the question above. Is there a difference in the pupils' enthusiasm for a piece of work with ICT, in their learning, in their presentation, in their literacy skills, etc...

HW Ideas (see below or go to Assignment called HW Ideas for Discussion 2):
Please feel free to post your own HW ideas or good practice

**Some other interactions in discussion forum 2**

ICT within Home Economics by MZ - Monday, 5 February 2007, 12:52 AM

Hi, I am MZ, a B.Ed (Hons) Home Economics student. Even though I am not a full time teacher yet, I feel that I can truly contribute with regards to this discussion, since my dissertation focuses on ICT within Home Economics with special emphasis on whether this enhances learning when compared to traditional learning. I created software on Milk myself (with Illuminatus) and tested this software in an ICT oriented lesson and compared it to a similar non-ICT lesson. Even though I cannot conclude yet (as I am still analysing the data) I feel that yes ICT does make a difference, since I could see that the students were truly motivated and enthusiastic. However as Ms.Mugliett told me in one of her visits "Ultimately probably the move should be more towards a blended form of learning" - that is a good lesson with appropriate resources as well as ICT as part of the lesson.

Moreover throughout my last teaching practice I tried to integrate ICT within the lesson to support my delivery. I used it during demonstration sessions, during First Aid lessons and nutrition lessons (either to recapitulate, to assess understanding or to guide students). I must say that the experience was a very positive one and from the students' feedback I could see that it really helped them.

Thus from both my dissertation (which I am still currently working on) and my teaching practice experience I feel that ICT is not better than what it replaces but it is a VERY potential tool that we should use as teachers to support our students in their learning experience.

What do you think?

Cu - MZ ☺

Delete | Reply

Rate...

Re: ICT within Home Economics by CS - Monday, 5 February 2007, 07:18 PM

Hello M ...

Well done for your dissertation, it really seems to be a very interesting and useful study for HE teachers.

I feel that it is useful for teachers to have access to ready made ICT resources which are designed for classroom use.

I would like to ask you a couple of questions:

- How did you integrate ICT during a demonstration lesson?
- Did you have access to a computer in the HE room?

Thanks,

CS

Show parent | Split | Delete | Reply

Rate...

Re: ICT within Home Economics
by KAREN MUGLIETT - Monday, 5 February 2007, 08:41 PM

Hello All,

Once again thank you all for the contributions. It is through this collaboration and sharing of ideas that we will help to integrate ICT into the Home Economics curriculum. Research shows that teachers have been more successful into integrating ICT when there was collaboration, training, time and resources. I am trying to support all through the creation of this online Community of Practice.

As for training most of you will have received some training in your initial teacher training course (ITE) however, this may not have been enough. As happens worldwide ITE is not providing enough training and more importantly is the in-service professional development. In the coming weeks I will be asking you to specify what you think are your needs in the field of ICT integration - do you want expert advice, do you want us to share ideas (which incidentally will be one of our next tasks), do you feel the need for more technical support, would you like an short online course on this same Moodle site, would you rather go for one of the evening classes offered by the ICT department at the Education Division.....etc. We are all very busy people struggling with work and family life, so this online activity might help us from the comfort of our homes. It might provide the ideas, support, professional development and hints we need to integrate ICT into HE. We might not become technology integrationists by next year but we might start.

There are plenty of resources in schools and although many of us are reluctant to use them or wish the computers are in our own HE rooms, we can still make use of what there is in schools. Schools are nowadays equipped with Interactive

Whiteboards, Computer labs, projectors, digital cameras and more...so we can make a start.....

Karen Mugliett
5/2/2007

Show parent | Split | Delete | Reply

Re: ICT within Home Economics
by MZ - Tuesday, 6 February 2007, 01:45 AM
Yes, it is definitely true Ms.Mugliett. There are a lot of resources available in schools. Moreover with regards to training (as you know), I found the in-service classes offered by the ICT Department at the Educational Division very useful. In fact in such classes I learned how to use Illuminatus - which helped me to develop the software for my dissertation!

MZ

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Re: ICT within Home Economics
by MZ - Tuesday, 6 February 2007, 01:54 AM
Hi C,

I integrated ICT during a demonstration through the use of a PowerPoint presentation. This PowerPoint included photos (which I personally took at home) of every step in making a pasta dish. Thus the students could visualise the method or steps after each other whilst I was demonstrating. Moreover I added a star, where I wanted students to carry out the task themselves. It really helped them to concentrate and to focus on what I was saying. I have photos of the actual lesson, however right now its 2am in the morning, and I do not know exactly where I have saved them, but next time I will try to attach them.

No, I did not have access to a computer in the Home Economics room, however the administration offered to give me the school's laptop whenever I needed it. Still, I felt more comfortable to use my own laptop instead. The school was very helpful and provided me with a white screen and projector whenever I needed to (however I had to book 1week - 2 weeks beforehand, which in my opinion ~~was~~ very reasonable).

Hope I answered your questions.

Cu and good night MZ

Show parent | Split | Delete | Reply

Re: ICT within Home Economics
by YA - Friday, 23 February 2007, 10:28 AM

dear all,

I am now going out for my TP and I tried to include ICT resources at least in one lesson (as I only have 5). The school I am placed into has a PC in the home economics but is very old, and apart from that, I cannot use it with the whole class, being 12 students. There are no projectors and when I tried to hire the computer lab, I could not because there is another computer lesson at the time of my lesson. it is a shame because I found some interesting kids websites full of games regarding some topics and I could not use them as part of my lesson. Mrs. Mugliett, don't you think that we should try to work together as teachers from all subjects to have a projector in every school? Kids will love to use computer!!

thanks

YA

Show parent | Split | Delete | Reply

Re: ICT within Home Economics by KAREN MUGLIET T - Friday, 23 February 2007, 12:14 PM

ICT Resources in class can be used in a number of ways. You can have a computer in the classroom you are teaching in and use it for group work, pair work, information searching, small group teaching, reference, etc. You may not have internet available in class and so you will have to use the computer with a CD Rom, for word processing work by the students themselves, to build a presentation with the pupils, etc. If this is not available at all you will need to use the equipment in other rooms in the school, probably in a computer lab or other specialist rooms. If you do so these rooms normally have a projector so ask for this as most if not all schools have projectors. There are quite a few schools that have interactive

whiteboards too. Some of these have been placed in specialist rooms, others in computer labs and others found their way in the Science rooms simply because teachers showed they would make use of them. That's why in Home Economics we have to show the officials that we know how to make use of ICT equipment in our subject. You need to book early and try to negotiate with the teachers who are already booked in the computer lab that you would like to take only one lesson from their booked slots.

If you want to use a website in school remember to check if it is black listed first. Earlier in this CoP we gave the number you have to call to reach Ms RX at the ICT Department at the Education Division to get a site white listed and accessible in schools.

If none of this is possible one may try to use the computer as extension work. Get the pupils to get information for you for next lesson. Give them some points to search for and then present in class. If you have a website which is useful and can't access it in class, ask them to access it at home and bring in the relevant information to discuss with you. You might ask them to bring information on things you do not usually cover in class eg Milk in the Past: Interesting Snippets. They can produce photos, print outs or drawings of what they have found and present it to the class. The ultimate of technology integration is in fact when pupils are building up parts of the lesson themselves through searching, reflections, presentations, processing, problem-solving etc.

Alternatively remember that technology does not only mean Computers and Internet but also includes digital cameras, radio, TV, videos, video cameras, etc.....and it is interesting to use these pieces of equipment too in class. They may belong to you or the school but with great care you can use them to enhance your teaching too.

I hope this helps you a bit. Next week I will post some information on Using interactive Whiteboards for the benefit of the 2nd and 3rd years who will be out on teaching practice in the coming 6 weeks and have asked for this.

Karen Mugliett
23/2/2007
Show parent | Split | Delete | Reply

Re: ICT within Home Economics
by SP - Friday, 23 February 2007, 07:57 PM
Hi:

Check out these videos.

http://www.foodafactoflife.org.uk/section.aspx?siteId=12&sectionId=

38

Just posting some questions to set you thinking...

How could they be used effectively with an HE lesson?

Are they better than a real live demo?

Are there instances when they could replace a live demo?

Suzanne P

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Re: ICT within Home Economics
by CB - Sunday, 25 February 2007, 01:35 PM

Dear Ms. Mugliett,

Thanks for giving birth to this wonderful community. I always make sure to find time to read everyone's feedback but I rarely give mine, due to my hectic life, and for this I excuse myself with everyone.

As regards to nutrition topics I still have to cover minerals, vitamins and food commodities with form 3s.

Thanks for all

C

Show parent | Split | Delete | Reply

Rate...


Re: ICT within Home Economics
by CS - Friday, 23 February 2007, 08:00 PM

Hello Y,

Why don't you assign a task for homework? Students who do not have a computer or internet access at home could carry out the task during the break. You could also group students and ensure that at least in each group a student is able to use a

computer.

I know you re feeling frustrated because you cannot use ICT during the lesson, however plan fun activities and students will enjoy the lesson and learn just the same.

They will surely appreciate your effort.

good luck for your tp,

C

Show parent | Split | Delete | Reply

Rate...

Re: ICT within Home Economics
by DG - Sunday, 25 February 2007, 09:53 AM
hi everyone,

I teach at St. J BJL and I do not have excess to ICT equipment since all computer labs are booked at all times due to a large number of students studying this topic. So unfortunately, I don't think I can participate in this.

D

Show parent | Split | Delete | Reply

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Re: ICT within Home Economics
by AB - Sunday, 25 February 2007, 12:57 PM
Hi all, sorry for taking quite long to give my part but at the time being I'm really busy with my tp.

Anyway.... regarding my tp topics, I lack topics in the nutrition field. I only have: minerals, diet related disorders and 2 practicals of yeast cookery and short crust pastry.

Having said so, I am still aiming to make use of ICT wherever I can in other topics. When I will trial some interesting ICT in my topics, I will let you know.

Till then take care and GOODLUCK to all my colleagues going on tp.

Regards

A ☺

## APPENDIX 12

## BRAINSTORMING ICT IDEAS: GET COMFORTABLE WITH INNOVATION

## EXCERPT TAKEN FROM DISCUSSION 4

This is a forum where we can list ideas of how we can integrate ICT in the Home Economics curriculum. We can be vague and not specific in terms of actual resources but we need to make sure the ideas can be adapted in our subject.

Here are some of my ideas, please add on more:

1) First of all talk to pupils re their preferences and what they want to know for each topic and then try to relate this to the topic in our syllabus.
2) Give pupils power and emphasise on hands on and constructive activities - hence use of ICT.
3) Promote collaboration amongst pupils across Home Economics classes in the same school, across subjects and across schools.
4) Creating digital stories to get pupils to image situations, share information and invent tales which can be applied to our subject.
5) Use music in class - this is the popular culture of our secondary students. Use positive lyrics and songs which can bring out stories for our topics.
6) Use CD players or cassette players to record pupils/students' work, eg making an advert, a news item (with vox pop in class) or a promotional message on a particular food, diet, eating habit, nutrient, etc.
7) Use digital cameras and photography for a number of class assignments. Most schools have digital cameras and children and adolescents take to photography very quickly. Have them capture experiments, cooked food, steps in a demonstration, the environment in the school before and after break, etc.
8) Twin pupils together in same class or in different classes and schools to make projects and presentations. One can even twin pupils or classes in schools in different countries, but this may be too ambitious at first, so start slowly.
9) Ask pupils to make or contribute to power point presentations. As one teacher in this CoP mentioned pupils get very excited when asked to contribute in class in ways in which they are having fun and understanding what is going on.
10) Investigate topics together on internet - eg investigating food allergies, bacteria multiplication, etc.
11) Have a class competition on building a protein molecule with kitchen materials, or making items from used products, or recipes with local produce. Ask students to present their concepts and creations on slides.
12) When doing PowerPoint presentations yourself have interactive parts, with questions, tasks, group work, etc? Involve the pupils. If presenting a power point on a smart board then one can also easily link with internet and ask pupils to investigate, search and

discuss.
13) HW via email where it is beneficial for both teacher and pupil.
14) Extension work at home - using internet to find out information, search, present work, research, remote preparation, etc.
15) Most students love using a microphone - allow them to make reports, interview, speak in front of the whole class, etc, to present a task/topic. Record them and get them to listen to themselves. This can give rise to some reflections and healthy discussions. Let them open up, help them express themselves (it is only when they talk about something and reflect upon it that you will know if they have really understood), involve them, use the space around the room, excite them, let them have fun.

I will stop here for now. Feel free to contribute more ideas or discuss the above.

Karen Mugliett
26/3/07

## APPENDIX 13

## DISCUSSION 9: INTERNET PROJECTS

The introduction of internet and electronic communications to teaching and learning has allowed teacher and students access to resources which would normally not be so easily available. The internet can provide us with very motivating and authentic elements to our teaching. This vast range of resources provides us teachers with a new teaching situation. The question now is - how do teachers and students cope with this vast range of information. There are also possibilities of communication with other students from other schools or other countries. The teacher's role is here challenged and altered once again. Teachers now must challenge students to questions their resources, to be cautious and to interpret data and information. Students must be trained to put the information into their own words. Teachers ought to explore internet sites for demonstrating examples and phenomena which can stimulate students in our lessons.

Activities in Education: From Information retrieval to Information provision (adapted
from: Somekh, B., & Davis, N., (1997) Using Information Technology Effectively in Teaching and Learning, London, Routledge)

*Banks of Information*

- many of the world's library catalogues are available on internet
- government and regional information
- current issues

*Real Artefacts to use*

- full texts of newspapers or Reuters' pre-published material
- full texts of classical books
- weather and acid rain data in the form of Quicktime movies

*Resources to us from a distance*

- simulations
- scientific data

*Project Work*

- newspaper days with news collection and publication
- projects on current or historical issues

- science and nutrition projects promoting learner participation

*Discussions to monitor or join*

- teacher groups eg communities of practice
- getting to know learners in different places eg Kidsnet

*Teaching a topic*

- presentation of a paper or argument
- video conferencing
- collaborative teaching/learning of a set of related topics
- demonstration and/or workshop using IT tools at a distance.

*Individual communication*

- feedback on assessment, teaching, etc
- collaborative writing of papers, projects, lesson plans.
- asking expert advice
- asking for a specific piece of information

There is so much potential. We have to learn to utilise the benefits of these possibilities.

ACTIVITY 1:
Think
of a situation where communication with students in other classes,
other schools and in other countries could support students' learning.

Are there any situations where you could see the value of communications with other teachers?

What organisation and management issues do you think you will need for these activities?

Students
studying nutrition could try to communicate with clinical nutritionists
or nutrition researchers and initiate dialogues with them re their
current work and research. These experts may be able to answer
questions in a more indepth way than the teacher. The motivational
element here is probably unquestionable. First hand information
available through the students own work.

CUTTING OUT THE JUNK

The internet is a world of information but it also has a lot of junk. Make
use of educational sites like the Virtual Teacher Centre : http://vtc.ngfl.gov.uk/

Alternatively look at links from school web pages many of which can be found on the RM Eduwebsite: http://www.eduweb.co.uk/
These sites have links to useful websites and cut down on junk sites.

MORE USES

At
University we are now using eLearning much more and hence using internet to deliver units, upload notes or reading packs, give homeworks or assignments and send graphics through our VLE (virtual learning environment). If a platform such as Moodle is not available in schools as yet, teachers can create their own websites and upload the same stuff as those indicated above. Students can also be encouraged to upload their work on the site such as their best piece of work, and that way even students can be sharing their good practice. This will increase the care they take with their work, ehance their literacy and IT skills and encourage to think of the audience who is going to read their work.

Later on this week more will follow. I'll send some concrete ideas for internet projects.

Karen Mugliett
3/10/07

**ICT ACTIVITY 20 – AN INTERNET PROJECT IN THE TOPIC OF HOUSING**

HOUSE SEARCH

(adapted from Cross-Curricular Internet Projects Bk 2)

Divide the students into groups in order to work on this project. This could be suitable to expose housing prices, choices depending on budget, family members' needs etc. Diffferent groups will be asked to examine and explore different questions below...then present with the help of slides and information.

Your
parents are looking for a new house to purchase. They would like to buy a four-bedroom detached house with a garage and garden with as many modern conveniences as possible, in any part of Malta.

Use a search engine/s to help them decide a few points:

1. Locating examples of a house as described above
2. Help them identify a particular area and give reasons why
3. Possible loans which are available in Malta for your parents to buy this house.

To search for a houses in specific areas you could use locally based websites hosted by local estate agents.

Tip: Try using the following search technique to ensure accurate results:
estate+agents+(type your prefered area/town name)

Search for:

the cheapest
the dearest
the nearest
the one you really like

Compare
using online estate agents and published lists from estate agents.
What are the advantages and disadvantages of both lists?

Use the
same websites to choose 15 houses priced between 175,000 euro - 350,000 euro.
Record your results in a database using the following fields:

Locality
Type
No. of Bedrooms
Garage
Outdoor area/Garden
En-suite/s
Cost

Print your work. Do you notice any trends in prices?
Are similar houses the same price around Malta?
Can you give reasons for your answer?

Therefore together the students will accumulate this information which could then be presented and shared and discussed. They will have a background when they come to discuss. Unfortunately when we make them discuss in class we often catch them unprepared and not so well versed. This will give them that background to really generate a good discussion in class. Try it.

K Mugliett

APPENDIX 14

## Table 23

### Suggestions for effective use of ICT in HE following Osborne and Hennessy's pedagogies for effective use of ICT

| **Osborne and Hennessy's (2003) pedagogies for using ICT effectively** | **Suggestions for effective use of ICT in HE** (these are only a few examples and a few technologies of what can be used in HE) |
|---|---|
| Ensure ICT use is appropriate and 'adds value' to learning activities | 1) Using the word processor students can write letters of complaint re a product which was found soiled and have to list constructive elements as to why this product is not acceptable and suggestions for a solution.<br>2) Use the British Heart Foundation site to promote healthy living and living for a healthy heart. Students can search for particular key words in order to create quizzes on conditions and risk factors which can affect the heart. |
| Build on teachers' existing practice and on students' prior conceptions | 1) Using desk top publisher students are asked to make food labels for items which they will cook in their practical sessions, listing nutritional and additional information suitable for consumers.<br>2) Research food and nutrition topics on sites such as those of the British Nutrition Foundation, using key words such as nutrition, health and food. Use this information to investigate food and nutrition concepts. |
| Structure activities while offering pupils some responsibility, choice and opportunities for active participation | Students are asked to collaborate on a project which involves digital photography, presentations and internet searches in order to explain a concept to the rest of the class. Group work is assigned for a variety of topics to be covered. Such topics could include: diets, eating disorders, environmental issues, food safety, food hygiene, etc. |
| Prompt pupils to think about underlying concepts and relationships; creating time | Students are asked to carry out a survey of eating habits with their families and list the |

| | |
|---|---|
| for discussion, reasoning, analysis and reflection | information on a spreadsheet which can then be presented in an activity in class and comparisons are made, thus giving rise to discussion and analysis together with suggestions of how the respective families can improve their eating habits. If one prefers to maintain anonymity teachers can suggest anonymous spreadsheets which are shuffled and presented by different individuals. |
| Focus research tasks and developing skills for finding and critically analysing information | An internet project or can be carried out as suggested in one of the activities on the CoP. (See Appendix 13).<br>An email project can also be created where students identify an expert in a field related to a topic of study and prepare a set of questions to ask the expert for more information via email. The students then critical analyse the information and compare with similar work from other students. |
| Link ICT use to ongoing teaching and learning activities | Students are asked to use digital photography, animations, interactive stories and digital stories to collaborate and create presentations on lessons in order to consolidate knowledge of what might have been constructed in class in other constructivist learning methods. |
| Exploiting the potential of whole class interactive teaching and encouraging students to share ideas and findings. | An online community can be used where available for the sharing or ideas, reflection and extension work thus encouraging students to articulate, write and express themselves and their understandings or opinions on various topics. |