CHAPTER 2

REVIEW OF RELATED LITERATURE

2.1 Introduction

To build up a theoretical basis for this study, the researcher reviewed related literature pertaining to the adoption of Internet innovations by early and late adopters among educators, Internet competencies among educators, integration of Internet into instruction and factors affecting the integration of the Internet in teaching and learning.

This review covers journal articles relating to computers, information communication technology (ICT) and the Internet and its applications in education, computer-mediated communications, telecommunications in teacher education, instructional technology, Internet competencies, organizational behavior, innovation theories and education psychology. Apart from this, local studies, conference papers, old and current newspaper publications and dissertations were also reviewed.

In the review of related literature, the researcher looked into five major areas. First of all, articles were reviewed to find out how the Internet and its various applications are utilized for educational purposes. Secondly, adoption of Internet innovation with reference to theories of diffusion of innovations and models of change were studied. In addition, resistance and barriers faced by educators in adopting Internet innovations were also studied in this section.

Thirdly, this study reviewed the different ways of ascertaining the competence of educators in Internet use by reviewing different checklists and questionnaires. Checklists pertaining to competencies in the instructional integration of the Internet were also scrutinized.

Fourthly, the current status of Internet integration in the educational sector both in western and local settings was reviewed. Articles that offered suggestions on the

methods of integrating the Internet in classroom instruction and associated problems faced in its implementation were also discussed. Pedagogical models of integrating the Internet in instruction were also reviewed.

Finally, factors that affect the integration of the Internet in the Malaysian teacher-education system were reviewed. The researcher studied attributes of network adopters, educators' self-perceived competency in the Internet, attitudes of educators towards adoption of Internet innovation and their gratifications derived from utilizing the Internet as well as their accessibility to the Internet at the workplace and in the home.

2.2 The Internet and its Applications in Instruction

Of the many definitions available, Comer's (1997) is the most relevant to this study. He defined the Internet as a widely successful, rapidly growing, global digital library built on a remarkably flexible communication technology. The Internet digital library offers a variety of services used to create, browse and access, search, view and communicate information on a diverse set of topics ranging from the results of scientific experiments to discussions of recreational activities.

According to Ho (1998), the Internet is a global computer network connecting other computer networks across the world. The size, geographical spread and speed of transfer and reception of information have begun to revolutionize communication and education. Not only is the amount of information accessible on the Internet extensive, but its rate of growth since its inception has also been phenomenal.

The Internet has grown since 1993 with the introduction of the graphical web browser software. Evidently, the growth of the Internet is regarded as unparalleled in the entire modern history of spoken and written communication (Maddux, 1996). As such, the founder of the Internet, Cerf Vint, states that by the year 2006, there will be

900 million computers and other devices such as Web TVs and home appliances linked to the Internet (Charp, 2000).

The phenomenal growth of the Internet can also be attributed to the many services that it offers. Some of these services include the electronic mail (e-mail), Bulletin Board Service (BBS), newsgroups (Usenet), electronic mailing lists (Listservs), the World Wide Web (WWW) and the file transfer protocol (Ftp).

The advent of the Internet has been hailed as having the potential to transform teaching and learning (Bell, Davies & Lunn, 1995; Fishman & Pea, 1994; Gorden *et al.,* 1995, Owston, 1997; United States Advisory Council on the National Information Infrastructure, 1995). With its increasing capacity for multimedia, multi-mode communications, information presentation and easy access to an ever-growing body of information as well as innovative ways of data representation, the Internet presents educators with exciting opportunities to enhance teaching and learning.

Therefore, it is very important to help Malaysian teachers in the new millennium to develop the ability to utilize the Internet. Teachers must be trained to use the Internet before they can integrate it into their teaching. Moreover, teacher training colleges being at the forefront of the Malaysian education system, need to incorporate the Internet and its applications into its curriculum.

Of the various Internet applications, the e-mail (electronic mail) is by far the most commonly used tool for communication. The e-mail can be used to send a single message or messages that include text, voice, video or graphics of files via the attachment mode to many recipients. The e-mail also gives students opportunities to communicate with people from all over the world. Via the e-mail, students are also able to tap into the knowledge base of various sites on the Internet and they in turn, can offer their own valuable suggestions about reading and writing. Therefore, in the age of technology, the e-mail is one of the greatest links offered (Horban, 1998).

Teachers can also utilize the e-mail in the process of teaching and learning. E-mail can connect the teacher and student. For example, a student can contact his or her

teacher for individual coaching where he or she might ask for further clarification on some point omitted earlier in classroom discussions. At the same time, a teacher can get in touch with a student directly and confidentially about a personal matter or a learning-related problem.

The e-mail also provides extended opportunities for personal counselling. Not only can teachers choose to make themselves available to their students at any time but they can also have an electronic record of all such transactions (Partee, 1997). Another advantage is that the e-mail extends office hours to any time the teacher turns on the computer. In addition to this, the e-mail is famous for being non-intrusive as the teacher chooses when to respond to any message. The teacher may send out a message to all recipients via the e-mail to emphasize some point made in class on the homepage or in a newsgroup.

The e-mail also allows private responses to a general discussion on the newsgroup. A teacher may wish to acknowledge privately rather that publicly a student's contribution to the newsgroup. This is because too many comments from the instructor in the midst of a discussion might distract students from pursuing their own lines of inquiry.

The possibilities are endless for creative interaction for teachers utilizing the e-mail. For instance, the teacher could send out an optional questionnaire to all students in his or her classroom in an effort to get to know them as individuals in a more personal fashion. In this way, introverted students can respond only to the teacher, whereas more extroverted ones can reply to all recipients.

The e-mail can also play a role in developing the ability of pre-service teachers to reflect on their practice and to enhance their professional development in their practical training programs (Barnes, 1998). Similarly, Malaysian teacher trainers can also utilize this technology as a tool to enhance the quality of the mentoring process. Trainee teachers in Malaysia have indicated that there is a need to build a closer rapport with their lecturers (Kaur, 1998).

However, like other Internet applications, teachers may face problems in the integration of e-mail in the teaching and learning process. One problem is that messages arrive in serial order and this may cause instructional material to be intermingled with unrelated messages. In addition, teachers may also be unable to get access to selected documents at certain times.

Another problem is that teachers often want homework or assignments kept private until all students have handed in their work. Thus, the teacher may face problems if he or she wants to edit or modify collaborative work. Moreover, there is the problem of digital storage; many institutions must delete accounts and purge e-mail messages at the end of each semester. This makes it difficult to archive materials as intact units for later use or browsing.

Another important Internet application is the electronic Bulletin Board Service (BBS). A BBS consists of a computer connected to one or more phone lines and a modem communications software that lets users call in and "post messages" for others to see. Bulletin Boards are expressly designed to provide storage areas for posting messages into specific categories. The Bulletin Board is intended for brief messages that do not need in-depth or on-going discussions such as group announcements. Bulletin Board postings are informative and very straightforward. The interface is direct and requires little thought. The system automatically fills in the date, time and author's name. The messenger only needs to supply a title and compose the message. Teachers can use this application to post messages across to different groups of students. Group administrators can delete and archive messages to maintain clean and well-organized bulletin boards.

BBS overcome some of the deficiencies of electronic mail as they are typically more user-friendly and there is organization of content. However, the BBS also generally shares some of the limitations of the e-mail. For example, the BBS has poor graphics capability and messages are posted serially. Furthermore, there is little or no ability to control access to selected documents at selected times. The BBS also acquires

joint editing of a common document and there is difficulty in archiving materials for later reference and use.

Thus, the disadvantages of integrating the BBS into the instructional process is that the teacher has only limited means to structure a discussion to keep students on track with pertinent materials submitted in a logical and organized way.

Klemm and Snell (1994) believe that the full pedagogical power of computer mediated group discussions are not ordinarily realized in the e-mail or BBS environments. In particular, they fail to optimize group dynamics and interactions in the learning process.

The major electronic bulletin board service available on the Internet is called network news, often abbreviated as netnews. The netnews system uses the term 'newsgroup' to refer to each individual bulletin board (i.e. each discussion group) and article to refer to a message that has been sent to the newsgroup. This system of newsgroups is called Usenet and it contains all the newsgroups that roam in cyberspace.

Once an article is posted to a newsgroup, people reply to it and this is how a discussion is generated. Individuals can post messages pertaining to various issues on the Usenet. As long as they remain posted, any interested individual with access to the Internet can reply to the issues raised (Wu, 1998). Each newsgroup has a topic and consists of a number of messages on a topic that is posted to it. There are about seven or eight categories that are found in this user network. Figure 2 lists a few of the major newsgroup classifications that are placed on the Internet.

Figure 2
Examples of Major Newsgroup Classifications on the Internet

Abbreviation	General Category of Discussions
Rec	Arts, Hobbies, Recreational Activities
Soc	Social Science, Cultures
Sci	Science, Engineering, Mathematics
Comp	Computer Hardware and Software, Computer Science
News	Network news system itself (not current news)
Clari	Newsgroups from Clarinet
Misc	Topics not covered by other categories

Discussions in the newsgroups provide ample data for both language work and thinking skill exercises, both of which are relevant to students. Students can also publish their messages on a particular newsgroup. Furthermore, students can compare their messages not only with other collaborative groups in the same classroom but also with those beyond the classroom walls. According to Wong (1998) there were an estimated 25,000 newsgroups and a daily dosage of one million articles being posted on the Internet in early 1998.

Newsgroups can be utilized in Malaysian schools although local research shows that the number of Malaysians utilizing this technology is very limited (Chan, 1998). A local newsgroup introduces a powerful new form of class interaction totally impossible in earlier times. Students reluctant to participate in a traditional class discussion may contribute extensively to a newsgroup. Moreover, the quality and quantity of students' contributions to the newsgroup can help form part of the class participation component of the grading process. Even, shy students can find the courage to write and send a paragraph to a newsgroup discussion.

According to Partee (1997) instructors who create this form of class participation will find (to their amazement), a depth of commitment by seemingly uninterested, uninvolved students. Students, who otherwise might remain silent in class, will offer observations of impressive quantity and quality in a newsgroup.

Newsgroups are very similar to mailing lists or listservs. Listservs are discussion groups that communicate via e-mail. They are server computer networks that distribute information to a list of "subscribers". An e-mail message that is sent to a listserv address is duplicated by the computer, which then delivers it to everyone who subscribes. Most listservs focus on a specific topic of interest by subscribing to people who include themselves in a list of receivers. A user who wants to have his or her name added to a public mailing list must send an e-mail request.

Every e-mail sent to a mailing list is received by all those who appear on that list. An individual can also choose to reply to the person who sent the original message. According to Comer (1997), listservs allow an arbitrary group of individuals to exchange memos and provide a way for groups of people who share a common interest to participate in a discussion. Teachers can use mailing lists to get their students to engage in discussions with students from other parts of the world.

According to Kaye (1998), the advantages of utilizing listservs are freedom from time and place constraints and the potential for one-to-one as well as group interactivity profiles. These characteristics indicate the potential of the listserv as a new educational paradigm.

Another popular Internet application is the World Wide Web (WWW). The WWW is part of the Internet and is a collection of all the information on the Internet. The web stores information as pages called web pages. Search engines on the Internet allow students to locate and use different types of information on the WWW. According to Dede (1996) and Gilbert (1996), the WWW signals a new era in how education will be conceptualized and delivered in the twenty-first century.

In an article by Williams (1998), she comments that "the World Wide Web has made it clear that the marriage of voice, video and data is upon us" and that hypermedia authoring in cyberspace will be the newest delivery system for education. Students can not only share their projects with a local audience, but they can also be global authors as well (Carr, 1997). He also states that HTML (Hypertext Markup Language) editors

have become as easy to use as word processors and more recent Internet browsers have HTML editors that are very user friendly. They are also free, easily learned and extremely powerful tools that allow students to publish their work via homepages.

A common method of communication on the web is through homepages. Many educational institutions have already begun to disseminate class schedules, registration material and course descriptions through their home pages. The homepages may be devoted to the syllabus, study questions and general reminders of class activities such as deadlines for assignments. Students can always refer to the homepages for information if they are unable to attend classes.

To this extent, an instructor may also choose to put daily lecture notes on the homepage. Even a relatively brief outline would eliminate the need for students to be distracted from their train of argument of having to copy notes. Moreover, being under a teacher's direct control, the resulting display of information would undoubtedly be more accurate. Students may read these notes at their leisure on the computer or choose to print them out. The ease at which such information is disseminated facilitates discussion (Partee, 1997).

A website may deliver general knowledge more effectively than a lecture. Rather than introduce basic information in the class period itself, an instructor may proceed directly to class discussions. Students who have presumably had time to check out the class material for that day can also come to the class prepared with well-thought out questions.

An LCD panel and overhead projector or a data projector teamed with a portable computer connected to the network would allow instructors to bring this material right into the classroom for explanation and further discussions. Students, who, for one reason or another had to miss that presentation, would at least have the basic lecture information that might prove crucial to understanding subsequent concepts.

Bull *et al* (1998) emphasize that the web is now an essential scholarly research tool. Students must be trained to use the web appropriately, just as they have been

trained to use the library as a research tool. According to these researchers, the web can provide in-depth information and animated graphics that are easily available for downloading.

A student who uses both traditional materials and print materials from the web enjoys a considerable advantage over a student who only uses traditional materials. At the same time, educating students to analyze, organize and use information on the WWW appropriately in projects, reports and class work is an enormous challenge for Malaysian educators.

File transfer protocol (Ftp) is another Internet technology that allows an individual to move files from another computer to his own computer where he can then read or manipulate them at his own leisure. File transfer protocol files can be transferred from one computer system to another. Ftp sites run on Ftp servers and if an individual wants to access the files on these servers, Ftp client program is needed. There are many sites containing libraries of Ftp files with useful information for students and educators to access and many of them are open to educational institutions.

Thus, it can be seen that there are a number of options for varying time, place, individualization and interaction in learning via the Internet. It is no wonder then that the number of Internet users is increasing every day. According to the Press Release by Matrix Information and Directory Services (MIDS) in January 1997, the Internet is growing exponentially, approximately doubling in size each year. In 2001, there were 142.3 million Internet hosts as compared to the 42.3 million Internet hosts in January 1998.

In the local scene, Zoraini (The New Straits Times, January 9, 1997a) reported that there were only about 1000 Internet users in 1993. However, according to the latest statistics conducted by IDC, a Malaysian research company, Malaysian Internet users in 2001 were estimated to be 4.06 million, representing 17% of the total population. It forecasts Internet users in Malaysia to reach 6.7 million by 2005 (The Star, January 5, 2002).

The above data show that more and more Malaysians are utilizing the Internet and its applications (The New Straits Times, October 21, 1999). Thus, different technologies are being incorporated into the Malaysian educational scene as the country moves towards an information-based economy.

One such technology is the CD-ROM (compact disc read only memory) technology that is popular and is frequently used as a software-delivery medium. A single CD-ROM can hold up to 650 megabytes (MB) of data with enough space to store about 150,000 pages of text.

Although compact discs and floppy disks are cheap, most multimedia programs are platform specific and may require special software to display their unique file formats. They may also require audio and videocards and other peripherals, all of which add expense. Satellite downlinks require students to be at the downlink sites and the technology is costly. In contrast, Internet technology is independent and is accessed by millions of people worldwide (Bournellis, 1995). Intense competition and sufficient commercial applications have introduced economies of scale, making the Internet affordable for schools and individuals.

The Internet has other advantages besides access and cost. Shared resources on networks obviate the need of having to distribute and install individual programs. The programs are immediately accessible, as there is only one current edition to maintain. Moreover, the Internet is more suitable than competing technologies for implementing the newer paradigms of learning because of its availability concerning the time and place of instruction, the individualization of instruction and the kinds of interaction users can have (Weisberg & Locatis, 1996).

Another advantage of the Internet as compared to other IT technologies is that it can provide a larger and richer array of information resources. In addition, there is no single authoritative information source and that individuals are responsible for deciding which information source to consult. Communication options that can be offered through the Internet are more conducive to cooperative team learning. They can be used

in ways that encourage students to build and share their knowledge representations (Scardamalia & Bereiter, 1996).

The Internet also encourages cooperative learning methods. Students are able to enhance their communication and social skills for organizing, summarizing, elaborating, and explaining their knowledge to others. Students may also be inspired by the insights of peers on the Internet (Klemm & Snell, 1994).

Thus, it is hoped that Malaysian teacher trainers will adopt Internet innovation by making the connection between the Internet and education more explicit through the utilization of the different Internet applications to meet their diverse educational needs. The challenge, therefore, is for them to develop pedagogical strategies, which exploit the Internet's potential for optimizing creative thinking and collaborative learning. Teacher trainers must also support one another in the effort to ensure that all students are provided a meaningful experience whilst using the Internet. This will be an added bonus that will positively affect the education of future Malaysians (The New Straits Times, August 30, 1999).

However, the most pressing dilemma facing the teacher trainers is how to meaningfully diffuse the Internet into the curriculum, a problem that exists at all levels of instruction. This is related to the fact that the teacher trainers are still not familiar with methodologies of integrating new technologies such as the Internet and its applications in the teaching and learning process.

This problem is further compounded by the fact that the teacher education sector in Malaysia is moving towards an IT-based curriculum. This shift towards using IT in teacher education is reflected in a directive which was recently issued by the Teacher Training Division of the Ministry of Education stating that all teacher trainees at teacher training colleges in Malaysia will be given computer and information technology training from the year 2001 (The New Straits Times, April 20, 2000). Directives such as this also indicate that the Malaysian Ministry of Education is aware

that the integration of computers and its latest technologies in the teaching and learning process is a prerequisite to bring the education system of Malaysia into a new era.

2.2.1 Computers and the Internet in the Malaysian Education System

Realizing the potential of computers as a tool for learning, the Ministry of Education of Malaysia took the initiative to integrate computer literacy into the school curriculum under the Seventh Malaysia Plan. Under the plan, a computer laboratory with forty to forty-five personal computers was set up for every seven hundred and fifty pupils in a school (Dasar Komputer Kementerian, 1996) to get Malaysian students involved in E-Learning.

In order to further encourage E-Learning in the country, the Internet was first provided to students to utilize the e-mail and to seek information on the Internet (Zoraini, 1997a). Consequently, Internet based education in Malaysia was initiated by the launching of the TM-School-On-Line web site in 1997. Currently, there is also a TM school online homepage *(http://www.tm. net. my/edu/tmsol)* to access UPSR (Ujian Penilaian Sekolah Rendah) (Lower Primary Examination) materials. Another web-based education project that Malaysian educators can identify with is *Pendidik Net Malaysia (http: //www.Geocities. com/ Athens/ Oracle/ 1771 utama. html).*

In addition, The Star Publications and the Education Ministry together with local organizations are attempting to remedy the lack of Internet access in needy schools in Malaysia with the 'Internet for All Project', which is a joint effort by these bodies to connect rural schools to the Internet. The 'Internet for All' project would initially involve five schools in the Klang Valley in its pilot phase, before being expanded to other needy schools in the state of Selangor.

Another combined initiative, the Smart Learning Environment (SLE) between the Government, Malaysian Institute of Micro Electronics Systems (Mimos) and Telekom Malaysia (TM) aims to connect schools and institutions of higher learning through the wide area network and introduce techniques of integrating the Internet in

the teaching and learning process to facilitate and enhance learning in schools (The New Straits Times, October, 1997).

The SLE program which complements the Smart School program was started in late 1997 by Mimos with the vision to create a learning environment that facilitates learning through the use of the Internet and its related technologies for classroom instruction. Thirty-three schools, representative of all types of Malaysian schools were adopted and funded by a research grant from the government.

Each school was provided with the appropriate connection and access to the Internet and teachers were provided with the necessary training. Twenty schools were provided with a leased line of 64-kilo bytes per second (kbps), and two schools have a 128kbps line speed connection. Sixty one percent of the schools were on leased lines while the rest were on multiple dial ups.

The first school to adopt the SLE program was Sekolah Kebangsaan Paya Rumput in late June 1998. This was followed by Sekolah Sukan Bukit Jalil. The SLE program was also implemented in most of the elite boarding schools like Maktab Rendah Sains Mara and urban schools like Seri Kampar Secondary School, Raja Chulan Secondary School, Dato Lokman Secondary School, Dindings Secondary School and Taman Putih Secondary School.

All ICT training under the SLE program was conducted on site, mostly using Cikgu Net (www.cikgu.net) as the online learning platform after school hours or during the weekends. This has enabled the training to be given to more teachers. Besides this, it also minimized disruptions to the teachers' daily routine.

There were three stages of training: computer literacy, Internet and standard application; ICT for classroom integration; and self-development of the teachers. The purpose of the SLE program was to help set up school infrastructure by building up the human resource skills, specifically among the teachers. It also helped to educate the administrators in these schools and make them aware of the importance of ICT

adoption in their daily work. Furthermore, the administrators were provided with the opportunity to experiment with new teaching methodologies through many aspects of this program.

Teachers involved in the SLE program were introduced to new learning tools, given access to unlimited information, thematic and interdisciplinary teaching approaches, and provided with project-based assignments, collaborative activities, school based assessment and supportive and efficient management systems.

This initiative consequently led to the *'Jaringan Pendidikan Kebangsaan'* project (or the National Education Network Project) in Malaysia. In addition to all these, the Ministry of Education has also launched the Mobile Internet Unit Project (The Star, August 7, 1999), which aids teachers and students in rural areas who are not included in the Smart School project or computer-in-education programs, to be exposed to the Internet.

2.2.1.1 Development of the Internet in Teacher Education in Malaysia

A review of research in the field of teacher education has shown that teacher trainers who do not undergo technology training cannot serve as models for teaching and learning with technology (United States of Congress, OTA, 1995). Thus, Malaysian teacher trainers need to incorporate the latest information technologies into the teaching and learning process to enhance their professionalism and quality of teaching.

With these goals in mind, the Teacher Education Division (TED) of the Ministry of Education introduced computer literacy as a compulsory subject within the curriculum for all new teacher trainees (The Star, November 3, 1995). According to Zalina's (1997) report, the subject was modified in 1993 and named Information Technology (IT). The course content included computer literacy, application of

software in teaching-learning situations, networking systems, the Internet and introduction to multimedia.

IT was also offered to course participants of the fourteen-week in-service program as part of Computer in Education from 1995 (KDP, 1995). In early 1996, TED introduced IT in the one-year Post Degree Teacher Training Course (KPLI) and in the one-year Post Diploma Teacher Training Course (KPLD). The subject was later made compulsory for all teacher training courses including the one-year Specialist Teacher Diploma Course.

According to Zalina (1997), all teacher training colleges in Malaysia are equipped with two computer laboratories. Besides that, the TED has also established two electronic resource centers (ERC), which offer facilities for information access through electronic mail via the Internet and Intranet in two of the teacher training colleges in Kuala Lumpur (Institut Bahasa Melayu Malaysia and Maktab Perguruan Ilmu Khas).

Besides these formal courses, the Ministry of Education has also organized short computer and Internet courses in the thirty-three teacher training colleges in Malaysia. These informal courses, which aim to help local teachers upgrade their IT competency levels and methodologies of IT integration into the classroom, are usually held during the school holidays (Zoraini, 1997a). In addition, the TED had also introduced a fourteen-week course in July 1998 to train in-service teachers for the Smart School program.

Realizing that a high level of technology and Internet utilization is vital for enhancing the computer literacy of Malaysians, the Government of Malaysia intends to accelerate the deployment of the Smart School project to all schools throughout Malaysia (The Star, January 22, 1999). Although the Smart School project officially began in January 1999, it was severely impeded by problems such as the shortage of computers and lack of funding. The economic turmoil (1997-1999) was partly to be

blamed as it forced the Government to reduce on the scale of the project, resulting in limited implementation of the original concept. However, the relevant parties after elaborate negotiations, re-launched the Smart School project in the first week of August, 1999. Under this project, Internet access by the Ministry of Education is to be provided to all Smart Schools through a data center with a 2 Mbps Internet link to be set up at its Technology Division.

The latest developments in the Smart School Project indicate that the system integration and project management works are 90 percent complete and the Smart School Management System is 80 percent complete in the 87 smart schools in the country. However, the last three of the 90 Smart Schools are still under construction (The New Straits Times, November 6, 2001).

2.3 Innovation in Teacher Education in Malaysia

The rapid growth of the Internet has provided the potential for the application of computer-mediated communications (CMC) in education. However, the capacity of the computer to assist in the delivery of the instruction is intrinsically limited both by the software and the hardware available on-site and the willingness of teachers to learn how to use it. The current push towards incorporating the Internet as an instructional tool in the teacher training classroom is an innovation of the utilization of computer technology (Maule, 1993).

At all levels of education, innovation in teaching and learning is an important consideration. Innovation in education is defined as "changing practices" (Fullan, 1982). This implies that innovation is the introduction and actual use of ideas or practices that are new or different from those that are already in existence. The Internet which features the central innovation of computer technology can contribute immensely in enhancing the quality of teacher education in Malaysia.

In the same vein, research on innovation was neglected by policy makers when they introduced information communication technologies into higher education in the United Kingdom. This had caused many problems and failures that could have been predicted and partly avoided in the implementation of this innovation. Similarly, research must be conducted in the area of innovation before the Internet is fully integrated into the Malaysian education system.

The Ministry of Education's move to incorporate Internet innovation in its educational system must be supported by well-planned training programs. Therefore, it is necessary for curriculum planners to give direct attention to IT innovation diffusion mechanisms when seeking to encourage the meaningful integration of the Internet in the teacher education sector in Malaysia.

An initiative known as the Smart Learning Environment (SLE) was undertaken by Mimos in thirty-three schools in West Malaysia to develop learning through the integration of the Internet and its related technologies in late 1997. The main aim of the project was to introduce innovative use of information communication technologies (ICT) for classroom instruction. Specific applications of content free software, such as word processing, spreadsheet, database, desktop publishing and graphing, Internet tools as well as Comil authoring tools were also introduced into these schools.

An evaluation study on the effectiveness of the SLE program was carried out among the 660 teachers in June 1991 (Rahman, 2001). The study showed that 84.9 percent of the total population agreed that the SLE is an effective mechanism in promoting ICT integration in the Malaysian classroom. The study revealed that the main ICT integration activities carried out in these schools were development of teaching modules, e-mailing and downloading teaching materials, web development, graphics, collaborative programs with foreign schools and information searching.

On the question of implementing ICT integration in their teaching and learning processes, about sixty percent of the teachers claimed that they were capable while the

rest claimed otherwise. The findings from the evaluation of this program reflected that teachers from the national education system who are placed in an online learning environment are more ready to incorporate the latest technologies into their teaching.

However, in the Malaysian teacher education sector, no study on the instructional use of the Internet and its related technologies by the teacher trainers has been carried out. Current local studies on the use of the Internet and its applications in the area of teacher training are limited to the areas of competency levels, attitudes of teacher-trainers as well as factors that influence the use of computer technologies. In addition, these studies tend to focus more on teacher trainees than teacher trainers.

Shanmugam (1999) investigated the information seeking abilities of teacher trainees in Southern Malaysia. His study showed that only 2.0 percent of the teacher trainees looked for information in the Internet very frequently while 33.4 percent did not seek information on the Internet. The study also found that a large fraction of the trainees did not know how to use homepage construction (49.2%) and e-mail facilities.

This revelation shows that trainees are only exposed to word processing during their tenure in the college even though the teacher-training curriculum mentions a variety of programs related to presenting information that need to be taught. The study also showed that the teacher trainees were not given hands on practice on the use of the Internet even though it was stipulated in the syllabus.

Other local studies in the teacher education sector researched the attitudes of teacher trainers towards computers (Nasirun, 1999; Karim 1996) and factors that influence the use of computers among teacher trainers (Baharin, 1998). Nasirun's (1999) study on attitudes of professional use on computers among teacher educators in a teacher training college in northern Malaysia showed that the attitudes of teacher trainers towards computers were very positive. Similarly, a study on attitudes of in-service teachers towards computers by Karim (1996) showed that ninety-five percent of the teachers had favorable attitudes towards computers and its related technologies.

Other studies in the teacher training sector focused on the factors that encourage the use of Internet innovation among education lecturers in Northern Malaysia (Baharin, 1998). The study found that the factors of availability of computers and computer training had significant relationships with the attitudes of teacher trainers in the use of computers for educational management purposes.

Thus, there are many factors that can affect the adoption of an innovation. If the Internet innovation is to be implemented successfully in the teacher education sector in Malaysia, it is imperative to understand some of the background theories and models as well as factors that support this innovation.

2.3.1Theories of Innovation

There are many theories that explain innovation of instructional technologies in an educational organization. Among them are Rogers' (1995) Diffusion of Innovations Theory and Fullan's (1982) Model of Innovation.

The theory of diffusion of innovations by Rogers (1995) explains the process whereby an innovation such as the Internet is diffused to the population of a given social system over time. Rogers defines diffusion as "a type of social change". It is the process in which an innovation is diffused through channels over a span of time among members of an organization whereby members who are early adopters adopt the innovation before others.

According to Rogers (1995), early adopters usually possess various levels of ability and skill, beliefs and visions about the value of technology, as well as specific personality traits, risk-taking behavior, motivations to learn about technology and self-taught development patterns. They would also have implemented computer technologies in different environments, under different conditions and with different expectations.

In addition, Rogers (1995) also reported that early adopters have also been found to differ from late adopters across a number of personality variables. Early adopters have more empathy, less dogmatism, a greater ability to deal with abstractions, greater rationality, greater intelligence and a better ability to cope with uncertainty and risk.

The variations in the personality variables between early and late adopters among educators are also reflected in Sherry's (1998) mixed-method research design study, which investigated Internet use within the School of Education at the University of Colorado, Denver. She found that the early adopters often express a good fit between Internet tools and their personal and cultural values. Conversely, she found that late adopters voiced concerns about the impact of the Internet on their core pedagogical strategies, indicating that it may not support their vision of learning.

Similarly, Brown's (1999) study indicated that there are a small number of early adopters among teacher educators in Arkansas, United States who are very enthusiastic in adopting Internet innovation because they can envision the perceived benefits of utilizing this technology in the process of teaching and learning. Brown (1999) proposed that recognition be given to the early adopters who develop teaching strategies that include innovative uses of the Internet for authentic problem solving and higher-level learning. On the other hand, late adopters among teacher educators still seem reluctant to adopt it for their teaching tasks.

According to Rogers (1995), the perceived attributes of an innovation; relative advantage, compatibility, trialability, complexity and observability can also influence the rate at which an innovation is adopted into a social system.

Many studies have used Rogers' theory of perceived attributes of an innovation to explain the adoption of the Internet into their educational organizations. Zhang (1999) in his study employed this theory to investigate doctoral students' adoption and utilization of the Internet in a College of Education in Texas. He found significant

differences between the adopter and non-adopter group on the basis of the perceived attributes of the Internet innovation. The early adopters' perception of the Internet positively affected their adoption and utilization of the Internet innovation.

A study by Cartas (1998) in 14 schools in San Diego found that potential adopters were more likely to implement an innovation if they had favorable perceptions relating to its need, complexity, compatibility and relative advantage. Similarly, Mubarak (1994) in his study of the adoption and use of Internet technologies by faculty members in Saudi Arabian universities cited that the five innovation attributes namely; relative advantage, compatibility, trialability, complexity and observability as significant factors in explaining the rate of Internet adoption by the Saudi Arabian faculty. Thus, this study employed the theoretical perspectives as advocated by Rogers (1995) for the diffusion of Internet innovation among Malaysian teacher trainers.

Another model of innovation by Fullan (1982) advanced the notion that any innovation goes through four stages namely, the approach, adoption, implementation and the institutionalization stages.

The approach stage is when the innovation is made known to potential adopters. This is followed by the adoption stage where adopters familiarize themselves with the innovation. The third stage of implementation is when the innovation is put into practice. Finally, in the institutionalization stage, the innovation becomes the norm of the organization. Fullan's (1992) research indicates that many innovations do not reach the institutionalization stage.

Therefore, Fullan (1992) suggests that in the diffusion of an innovation, it is very important to study models of change that support an innovation as well as resistance to change.

2.3.2 Models of Change

Teachers of the 21st century must change to adopt innovations in information communication technologies that are appearing rapidly in the world of education (Tedesco, 1996). With the current expansion of the Internet and its applications, it is imperative that teacher-education programs be adjusted to take into account the rapid changes brought about by these technologies. However, teacher trainers attempting to integrate and adopt new technologies may encounter different forces of change. These forces can come from external or internal sources. Administrators and policy makers need to be aware of these forces as they can affect a new change in an organization.

Schien (1997) defines change as a process by which a person is presented with a new pattern of behavior and adopts the pattern as his or her own. As Schien (1997) points out, the process of change occurs through the mechanisms of identification and internalization.

In the identification mechanism, a person learns new attitudes by identifying with and emulating other people who hold these attitudes. Whilst in the process of internalization, an individual learns new attitudes by being placed in a situation where new attitudes are demanded of him as a way of solving problems. The teacher education sector in Malaysia must attempt to change and adopt new innovations to maximize the teaching and learning process. Most theories of organizational change originated from the landmark work of social psychologist, Lewin (1968).

2.3.2.1 Lewin's Classic Change Model

Lewin (1968) developed a three-stage model of planned change, which explained how to initiate, manage and stabilize the change process. According to Lewin, there are three stages of planned change, which are unfreezing, changing and refreezing.

The unfreezing stage primarily looks at how motivation is produced to discard old patterns of behavior. Administrators in an organization begin the unfreezing process by disconfirming the usefulness or appropriateness of their employees' present behavior or attitudes.

In the changing stage, staff development is central where new perspectives are introduced in place of the old ones. Role models, mentors, experts and training mechanisms are used to facilitate change at this stage. Finally, helping individuals integrate the changed behavior into normal practices in the refreezing stage stabilizes the change process.

Lewin's (1968) change model shows that for an innovation to be introduced there must be a methodical approach to introduce change and more importantly, the individuals that are to be "changed" must feel that there is a real need for it. Similarly, policy makers can adapt Lewin's model of change when initiating Internet innovation in teacher education in Malaysia. However, the implementation of any innovation will normally be met by some resistance to the process of change.

2.3.2.2 Resistance to Change

A technological innovation such as the integration of the Internet in the teaching and learning process is important as it improves work methods which can lead to more efficient operations, increased productivity and improved learning conditions. However, some educators will still resist change even though they know it can enhance an organization's goals.

According to Kitchin (1997), people tend to resist technological changes or appear to resist them when they believe that the proposed changes will not produce the results that administrators seek, even though they agree with the results and goals that administrators seek. Therefore, Kitchin (1997) suggests that administrators consult and

involve the employees concerned when attempting to introduce change such as the use of new technologies.

Clifford, Friesen, and Jacobsen (1998) also state that the integration of computer technology into education and the proliferation of computers in society appear to both demand and require changes in the teaching and learning processes. Arnold (1998) too advocated that openness to change is necessary if the Internet and its applications are to be successfully implemented in schools and the teacher education sector.

It can be seen that as a result of new computer and Internet technologies, the work of teacher trainers is likely to change with respect to curriculum content, classroom management and teaching methodology. Consequently, the Malaysian Teacher Education Division must be aware of the tenets of innovation and forces of change and should be able to overcome any resistance to change in implementing Internet innovation in teacher training colleges in Malaysia.

2.4 Information Technology (IT) and Internet Competency

Global communication has spurred the education fraternity to use IT efficiently and effectively. Consequently, this has brought about the need to carve out new learning environments, educational technology skills and relevant curricular content that need to be interwoven into the teaching and learning process. In order to achieve this, present day educators must be competent in the use of computers and also be e-literate.

Competency has been defined by McLagen (1983, p.7) "as an area of knowledge of skills which is critical to the production of key outputs." Outputs are defined as products, services, and performance of specific roles (McLagen & Suhadolnik, 1989). Therefore, competencies are knowledge and skills that enable an

individual to produce outputs. Joyce (1974) describes educators as assuming different roles, which requires a range of competencies.

The United States of America has pioneered the incorporation of computer literacy competencies into teacher preparation programs since 1988. The International Society for Technology Education (1997) has also produced standards for IT competencies that serve as guidelines for teachers to incorporate the latest technologies into their teaching.

Correspondingly, a recent study by Scheffler and Lagan (1999) attempted to identify specific and discrete computer competencies vital to teachers for classroom implementation of technology. The objectives of this study were to update previous competency studies to incorporate recent hardware and software advances and to develop a list of competencies agreed upon by educators recognized as knowledgeable in computer technology. Technological advances such as the e-mail, networks and the Internet formed about fifteen percent of competency statements of the survey instruments. The results of the study showed that making computers an integral part of the curriculum and instruction had the greatest importance for teachers.

Scheffler and Lagan's study also attested to the importance of Internet and e-mail competencies for educators. The increasing accessibility and usage of the Internet and e-mail in schools is expected to bring about more emphasis on the importance of network related skills which will inevitably lead to these skills being moved up higher on the priority list of required skills for teachers.

Some of the competencies that were identified in this study are that teachers must be able to operate a computer system to utilize software, design student activities that integrate computers in a variety of grouping strategies, demonstrate knowledge of multimedia, hypermedia and telecommunications to support instruction, demonstrate skills in using word processing, integrate computer-based instruction into the curriculum and apply technology to facilitate the emerging roles of the learner and the educator (NCATE, 1996).

Another test that has been designed to test the competency of teachers in the usage of the Internet is the Internet Competency Matrix (1997) *(http: //rmbrandt. Reols Eom/97a/Quiz Internet competency.html)*. It tests the competencies of teachers in understanding Internet vocabulary, composing, receiving and managing electronic mail, participating in listservs, netnews and discussion groups, uploading and downloading text and binary files, diagnosing minor technical problems in Internet connection as well as researching and publishing documents on the World Wide Web.

The rationale for setting the above competencies is to ensure that teachers master the relevant skills and feel comfortable in implementing technology in the classroom. After acquiring the required skills, teachers are required to complete classroom-learning projects, which are technology infused and standard-based. These projects give teachers an opportunity to integrate IT competencies that they have learnt.

Some of the competencies that Fluck (1996) recommends, is that all teachers are able to create web pages, develop multi-media presentations, send and receive e-mail, participate in desktop video conferencing, search CD-ROM based information sources, use web and Internet search engines effectively and collect and analyze data from the real world.

In relation to this, Roden (2000) identified a number of technology skills that were clearly identified as priorities for pre-service teachers. The data revealed that word processing skills had the highest priority among the groups. The data also revealed that the other high priority skills included use of e-mail, accessing the Internet, utilizing CD-Roms, and possessing knowledge of computer terminology. Roden (2000) also found that low priority skills included knowledge of programming languages, MS DOS and web page design.

However, there has been a dearth of studies measuring the computer and Internet competency of lecturers in the teacher training colleges in Malaysia. Local educationists have arrived at a new aphorism pertaining to computer literacy in the educational system. Mohamad Khalid and Wan Mohd Salleh (1986) suggested that

computer literacy in the Malaysian context required a person to know less about the technical aspects of computers and more about how to use them effectively in instruction. They suggested that priority should be given to the application of software packages such as word processing and spreadsheets. However, they did not negate the fact that programming and multi-media skills should be taught in schools because it helps in the development of logical thinking and problem solving skills.

Similarly, Yong (1997) in his study recommended that computer competency in Malaysia must now be redefined to cover Internet usage and multimedia. This holds true for the current scenario in the ICT world where changes are taking place at a rapid pace. While ICT provides powerful tools that can transform many aspects of the personal lives of individuals, integration of Internet technologies in the classrooms is a relatively new phenomenon.

2.5 Integration of the Internet in Education

Educators in Malaysia (Nasirun, 1999; Chong, 1998; Karim, 1999) are excited about the potential of information communication technologies and the number of possibilities they offer for the enhancement of classroom instruction. The Internet can provide real assistance to educators in delivering meaningful instruction and learning.

Smart Schools, which use the Internet, are seen by many as having the potential to better equip students for living in the twenty-first century. This is because updating of personal skills and technological know-how is constantly required in the new millennium (Fluck, 1996). The Internet is also changing virtually the way all interactions are taking place in educational systems. This is because it can help students to send and receive e-mail messages, download lesson plans, research for on-line materials and work on collaborative projects beyond the walls of the school classroom. Once adept at using the Internet, students have immediate access to multiple resources and tools for combining these resources (Charp, 1998; Topp, 1996).

The result of this is that students spend less time looking for answers and information and more time on analyzing, reflecting and understanding issues in the classroom. The Internet also provides students with mechanisms for accessing various forms of data and opportunities for social dialogues and discussions. This eventually enables students and teachers to reorganize, consolidate and share information in the classroom.

Another advantage of using the Internet in the classroom is that technological learning requires learners to assume primary responsibility for independent learning, ask relevant questions, pursue needed knowledge and evaluate learner experiences. Learning in this manner is less passive, less compliant and less dependent on external directions than learning in congenital settings (Lennertz, 1999). An evident result of this is that students tend to better grasp the subject matter in the classroom.

In addition, another advantage of the Internet is that it can positively enhance the quality of writing in a language class (Hunter, 1999). Studies have shown that children tend to produce higher-rated writing in terms of fluency and mechanics when working on the World Wide Web.

Research studies in recent years have also consistently reported on the increased amount of cooperation and social interaction around Internet-based activities as compared to other more traditional classroom environments (Wilburg & Carter, 1994). The findings of the study by Wallace (1998), suggested that teachers require on-going Internet training, technical support, home Internet access and time to learn and incorporate the Internet into classroom activities. The study also revealed that Internet use enhanced teachers' self-esteem and changes their attitudes towards computers. Moreover, Internet use by teachers encouraged them to restructure their classes and schedules to accommodate Internet resources within the classroom.

Thus, many studies have shown that it is beneficial for teachers to incorporate and utilize the Internet and its applications in the teaching and learning process. These studies provide some of the rationales for bringing Internet innovation into the teacher education system in Malaysia.

2.5.1 Rationale for Integration of the Internet in Teacher Education

Teacher education programs need to be restructured to emphasize the importance of IT in Malaysia, with IT-based subjects replacing traditional ones so that these programs remain relevant to the country's education system needs. The latest teacher education program has already incorporated IT into its curriculum (Teacher Education Division Online, 1999). According to Datuk Seri Dr. Mahathir Mohamad, the Prime Minister of Malaysia (The New Straits Times, October 12, 1997), rapid changes taking place in the information technology world would compel such changes to be made and the failure to make the necessary changes would result in Malaysian educators being left behind.

The importance of incorporating IT into the curriculum has been evident in the Western education system where all teacher educators are expected to be proficient in the integration of these technologies into mainstream teacher education programs. The Malaysian education system is also going to be increasingly dependent on information communication technologies in the twenty-first century (Awang Had, 1999). Thus, it is vital that Malaysian educators enhance their competencies in IT and the Internet (Zoraini, 1995).

Consequently, the successful integration of the Internet into the classroom will depend on the ability of Malaysian educators to structure the learning environment in non-traditional ways and to develop socially active classrooms. However, this may be difficult to achieve in view of the findings of a local study, which was conducted by Mimos (1998). The study revealed that only five percent of the usage of the Internet in Malaysia was for educational purposes. This indicates that the actual potential of the

Internet in the education system of Malaysia has yet to be realized. This is accentuated by the consensus among researchers that there is limited discussion on the educational opportunities that can be provided by the Internet (Chapin & Messick, 1996; Maxim, 1999; Michaelis & Garcia, 1996; Parker & Jarolmek, 1997).

Therefore, the teacher educators in Malaysia need to be inculcated with the skills of integrating the Internet in the classroom. Moreover, teacher educators need to be guided to develop more positive attitudes towards the incorporation of Internet innovation in the classroom. This is in line with the findings of Barker and Dickson (1996), which state that technical expertise in the Internet has to be in the forefront of teacher preparation programs as this will enable teachers to utilize the acquired expertise in actual teaching situations.

Lane-Kelso (2001) found that teacher educators who reported using computers as an integral part of teaching led to a shift from text only resources in the classroom to using the Internet for the most current information source brought about increased student interest in learning and an enhanced professional role among their peers. Hence, besides the benefit of instructional effectiveness, teacher educators who adopt the Internet into their teaching can also help inculcate positive student attitudes towards the Internet.

Thus, administrators of teacher training colleges must seek creative ways of diffusing the Internet into the educational system and expose teacher educators to the methodologies of integrating the Internet and its applications in the instructional process.

2.5.2 Methods of Integrating the Internet in Instruction

Educators must learn the techniques of infusing the Internet and its applications in the classroom. For example, teachers can utilize the WWW to browse resources on the Internet or prepare articles based on materials extracted from the Internet. They can participate in Internet-based desktop videoconferencing, Internet-Relay Chats (IRC) or

participate interactively using Telnet in any lesson. They can also initiate on-line dialogues in their teaching by using mailing lists, bulletin boards and newsgroups. Teachers can also use interactive multimedia tools (web page creation) and install downloaded software into the classroom computer via file transfer protocol (Ftp) applications.

Another method for teachers to integrate the Internet in the classroom is by selecting the appropriate content area and target audience from the WWW and disseminating this information to their students. Teachers can also utilize materials on the WWW for their own personal development. Alternatively, teachers can send e-mails to obtain current information for teaching, collaborating and sharing teaching ideas. Furthermore, they can interact with discussion groups in their school and exchange reports and ideas in a cooperative way.

E-mail can also be used as a reflective activity. Teachers can identify and use e-mail based learning resources to develop multi-media presentations. Students can also create electronic portfolios in a variety of ways to communicate their ideas. However, Merseth (1991) discovered that the extension of e-mail usage to teacher educators provides a platform more for social and emotional support than for professional information exchange. As such, purpose, ease of access and convenience for task completion are important factors in promoting e-mail use (Clarken, 1993).

According to Thomas *et al* (1996), students in their practicum sites can e-mail their specific questions regarding assignments, meeting times, and pedagogical as well as classroom management concerns to their supervisors. Reflective journal dialogues sent to supervisors via the e-mail will also allow pre-service students to receive feedback immediately rather than wait for their supervisors to make the next observation at the practicum site or between weekly on-campus seminars. In addition, students' can communicate with cooperating supervisors via the e-mail about the next day's lesson plans or share reflections about the previous day's teaching.

In addition, studies on Internet use show that educators are using the Internet for preparing lessons, enhancing their professional communications and directing their students to use the Internet for research and web-construction purposes (Becker & Anderson, 1998). At the same time, teachers are also using the Internet for conducting online research in twenty-one states in America (Solomon, 1998).

These methodologies of integration of Internet are indirect in nature, indicating that utilizing Internet innovation directly in classrooms settings is still low among western educators.

2.5.3 Direct and Indirect Modes Of Internet Integration

Related studies in the area of Internet integration revealed that the mode of direct Internet integration is only popular in American schools that have high Internet access. Becker and Anderson (1998) found that the effects of having classroom-located Internet connectivity contributed to direct modes of Internet integration. This was evidenced by the fact that students were utilizing the WWW to do research on a regular basis. This was also a practice of nearly one-quarter of all teachers who had a modem in their classrooms and thirty percent of those who had high direct high-speed Internet access connections.

According to Wallace (2000), three high school science teachers at the University of Michigan are already utilizing a direct mode of integrating the Internet into the teaching and learning processes. In this mode, teachers are totally involved in the learning processes from the planning stage to the implementation stage of conducting Internet-integrated activities in the classroom.

On the other hand, a very recent study by Becker (2001) on 4000 teachers from grades 4-12 in the United States with regards to how teachers used computers in instruction reported that besides word processing, very few teachers get their students to make frequent use of computers during classroom teaching. Students in lower ability classes were often given computer games and drills related to the subject areas of their

class, but very few teachers were using more sophisticated computer software and Internet tools for doing productive and constructive academic work.

Likewise, the United States Office of Technology Assessment (OTA, 1995) report revealed that while half of the recent teacher-education graduates reported being prepared to teach technology in drill practice, tutorials, games and in writing and publishing centers, less than one in ten felt they could use formats such as multimedia packages, electronic presentations, collaborations over networks, the Internet and problem solving software in the classroom.

Brown (1999) also found that teacher education faculties from Arkansas are integrating computers in their instruction in three main areas: (1) use of e-mail and Internet, (2) use of WWW for problem solving and (3) use of word processing to generate booklets, reports and newsletters. However, Brown (1999) reported that the use of the WWW for problem solving was still low among teacher-educators. She concluded that the Internet and its applications had not been meaningfully integrated into the teacher-education curriculum. She opines that the integration lacks depth both in individual courses as well as in the curriculum as a whole.

Further, Bullard (1998) found that college professors in University System of Georgia teacher-education programs use technology more for teaching preparation rather than in the actual classroom. His study indicated that teacher educators perceived the WWW application more useful as a research than as an instructional tool. Further, Layfield (1998) found a very low use of e-mail and WWW in classroom activities among secondary agriculture teachers. Thus, these findings imply that the direct mode of using the Internet for instructional purposes is still low. The lack of direct forms of Internet integration is also reflected in Nettle's (1998) study. He found that many instructors are taking advantage of the Internet by creating web pages. These websites vary from a simple posting of the course syllabus to multiple pages that include lecture notes, class projects, homework and assignments, links to other sites, interactive

quizzes and password-protected grade postings. However, most of these activities are conducted out of classroom teaching hours and not directly in classroom settings.

Likewise, a study by Kwek (1999) identified the perceptions of teachers in grades four to eight in California elementary schools. He used semi-structured interviews that were conducted via online questionnaires. His study revealed that teachers used the Internet as a resource tool to access classroom lesson plans and instructional support materials to research curriculum content. They also used the Internet more for students to access current information, for data and research, and as a communication tool with other students and less for students to participate in online projects and classroom teaching.

Moreover, a study in American settings in eighty Illinois secondary schools by Lupo (1999) revealed that although the Internet was used in participating schools regularly as a classroom resource, it had not been incorporated seriously and directly into the teacher-training curriculum. This is related to the fact that most educational institutions in Western settings do not outline clearly the use of the Internet network for their educators (McKenzie, 1999a). According to McKenzie (1999a), there is a need to have well-articulated curriculum plans on how competencies in Internet technology will enhance the reading, writing, reasoning and research of students in classroom activities. Bowman (2001) also advocated that definite benchmarks should be outlined for course development in the incorporation of the Internet into the teaching and learning processes. Initiatives such as these will lead to more direct forms of Internet integration. Thus, there is a need to investigate the forms of Internet integration that are currently being advocated in the education syllabus of the Malaysian teacher-training curriculum.

It is evident that both the direct and indirect modes of Internet integration in schools and teacher training colleges provide opportunities for better communication and instruction if these tools are suited to the requirements of the educators. However,

research in this area has also shown that educators face many problems in both modes of instructional integration of the Internet.

2.5.4 Problems Associated with the Integration of the Internet in Instruction

Issues such as how, when, and why institutions of learning should provide future teachers with expertise in the use of technology and the Internet are some of the questions that are beginning to dominate discussions of initial and continuing teacher preparation. A recent report issued by the United States Congress, Office of Technology Assessment (1995) devotes two chapters to the importance of technology learning. The Journal of the Association of Teacher Educators, Action in Teacher Education and the Journal of the American Association of Colleges Of Teacher Education as well as the Journal of Teacher Education have devoted entire issues specifically to technology and teacher education.

Willis (1993) also states that questions about hardware, software and how to use their applications are no longer the most important topics in educational technology. Today, the major issues are related to instructional strategies, instructionally appropriate software, professional development and how to provide continuous technological support to educationists.

Given the rigorous teaching and administration responsibilities typical of public schools, many educators are unlikely to use their school's link to the Internet until they are convinced that it can bring about instructional gratification and professional development to them. However, a number of studies and reports reveal that both new and veteran teachers feel inadequately prepared to use the Internet and its technologies in the classroom (Brooks & Kopp, 1989; Roblyer & Barron, 1993).

According to the President of Tenth Planet Explorations Incorporation, Vedoe (1995) whose study was on teacher perceptions towards the Internet and its role in the learning process, the lack of adoption of the Internet was due to the inability of educators to effectively integrate it in instruction. In the same vein, Fulton (1993) also

cited time and support as crucial factors which hinder teachers' use of technology in the classroom. Taylor (1994) confirms that teachers' inhibitions about integrating technology are also due to their lack of knowledge of newer technologies, inadequate support from the administration and lack of time in learning how to integrate new technologies into the teaching and learning process.

This is further confirmed in a study by the United States Congress Office of Technology Assessment (1998a), which concluded that most teachers believe they are inadequately prepared to use instructional technology. Other obstacles cited by the teachers to effectively integrating technology into their curriculum are the lack of knowledge about software, time constraints, the limited vision of the potential of the technology for teaching and the lack of institutional recognition (Staman, 1990, Wetzel, 1993).

Gallo and Horton (1994) also investigated the barriers Florida high school teachers encountered in using the Internet. Their study showed that, on the whole, in teacher-education, technology training has been lacking or poorly complemented. They also stated that on some campuses, the only training available is through the computer science department or computer department where trainers teach technology rather than the application and integration of IT in instruction.

According to the National Council for Accreditation of Teacher Education (NCATE), (1997) the lack of use of technology by teacher educators in America can be attributed to several factors, the first being that many teacher education programs lack the hardware and software essential for strong programs. Another pertinent reason is that teacher education programs are often given low priority for special technology funding on their campuses and therefore are denied essential technology. Besides that, many teacher education faculties also lack the knowledge and skills to incorporate technology into their own teaching. Moreover, a majority of teacher education departments and colleges in the United States have not been able to invest in the technical support required to maintain a high quality technology program.

Walters (1992) also found that teacher education programs in America do not typically incorporate new technologies across the curriculum. In addition, the instruction that is provided to pre-service teachers tends to focus more on the older and simpler instructional applications of computer technology (e.g. computer assisted instruction, word processing) and less on exposure to and practice with newer, more sophisticated tools (e.g. electronic networks, integrated media, problem solving applications), which support the development of students' higher order thinking and problem solving skills.

An additional problem that arises in the teacher education sector is the disagreement among teacher educators about the best approach in preparing teachers to be proficient in computer-based instructional technologies. Thus, instead of discrete computer literacy courses, computer instruction should be integrated into existing programs of teacher education (Weibe, 1995).

Barron and Goldman (1994) also identified several obstacles in infusing Internet and its technologies into teacher education programs. They include the limited availability of equipment, lack of faculty training, technical support and funds, lack of time to develop facilities which use equipment and software, and, no clear expectation that the faculty will incorporate the Internet into its academic activities.

The problems underlined above also hold true in Malaysia. According to Dr. Dato' Anuar Zaini Md Zain, the Vice Chancellor of University Malaya, the current scenario in Malaysia is that teachers and educators are still indulging in the chalk and talk method in the teaching and learning process (The New Straits Times, May 8, 2000). In relation to this, Topp *et al* (1995) advocates that improving the performance of technologically proficient teachers will require expanding technology use among teacher educators and solving the problems that they encounter in the instructional process. This certainly applies to Malaysian educators who similarly need to be exposed to the appropriate pedagogical methods of integrating the Internet into the instructional process.

2.5.5 Pedagogical Considerations of Internet Integration.

Given the critical role of technology in education and the social and economic future of the nation, preparing teachers to integrate the Internet and its technologies in the classroom is critical. Preparing pre-service and in-service teachers to play their role in creating an "information society" requires that education faculties to be knowledgeable about technology and telecommunication resources (Gonzales & Thompson, 1998). However, the shortcoming that arises is that although a high percentage of American teachers have access to computer hardware, they lack the training and pedagogical framework needed to utilize the Internet as an effective classroom tool (Cooperman, 1998; Esthella & Montes, 1999).

Therefore, diffusion of Internet innovation in education as a whole is a complex matter influenced by a number of interdependent factors. In order to achieve maximum integration of the Internet in the teaching and learning process, educational institutions require retooling while most educators need retraining and reskilling within a supportive environment (McIntyre & Finder, 1996; Gallo & Horton, 1994).

Internet proponents believe that since the Internet offers a plethora of resources, many of which are free, teachers need to learn only how to extract these resources in order to use them. Classrooms become more student-centered as opposed to teacher centered; small group instruction and learning takes the form of a "structured exploratory" approach in which case the teacher assumes a greater role as a facilitator and a coach (Dwyer *et al.*, 1991).

According to Littauer (1998), the role of a facilitator is still a new and unfamiliar role for teachers, especially those having limited experience with computers as training in this teaching method is sorely lacking at all levels. Thus, few school systems are likely to take advantage of the Internet and its technologies unless there is an ease of usage and a compelling pedagogical rationale (Newman & Bernstein, 1992, p.7). Thus, in order to tap the increased access to information made possible by

technology, a shift in pedagogy from the mode of " teacher as information provider" to "teacher as facilitator" is needed.

According to Tomei (1997) the discipline of educational psychology recognizes certain theories regarding how individuals can master learning material on the Internet. Tomei (1997) states that the Internet is too hands-on and too dependent on prior student knowledge to be effective as a "' facts and skills, drill and practice" media. Therefore, the use of the Internet in a behavioristic, teacher-centered classroom violates the strength of this technology as an instructional tool.

Moreover, according to Bruner (1997) the new paradigm of learning in the twenty-first century places the responsibility of learning on the individual. Bruner (1997) expands on this notion by adding that an educator develops more effective instruction by matching the method of presentation to the most appropriate learning style of the student. From a pedagogical viewpoint, the greater the learner's autonomy, the higher the level of active learning that can be successfully employed. Based on the theory advanced by him, the Internet enhances an individual learner's independence.

Integrating the Internet into education would also mean supporting the seven aspects of meaningful learning which form the thrust of pedagogical considerations in integration (Jonassen, 1996). According to Jonassen, the seven aspects of meaningful learning are active, constructive, collaborative, intentional, conversational, contextualized and reflective learning. These characteristics are interrelated, interactive, and interdependent.

Therefore, the Internet encourages a constructivist style of learning whereby educators act as facilitators of knowledge. Thus, the most productive and meaningful use of the Internet cannot occur in traditional educational institutions. This is because the most productive and meaningful use of the Internet involves being engaged in knowledge construction, conversation, articulation, collaboration and reflection.

Jonassens's study has shown that the abovementioned methods are vital pedagogical issues that educators must consider in the instructional process. However,

this has not been practiced by most educational institutions, as they do not follow a model or a frame of reference for integrating the Internet into the teaching and learning process.

According to Barker and Dickson (1999), it is imperative that educators refer to expertise based on specific integration models for infusing the Internet into the teacher education sector.

2.5.6 Models for the Integration of the Internet in Instruction

From the standpoint of education reform, the virtues of the Internet does not lie in the technology's use *per se,* but in the instructional context within which it is used. Thus, integrating the Internet can be easily absorbed into the curricula by referring to frames of reference or models of integration.

The first model of integrating the Internet is the one propounded by Marcinkiewicz (1994) who categorized computer use and integration of technology into the teaching and learning process by teachers into five distinct levels. The first category, the non-use category, indicates the absence of any use of computers at all for teaching. The second level is the familiarization stage where teachers become familiar with computers. The third level is the utilization stage whereby teachers begin to use computers in teaching. In the fourth stage, which is the integration stage, computer usage becomes critical to the teacher's teaching. At this stage, teachers consciously and inextricably delegate some of their duties to computers and are aware of their changing roles. In the final stage of innovation, teachers continue practicing learning how to improve instruction in the classroom.

The second model as advanced by Moerch (1998b) says it is the manner in which technology and computers are used as tools to support students' thinking and reasoning skills across the curriculum that is important. He designed the Loti framework that identified seven levels of technology infusion ranging from non-use

(level 0) to refinement (level 6) and the other levels as awareness, exploration, infusion, integration (mechanical), integration (routine), expansion and refinement.

These levels of technology infusion are expansionary in nature and at the integration levels, educators have to utilize multimedia telecommunications, databases, spreadsheets and word processing technologies to increase students' understanding of complex concepts and problem solving skills.

The third model, the Classroom Learning Model is based on the Singapore experience in integrating the Internet as a learning tool (Tan & Wong, 1999). This model comprises the integration of the Internet into the curriculum with the intention of bringing discovery learning and real world experiences into the classroom. In addition, this model underlines the importance of the vision of learning goals, which emphasizes the need for engaged learning. Additionally, the vision of task goals sets specific tasks in satisfying students' quest for knowledge and skill. Finally, instructional goals are introduced to make instruction more interactive to allow for the co-construction of knowledge in the classroom.

The fourth model by Sibley and Odasz (1999) which is known as the Internet Style Learning Model (ISL) was created for integrating the Internet in the teaching and learning process. The ISL model examines the resources and capabilities that the Internet provides and ways to integrate these resources and capabilities in the teaching and learning process.

According to the ISL model, to be able to integrate the Internet and its applications successfully, teachers first have to be aware of the existence of the Internet and how it can help them to have immediate access to information.

In the second stage, teachers should learn how to find the information they need by using web-based search engines and directories. They can then process this information by copying or pasting it into their software applications and analyzing and manipulating it in diverse ways.

Teachers who are well versed with the two stages mentioned above could then move on to the next stage, which is Internet publishing. A teacher can be a publisher and has the ability to broadcast the address of his or her site by registering it with all the search engines and promoting it on or off the Internet. He or she can also distribute it to a selected audience.

The next stage in the integration process is collaboration. At this stage, teachers need to be competent in the utilization of e-mail technology as information acquired can be transferred, commented on, edited, analyzed and manipulated by one or any number of people any number of times in truly global collaboration via listservs (electronic mailing lists).

The final stage is real world problem solving. The ISL model stresses on building learning communities, learning to learn, and, electronic democracy. Therefore, the main basis of the ISL model of integration is using and combining these four capabilities in powerful and innovative ways to make the Internet style of learning exciting for educators and students alike.

In conclusion, a model technology integrated classroom does not mean that each student has ready access to a computer, modem, CD-ROM player or the Internet. In essence, the model technology classroom needs only a few Internet connections, with students using computers in school libraries or computer labs. It is the manner or technique where computers and the Internet are used as tools to support students' thinking and reasoning skills across the curriculum which forms the foundation of the model integrated classroom.

Thus, the challenge that lies ahead is for teacher educators to develop pedagogical strategies and tactics that exploit the Internet's potential for optimizing critical and creative thinking as well as active and collaborative learning in the Malaysian classroom. Besides that, it is also pertinent for teacher educators to understand the factors that influence and hinder the adoption of the Internet in the teaching and learning processes.

2.6 Factors that affect Internet Integration

In recent years, there has been a significant increase in the number of educators who use educational telecomputing networks (IDC, Business Computing, 2000). Despite this tremendous growth, a number of investigations into computer use in K-12 classrooms have concluded that computers and the Internet are not being fully exploited by the majority of teacher educators (Milken Exchange on Educational Technology, 1998). This situation also holds true in Malaysia (Shanmugam, 1999). Shanmugam's (1999) study revealed that Malaysian teacher educators indicated that they needed to enhance their Internet skills because they could not guide their trainees in Internet-based activities in the classroom. Thus, it is necessary to examine the factors that have attributed to the instructional integration of the Internet in the teacher training colleges in the Klang Valley.

In addition, results of several qualitative studies have identified conditions that may encourage the instructional use of the Internet and networks. These factors include experience and competence in using networks, time for learning to incorporate them into instruction, support from the early adopters of Internet innovation, access to a computer and modem at home and the extent to which teachers recognize the use of networks as fitting into their curriculum (Gallo and Horton, 1994; Stuhlmann, 1994; Sunal *et al.*, 1993).

The latest research in technology use has indicated that there are five factors, which are strong predictors of the utilization and integration of the Internet in the classroom. The first factor is the attribute of educators who use the Internet to support instruction (Roberts, 1998). An exploratory study by Roberts (1998) examined the attributes of 500 educators using the Educational Internet network to support instruction. Roberts found that the early adopters of the network had the characteristics of being self-taught Internet users and who were personally motivated to use this technology in instruction.

As such, Roberts (1998) recommended that it is important to identify the characteristics of early adopters who are utilizing the Internet for instruction as these educators can help to accelerate the adoption of Internet innovation in an organization.

The second factor is the Internet competency levels of educators (Kraut, Scherlis, Muhkhopadhyay, Manning & Kiesler, 1996; Westermeier, 1998; Arosteguy, 1999). These studies indicated that the lack of competencies in utilizing the Internet and its applications were a major obstacle for educators in their instructional integration of the Internet.

Thirdly, the attitudes of educators towards Internet innovation also play a prominent role in the integration of the Internet in the classroom. Studies of educational network systems in America have identified that educators who are integrating the Internet in the instructional process tend to have positive attitudes towards the use of Internet innovation (Anderson and Harris, 1997; Boulware, 1994; Hamilton and Thompson, 1992; Honey and Henriquez, 1993; Ravitz, 1999).

Fourthly, the types of gratification that educators are deriving from the use of the Internet can also affect its instructional integration (Anderson, 1992; Boulware, 1994; Broholm & Aust, 1994; Honey & Henriquez, 1993; Mathies & Nelson, 1995; Hunter, 1999). Fifthly, accessibility to the Internet both at the workplace and in the home settings have a positive effect on the instructional integration of the Internet (Market Data Retrieval, 1997; Ravitz, 1999; Becker & Anderson, 1998; Solomon 1998; Wellington, 2001; NCES, 1998; Sanger *et al.*, 1997).

Thus, the objective of this research is to study to what extent these factors influence the integration of the Internet in the classroom in the Malaysian teacher training colleges in the Klang Valley.

2.6.1 Attributes of Network Adopters and Internet Integration

The theory of diffusion of innovations by Rogers (1995) advocates that in any innovation, there are two major adopter types of an innovation; the early adopters and late adopters. The theory also states that early adopters of an innovation usually have different attributes compared to the late adopters of that particular innovation.

According to Rogers (1995), the early adopters are those who have the attributes of being able to cope with uncertainty, understand complex technical knowledge and they are constantly networking with other innovators. On the other hand, the late adopters are very skeptical of change and usually try to resist new innovations.

Research in this area has also revealed that early adopters of Internet innovation usually have certain similar characteristics such as higher levels of schooling, longer teaching experiences and more prior computer and Internet experiences (Boulware, 1994; Honey & Henriquez, 1993). Related studies in this area have also showed that the characteristics of early adopters of the Internet include higher levels of education, greater familiarity and use of mass media materials, positive attitudes towards change and a high degree of innovation-seeking (Blanch, 1994). Blanch (1994) found that early adopters of Internet innovation had higher levels of education and more computer experience than late adopters.

A similar exploratory study examined the relationship of personal attributes and the adoption and use of the Internet by educators working for the North Carolina Cooperative Extension (Owen, 1999). The data was collected from the respondents using a participant form for measuring twelve independent factors, the Myers Briggs type indicator for measuring personality and an Internet usage instrument for measuring the use of the Internet. Among the participants, there was a balance in gender and a broad range in age, tenure and computer experience. Most of the participants who had

achieved at least one graduate degree, reported having adequate access to the Internet, lived in rural communities, and viewed their use of computers as average.

The data analysis revealed that gender, age, level of formal education, tenure, computer experience, ease of access, Jungian personality type, learning approach, and computer support were significantly related to the use of the Internet at $p = .05$. On the other hand, job responsibility, supervisory support and the reward system were not found to be significantly related to Internet use.

A similar study by Brown (1999) showed that there were relationships between the personal attributes of education levels and age of teacher education faculty members in Arkansas and their reported use of the Internet. The data showed that tenured assistant professors between the age of 40 and 49 who are familiar with ISTE (International Standard of Technology in Education) were most likely to have a higher knowledge level and use of computers in their methods instruction than other faculty members from the Arkansas sample.

In addition, Roberts (1998) investigated the demographics of 229 educators in K-12 classes who had utilized the Internet for instructional purposes. The collected data identified almost ninety percent of the educators as teachers with six or more years of experience and within the age range of 40 to 49 years. Roberts also found that early adopters of Internet innovation who had six or more years of teaching experience were receptive to Internet technology. This study revealed that it is the younger educators who are keener to use the Internet for teaching and learning purposes.

Likewise, Haris (2000) investigated computer and Internet use of 133 class teachers at Carl Schurz High School, a Chicago public school in Illinois. He investigated the relationships between demographics technology plan, school improvement plan and staff development factors with Internet use. Interviews, sign-up sheets, software documentation and reports were presented in the data analysis of the study.

The major findings of his study showed that teachers with thirty-five years of teaching experience represented the largest group of non-computer and non-Internet uses. On the other hand, almost all teachers with ten years of teaching used a computer and the Internet. His study also showed that the younger teachers were using the Internet more for preparing teaching materials than for instructional uses.

Similarly, Becker and Anderson's study (1998), found that teachers who were most likely to use student web publishing projects were those who had four to seven years of teaching experience behind them. In addition, Becker and Anderson's (1998) study showed that teachers with relatively limited educational experiences are less sure of the need of the Internet in the classroom and are perhaps half as likely to use it as compared to teachers who have extensive educational experiences.

The study also found that advanced degrees held by teachers contributed the most to predicting the teachers' judgment of the value of the Internet for classroom teaching. In addition, they found that the kinds of teachers who are most likely to be drawn to the Internet are the younger ones, those who are leaders in their profession and teachers with constructivist pedagogies. Thus, it can be concluded that younger teachers with higher educational experience are the ones who are most likely to use the Internet in the teaching and learning process.

On the contrary, Lee's study (1998) at the Mississippi State University revealed that older faculty members with higher educational levels, more teaching experience and higher professional rank significantly lacked conviction about their computer and Internet abilities. Lee's study found significant relationships between selected faculty demographic variables of age, education levels, position/rank, years in the current position and computer as well as Internet skills.

Meanwhile, Layfield's study (1998) on the relationship between Internet use and selected demographic characteristics of 708 secondary agriculture teachers in twelve states in the United States of America revealed that demographic factors such as

age and years of teaching experience were found not to influence teachers' use of the Internet.

As such, several studies have shown that factors apart from personal attributes, are more important in the use of the Internet. A study by Al-Najran (1998) investigated Internet adoption by demographics, education, mass media use and Internet attitudes in Kuwait University. However, the results of his study confirmed that gratifications derived from using the Internet and prior computer experiences were more superior in predicting time spent online on the Internet in the classroom as compared to the demographic attributes.

Similarly, a recent study by Becker (2001) mentioned that American teachers' lack of expertise in using computers is an important inhibiting condition, which prevents frequent Internet use. Most teachers reported at least fair competency in using computers in different ways.

Computer experience has gained wide recognition as a critical component of the educational process. Researchers have found that an educator's computer experience may either enhance or slow down, and in some cases even prevent, the development of effective Internet skills for classroom use (Campbell & Williams, 1990). Thus, teachers who are comfortable using computers are aware of the ways it can help them to perform certain teaching tasks more efficiently. Hence, the longer the experience of these teachers in using computers, the more comfortable and confident they felt while working with computers and its related applications (Holzinger, 1992).

Instructional technology research has also indicated that there is a positive relationship between Internet integration and prior experience in computers (Ayersman, 1996; Ayersman & Reed, 1996; Busch, 1995; Gardner *et al.*, 1993, Hadfield *et al.*, 1997; Houle, 1996; Maurer, 1994; Overbaugh, 1995; Savenye, *et al.*, 1992; Woodrow, 1991). These studies have extensively studied the relationship between computer experience and computer anxiety and have concluded that greater computer experience

correlates with reduced computer anxiety. As a result, learning computers and Internet-related applications becomes easier.

Thus, there is a close relationship between computer experience and Internet use. Logically, computer experiences should affect Internet experiences. According to Morahan-Martin *et al* (1992), computer experience also predicts Internet competency. Similarly, a study by Kraut *et al* (1996) also provides support for the contention that computer experiences play a major role in forming positive attitudes in adopting the Internet for instructional purposes among educators.

A recent study by Zhao *et al* (2001) in Michigan found the strongest predictor of teaching confidence among K-3 exemplary technology using teachers in the post-Internet age was confidence in personal computing and Internet skills. These teachers also held positive attitudes about integrating computers and the Internet in education.

Likewise, Philson's study (1999) examined the factors affecting academic collaboration via communication technologies, particularly in the use of e-mail and the World Wide Web. His study utilized web-based surveys, which were administered to randomly selected numbers of listservs representing different disciplinary foci. A total of 702 usable responses were received from individuals in 23 different disciplines from educational institutions in over 50 countries.

The statistical analysis in the study included correlations, regressions and Anova, with the dependent variable focusing on collaboration. The results of his study revealed that the two most significant predictors of collaboration were Internet access and educators' prior experience in using e-mail.

Similarly, Hogle (1999) investigated the factors that significantly contributed to the use of the Internet in instruction by members of the education faculty in a university setting. His study revealed that the most important factors were access to adequate expert Internet assistance, availability of knowledgeable peers willing to share their

experience and experience in the Internet as well as hands-on experience using concrete examples and ideas on how to integrate the Internet in instruction.

It is thus important to help educators develop abilities to use the Internet and its applications in the teaching and learning process. The most common approach to encourage teachers to integrate the Internet has been to provide them with opportunities to increase their knowledge about IT though workshops, courses or technology-rich experiences (Thurston, Secaras and Levin, 1997).

Similarly, Wallace (1998) studied the relationship between adopter type and Internet use in this population of general K-12 teachers in a school system in Tennessee. Wallace (1998) found that the innovators and early adopters are the ones who use the Internet the most while laggards among the teachers have little experience in using this innovation. The additional findings show that the younger age groups, females and general subject teachers possessed higher mean scores for innovativeness in Internet use than other groups.

However, other researchers (Campbell & Williams, 1990) have concluded that prior computer experiences will not eliminate the phobia of using these technologies for instructional purposes, and in many instances may, exacerbate existing problems (Weil *et al.*, 1990, p.362). This is because the benefits of prior computer and Internet experience depend on how the specific experiences are interpreted or appraised by an individual.

In addition, Harris and Grandgenett (1996) found no strong significant correlations between telecomputing activity and beliefs and demographic characteristics of educators of Internet innovation. Their study correlated data representing a year of online use with responses to questionnaire items about teacher beliefs and demographics for 558 respondents from a sample of 1000 randomly selected Tenet users.

In view of these inconsistent results in western settings, it is the intention of the researcher to determine whether the instructional integration of the Internet in the teacher training colleges among the teacher trainers in the Klang Valley is affected by similar variables of educational background, teaching experience, computer experience and Internet experience.

2.6.2 Self-Perceived Internet Competency and Internet Integration

The United States of America has taken the lead in wanting to achieve a computer centric society. A number of states throughout America are revising their K-12 curriculum to produce students with ICT skills and knowledge, which are needed for the 21st century. They are also establishing competency standards so that teachers will become more competent in the use of technology (Minnesota Department of Children, Families and Learning, 1996; North Carolina Department for Public Instruction, 1993).

On the other hand, despite establishing IT competency standards, research on pre- service teacher programs in the United States indicates that most educators do not integrate much Internet technology into their teaching (Hunt, 1994; Office of Technology Assessment, 1995).

In relation to this, some researchers emphasized the importance of organizational factors such as cost of implementation and incentives for teachers in the form of money, time-off and promotions as the most important variables in the success of computer-based instruction (Ravitz, 1999). However, others considered faculty attitudes and competencies in computer and Internet technologies as the most vital factors for successful computer and Internet based instruction (Whiteside, *et al.*, 1989; Skinner, 1988; McGill, 1998; Moersch, 1999; Westermeier, 1998).

In the same vein, a recent study by Becker (2001), found that the ways in which teachers get their students to use computers are certainly affected by their self-perceived level of technical expertise. The study also found that the strongest predictor

of frequent use of authoring software by academic secondary teachers was their own perceived levels of technical expertise and use of computers for professional purposes.

Similarly, Jacobsen (1998) found that early adopters in two large North American universities reported higher levels of expertise than mainstream faculty for 38 out of the 44 types of computer software and tools and earlier use in teaching for 27 out of 44 types of measured types of instructional technology.

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Likewise, Eastin (2001) studied the relationships between behavior, cognitive and environmental factors as mechanisms to Internet use among educators at Michigan State University. He also investigated the roles of both personal and non-personal experiences within an educator's environment as antecedents of Internet self-efficacy judgments. The findings of his study revealed that Internet self-efficacy of educators was significantly related to their prior Internet experience.

Further, Jacobsen (1998) found that early adopters in two large North American universities reported higher levels of expertise than mainstream faculty for 38 out of the 44 types of computer software and tools and earlier use in teaching for 27 out of 44 types of measured types of instructional technology. Jacobsen (1998) reported that the early adopters had more self-confidence with instructional technology and this aided them in its use. According to Jacobsen (2000) early adopters usually have the skills, knowledge and interest as well as motivation to develop teaching applications for a particular content area as compared to the mainstream faculty or late adopters.

In addition, Loyd and Gressard (1984a) also found that the existence of computer skills had an effect upon computer attitudes and computer integration in the classroom. Thus, many studies have shown that a higher level of self-perceived

computer competencies can enhance computer utilization and integration in the classroom (Loyd & Gressard, 1984b; McCollough, 1986; Baker, 1994; Dambrot, *et al.*, 1985).

On the other hand, numerous studies have indicated that educators have found the Internet to be somewhat complex or they had encountered technical difficulties when using this innovation (Gallo & Horton, 1994; Honey & McMillan, 1993; Sunal *et al.*, 1993). These educators have faced difficulties because of their inherent lack of technological skills in utilizing the Internet. Although teachers feel it is important to know how to use the Internet, they are not very confident in their own Internet skills (Bratina & Templeton, 1997).

Moreover, Shearman's (1997) study reports that many teachers in American schools are frustrated with their lack of computer and Internet skills. In a study of rural teachers, Matthews *et al* (1998) found that more than three-quarters of the Internet users classified themselves as novice users and this hindered the integration of the Internet innovation into the school curriculum. In the same vein, Hogle (1999) revealed that some of the most important factors that influenced the integration of the Internet in instruction among faculty members in colleges of agriculture in the United States and Canada are prior computer experience and competency in the Internet.

Similarly, Lennertz (1999) found that self-perceived Internet competency levels of faculty members at small Christian colleges in America affected their professional integration of the Internet in the instructional process. McCord (1998) concurs with this finding, whereby he too indicated that the technical orientation of the lecturers' discipline, competency in the Internet, utility beliefs and general attitudes toward computers were the significant predictors of adoption and integration of the Internet in instruction.

In addition, Layfield's (1998) study of 708 secondary agriculture teachers in twelve states in America showed that the teachers who had the lowest competencies in e-mail and World Wide Web applications had problems in integrating the Internet in the classroom. According to Tidd (1994), educators with a low level of Internet competencies may spend more time in learning how to utilize the various Internet applications rather than integrating them in the instructional process. They also might have to relearn basic commands and instructions of Internet technology unless they used the Internet regularly.

Similarly, Westermeier (1998) carried out a study among 300 randomly selected K-12 teachers in a large urban unified school district on teachers' level of computer skills, amount of time students spent using computers and teachers' attitudes and staff development in integrating computers into the curriculum. Westermeier (1998) used structured interviews to elicit information regarding the reasons why teachers used computers with their students as well as factors that encouraged or hindered the use of computers in the curriculum.

Overall, Westermeier found no difference in the distribution of computer skills between teachers at upper elementary level (grades 3-5), intermediate level (grades 6-8) or at high schools (grades 9-12). The lower elementary (grades K-2) teachers were somewhat less skilled computer users. His study also showed that teachers who had difficulty in using the Internet in the classroom had moderate Internet skills. The data from each teacher were used to determine their computer literacy score, and then the score was used to place teachers into one of the following categories: novice computer user, limited computer user, competent computer user and expert computer user.

Westermeier (1998) also found a significant correlation between teachers' levels of computer literacy and the amount of time their students used computers. The study reflects that educators have differing levels of computer and Internet competencies and this affected the instructional use of computers and the Internet in the teaching and learning process.

Meanwhile in the Asian setting, a study by Pan and Lee (1997) pointed out that most of the teacher trainers in Singapore are still incompetent in the latest ICT technologies. As such, there is a lack of integration of computers and ICT in the teacher-training colleges of Singapore. Pan and Lee (1997) administered a survey to study the relationship between ICT competency levels of teacher trainers and their appreciation of computers and IT in education. The survey revealed that most of them strongly believed that IT could help them to do a better job in their teaching.

However, the study also showed that seventeen or about forty percent of in-service teacher trainers were novice computer users, and five or fifteen percent of the pre-service teacher trainers were also novice computer users. Thus, Pan and Lee concluded that it is important to enhance the competency skills of Singapore teacher trainers and that they needed to be shown methods of integrating useful features of computer and Internet technology in instruction. These steps are important to ensure successful adoption of IT in the teacher training colleges of Singapore. Therefore, the same scenario may be applicable in Malaysia as both countries have the same cultural setting. Consequently, there is a need to study the competencies of Malaysian teacher educators in using the Internet, as having adequate Internet skills would be a prerequisite for bringing about successful integration of the Internet in the teacher-training curriculum (Thompson, 1998).

However, the other paradox that arises is that despite some of the educators having high Internet competencies, the rate of instructional integration of the Internet might still be low. This can be attributed to time constraints, lack of support from administrators, lack of access to the Internet in the workplace and high maintenance costs (Davis, 1996).

This scenario is also reflected in Falba's study (1998), which investigated teacher educators' current levels of technology use and their use of technology in teaching classes at an undergraduate teacher-preparation program at University of

Nevada. The study employed quantitative and qualitative methods that were carried out in two phases in the study.

Falba (1998) found that that although 93% of the college education faculty members believed technology in teacher education was very important and rated themselves as having high levels of knowledge and skills with various computer and Internet related applications, use of these technologies in teaching was still limited.

Interestingly, other studies have found that self-perceived Internet competencies are not important in the integration of the Internet in the teacher-training curriculum. Cooperman's (1998) study found that technical skills and pedagogical orientation did not predict motivation or perseverance in integrating computers into instruction. On the other hand, his study showed that teaching experience, collegial support, and school culture appeared to influence initial choices of 5^{th} to 8^{th} grade classroom teachers in utilizing the Internet in the instructional process.

In view of the fact that the research studies reviewed have shown contradicting findings, it is the intention of this study to determine whether the instructional integration of the Internet among the teacher trainers is affected by their self-perceived Internet competencies.

2.6.3 Gratifications derived from Using the Internet and Internet Integration

The main reason for the growth of the Internet to its present size is that it gratifies people's needs in one way or another. The "pull" towards the Internet makes it an indispensable tool to reach out to people and this holds true for the education system as well, where the right gratification can be used to supplement and enhance traditional teaching methods. Thus, the ascertaining of the relationship between what prompts the users to use the Internet and the gratification they expect from it, can provide the key to implementing an education system, which relies on the Internet as a teaching and learning tool.

Three distinct types of gratification can be derived from utilizing the Internet and its related technologies. They are personal, professional and instructional gratifications. Personal gratification for educators comes as a medium to break away from their daily routines. Besides, being a source of entertainment, the Internet allows them to keep in touch with their family and friends and provides a sense of spending their time beneficially. This is usually the premise from which educators begin their contact with the Internet and this will eventually lead them to utilize the Internet to attain professional gratification (Haris, 1995).

Professional gratification for educators comes across as removing the intricacies of researching for teaching materials and novel ideas as the Internet allows for a systematic and focused research (Ertmer *et al.,* 1994). Internet tools such as the e-mail and newsgroups also provide a platform for educators to share their perspectives on teaching methodology and this will inevitably lead to a higher standard of teaching.

Similarly, another major gratification is that the quality of intellectual exchange on the Internet i.e online discussions between educators and their students is enhanced due to the availability of time in executing responses (Stiles *et al.*, 1993). In addition to this, educators are integrating the Internet because of the instructional gratifications derived from the utilization of the Internet. According to Johnston (1997), the main instructional gratification educators derive from utilizing the Internet is that it enhances students' cognitive skills and academic achievements. Thus, the above findings run parallel to Anderson's contention (1992) that the Internet is predominantly used by educators for instructional and professional gratification and less often for personal, social or recreational gratifications.

According to the survey by George Tech Graphics (1999), browsing, information seeking and entertainment are the three main gratifications obtained by Internet users. An astounding 82.6% of the web users are simply browsing according to the aforementioned survey.

On the same note, the Nielsen Internet Demographic Survey (1999) showed that 90% of web users were also browsing and exploring on the Internet. These surveys show that Internet users were deriving pleasures from the thrill and excitement of a whole new world by surfing the web. Another point of interest revealed in these surveys was that the Internet was also fulfilling the informational and cognitive needs of its users. This is not surprising at all as the Internet was primarily designed to disseminate information.

Likewise, Zakari's study (2000) investigated the uses of the Internet by 571 Saudi graduate students in the United States. The main purposes of his study were to determine the value of the Internet and to determine whether the Internet should be adopted into higher educational settings. Quantitative techniques in the form of questionnaires and qualitative data in the form of semi-structured interviews were utilized in the study. Sixteen students were interviewed and chi-square statistics as well as content analysis techniques were used to analyze the data of the study.

Zakari's study showed that students very motivated to use the Internet as they were deriving many academic gratifications for their graduate studies. Some of these benefits include ease and speed of obtaining international and national resources, keeping up-to-date with new literature in their fields of the study and establishing online databases, journals, and research projects.

The students were also deriving professional gratifications, which enabled them easy and wide communications with scientists around the world. Additionally, professional communications and collaboration with their advisors, professors and colleagues were also enhanced. As such, the Internet enabled the Saudi Arabian graduate students to do their academic work better than before using the Internet.

Similarly, Fusayil (2000) investigated the gratifications derived from the use of the Internet of 167 full time faculty members at Ohio University. The sample included randomly selected faculty members from all six campuses of Ohio University. Two

thirds of the faculty members were from the main campus and one-third was from the five regional campuses at the university. A mixed-method research design utilizing both survey and interviews were utilized in the study.

Fusayil found that the main instructional gratification derived by both groups of faculty members was that it aided in their research. On the other hand, the main professional gratification derived by both groups of educators was enhanced communications with colleagues and students.

Cartas (1998) also studied the relationship between gratification, Internet utilization and its integration in instruction when he designed the San Diego Technology Implementation Survey that was conducted on four hundred and twenty six teachers. The main finding of this study was that fifty-five percent of the teachers had never used the Internet or multimedia to make presentations in their classroom. The reasons cited for this low integration rate were due to the low personal and professional gratifications derived from utilizing the Internet. This finding was also reported in Hueth's (1998) study, which found that the most critical factors in enhancing the integration of the Internet in Midwest College in America were instructional gratifications, infrastructure and staff development.

Similarly, Bowman (2001) found that one of the main instructional gratification that motivated educators at public colleges in Texas to use Internet innovation was derived from the use of the Internet, which included improved student participation. Another study by Suh (2000) on the use of the Internet among Florida State University faculty members revealed that the perceived advantages of web-based instruction is a significant predictor of levels of instructional use of the Internet.

Therefore, taking a cue from the aforesaid studies, the Teacher Training Division of the Ministry of Education of Malaysia should emphasize on the personal, professional and instructional gratifications that are being derived by the teacher trainers, as these are fundamental in increasing the level of Internet usage in their

teaching. Correspondingly, this study will ascertain the types of gratification that stimulate Malaysian teacher trainers to incorporate the Internet into their teaching.

In conclusion, the literature review in this area shows that there is a relationship between the different kinds of gratifications obtained from Internet utilization and Internet integration (Hunt & Bohlin, 1995; Hunter, 1999). Thus, it is the intention of the researcher to determine whether the gratifications derived by Malaysian teacher trainers from Internet use affect the instructional integration of the Internet in the teacher-training curriculum.

2.6.4 Attitudes towards Internet Innovation and Internet Integration

The integration of the Internet into the Malaysian teacher-education system can precipitate change and innovation in the quality of teaching. Therefore, Malaysian educators must have positive attitudes towards this innovation if they want their students to be successful in utilizing the Internet in the 21st century. Consequently, there is a pressing need for research that examines Malaysian teacher trainers' attitudes towards the adoption of Internet innovation and its relationship with the integration of the Internet in the Malaysian classroom.

The dynamic era of the digital economy has resulted in constant improvements in the Internet whereby it can bring about innovation in the classroom (Collins, 1997; David, 1991, Sheingold and Hadley, 1990). The innovation of using the Internet in the instructional process is that teaching no longer centers around the transfer of knowledge from teacher to student. Learning comes from student inquiry, critical thinking and problem-solving skills based on information accessed from a variety of resources on the Internet. Moreover, Becker and Ravitz (1999) states that innovations in teaching such as integrating the Internet often require teachers to learn to re-think their teaching crafts, basic pedagogical teaching approaches and learning goals for students.

Internet innovation gives educators tools for carrying out research, data analysis, and knowledge of applications, communication and collaborative writing. It also provides tools for educators to access information, evaluate knowledge sources and apply knowledge to issues and problems. These are then some of the primary learning expectations for students in today's schools (Houghton, 1997; Mellar & Jackson, 1994).

The Malaysian Ministry of Education is also trying to incorporate these tools into its education system so that it can compete and thrive in an information-based society. Consequently, if Malaysian educators take the initiative to integrate Internet innovation into their teaching, they can carry out a wide range of activities such as collaborating with other school sites and participating in live events over the Internet (Irani and Sharp, 1997).

Similarly, Gibson and Oberg (1997) studied Internet use in six schools in Alberta that involved 175 teachers and 3660 students. A case study approach utilizing observation and interview techniques were employed to study how teachers were learning to use the Internet and its applications. The study found that positive attitudes towards school and learning generated computer and Internet use among the teachers. As such, the teachers were already using the Internet for developing lesson plans by surfing sites to find unique lesson plan ideas, delivering lessons via e-mail, downloading professional documents, researching educational issues and visiting sites to ask questions relating to their teaching.

Thus, it can be seen that the underlying philosophy and theme of using all forms of Internet innovation is to complement and enhance the traditional dimensions of instruction and learning.

However, the situation in Malaysia at the present moment is worrying as the teacher-trainers have been directed by the educational authorities to incorporate the Internet into their teaching methods without being given a clear picture of what the classroom of the future, with the incorporation of Internet innovation, will look like.

This lack of vision is bound to create anxiety, as educators are treading in unchartered territory, which may cause a great deal of stress amongst the educators with regards to the integration of Internet innovation into instruction.

On the same note, Raymond and Anderson (1987) and Turner (1989) found that the integration of information technologies into the instructional process causes teacher anxiety. Therefore, in order to introduce new technologies with the minimum amount of chaos, the teacher education sector should initially seek to involve teacher trainers with early adopter characteristics.

This is related to the fact that the findings of Agarwal *et al* (1999) who found a significant difference between attitudes of early and late adopters and accepted the hypothesis that early adopters of IT innovation have more positive attitudes toward the use of innovation than late adopters.

Similarly, the findings of Wallace's study (1998) supported the findings of Agarwal *et al* (1999). Wallace (1998) examined specific Internet variables with respect to computer attitudes and usage in the general K-12 teacher population. The results of his study revealed that innovative adopters of the Internet in a school system in Tennessee are believed to possess higher overall positive attitudes towards new Internet experiences.

Likewise, Cooperman (1998) investigated the relationship between teachers' pedagogical beliefs and their beginning classroom ventures with the Internet. His study employed qualitative methods drawn from descriptive case studies, ethnography, and biographical research in teacher's thinking. His sample consisted of three regular class classroom teachers (two teaching grade five) and one teaching grades 6-8 who participated in the research from January through June 1996. The data sources in his study included observation of teachers in action, multiple interviews with participants and colleagues, written personal histories and classroom artifacts.

His study revealed that the differences in teachers' early Internet practices stemmed from pre-existing pedagogical beliefs, particularly those relating to how students learn. Cooperman (1998) found that innovators among the teachers were the ones who initiated the diffusion of the Internet into the school curriculum, as they were willing to change and accept new computer technologies.

According to Sheingold and Hadley (1990), exemplary computer-using teachers showed a willingness to change, accepting new roles and innovations and granting students new responsibilities. Related research in this area has also shown that innovative adopter types are found to possess higher overall attitudes towards adopting the latest IT innovations in the educational process (Leavitt & Walton, 1975). In addition, research on innovative adopter types and attitudes toward instructional media (Craig *et al.*, 1995) and the Internet (Finlay & Finlay, 1996) strengthen these findings.

According to Geoghegan (1994), early adopters are more experienced with technology and have higher use of innovativeness, thus capitalizing on technology's many features and options. They seek the different uses of technology to solve novel problems and contribute to new and better uses of technology. On the other hand, laggards have relatively strong conservative values and resistance to change.

Jacobsen (1998) also found that early adopters among faculty members at two large North American universities had very positive attitudes towards the use of Internet innovation. Jacobsen (1998) found that time, distance, locations as well as inconvenience are not limiting factors for early adopters who want to adopt an innovation. She discovered that early adopters play a very important role in increasing the observability of Internet innovation and enhancing its perceived value for utilizing it in different ways in an educational organization.

Thus, the latest studies in the area of information technology are focusing on the Internet attitudes of educators (McCoy, Leah & Baker, 1994; Bullard; 1998, Westermeir, 1998; Becker & Ravitz, 1999). The findings of these studies reveal that

positive attitudes towards the Internet aid in its integration into actual teaching situations. These findings were also confirmed in Lee's study (1998), which found that a person's attitudes toward the Internet were important in influencing the use of the Internet in the workplace.

Lee (1998) investigated the Mississippi State University's faculty members' use of computer technology provided by the university. Lee's study was designed to identify their computer anxiety, confidence, desirability, use patterns, perceived skill levels, learning interest regarding university provided software application programs and their computer training needs. Lee (1998) found significant relationship between the respondents' computer attitudes and computer use patterns. The more respondents used computer technology, the lesser was their anxiety. There was also more confidence and desirability amongst them in using computers for instructional purposes.

On the other hand, there are studies that found no significant differences in the attitudes towards Internet innovation and Internet integration. Bullard (1998) found that there were no significant differences in the attitudes toward educational technology among the teacher-education institutions that were surveyed. In his study, three hundred and fifty professors in University System of Georgia teacher education programs were surveyed using the faculty instructional computing questionnaire by Faseyitan and Hirshcbuhl (1994). The professors included in the current study were employed among five randomly selected university systems of teacher education programs in Georgia. Multiple regression analysis and analysis of variance were used to determine the composite and independent effects of the selected independent variables on the criterion variables attitudes towards educational technology and use of educational technology.

Bullard conducted the study to determine the attitude of college professors in teacher-education programs towards teaching with technology, the flexibility in using technology for instruction, and the status provided by using educational technology. This study was also conducted to ascertain data to indicate if the professors' attitudes related to selected variables.

The variables that were analyzed ranged from the professors' use of educational technology, their gender, place of employment, rank, length of overall teaching experience, efficacy and institutional encouragement to use computers in instruction. Bullard (1998) did not find any significant difference between the university professors' attitudes toward educational technology and its use in instruction. The study also did not indicate that the attitudes of these professors towards educational technology differed at institutions that encouraged the use of computer instruction from those that did not.

Similarly, Toms (1997) used the Stages of Concern questionnaire that was mailed to 540 respondents to investigate the attitudes of faculty members in Florida University toward Internet use. The data were analyzed using correlation and regression on techniques. The stages range from non-concern, (awareness), to self (information and personal), task (management) and impact concerns (consequence, collaboration and refocusing).

The study implied that once educators have consequence, collaboration and refocusing concerns, they would tend to use the Internet more for instructional purposes. Matthew, Parker and Wilkinson (1998) state that many factors impinge on the faculty's movement through the stages of concerns. This progression requires more than knowledge of the innovation. Faculty movement through the stages is highly personal and impacted by faculty capabilities and other demands on their time as well as successful experiences with the innovation (Wilkinson, 1997). As such, Matthew, Parker and Wilkinson (1998) reported that faculty fears and concerns affect individual

personalities. Their findings revealed that the late adopters had higher internal concerns in all components except for personal concerns in their attitudes toward Internet innovation. Similarly, Rutherford and Grana (1995) found that mainstream and late adopters faced many personal concerns and these were manifested as resistance to the change process in accepting Internet innovation for instructional use.

Hence, Matthew *et al* (1998) advocated that it is important to ascertain the stages of concerns of early and late adopters, as it will reflect their attitudes towards the integration of the Internet in instruction. The early adopters especially are willing to take risks, are eager to learn new things, and are flexible enough to cope with new technology while others are not.

Although there is considerable research on attitudes of educators towards computers, there is very little evidence of attitudes towards Internet innovation and its utilization in the actual teaching process (McCoy, Leah & Baker, 1994). Therefore, there is a need to study if the attitudes of the teacher trainers towards the adoption of Internet innovation will have an effect on the instructional integration of the Internet in the teacher training colleges in the Klang Valley.

2.6.5 Internet Access at the Workplace and Internet Integration

Increased access to the Internet is making a unique contribution to the teaching and learning processes (Shaw, 1994). In relation to this, many western studies have indicated that Internet access at the workplace is a very important factor in enhancing the integration rate of the Internet into the teaching and learning processes (Fusayil, 2000; Sherry, 1998).

Similarly, Ravitz (1999) reported that early adopters among 238 teachers in 124 schools throughout the United States who made efforts to use the Internet both in their own professional work and as a part of their classes with their students had had multiple high-speed Lan-based Internet connections in their schools for several years.

Ely (1990) found that one of the conditions that were identified as facilitating implementation of educational technology innovations in schools was access to the Internet in classroom settings.

In addition, Becker (2001) found a correlation between secondary teachers who used computers frequently with their students and their access to computers within their own classrooms. The study conducted in 1998 was based on 4000 teachers from grades 4 - 12. The teachers provided information principally about their teaching philosophy and actual teaching practices in one specific class. With regards to their access to and use of computers as a classroom teaching practice, Becker found that teachers who have five to eight computers in their classroom were twice as likely to give students frequent computer experience during class than teachers of the same subjects with one to four classroom computers. As such, he reported that adequate access to the Internet in educational institutions is crucial in the instructional integration of the Internet.

Similarly, Cartas (1998) in a study on technology use in regular education classrooms found that the majority of teachers surveyed (92.7%) indicated that they had at least one computer station in the classroom and this aided them in integrating the Internet into their classroom teaching. However 52% of the teachers still remained without access to the Internet in the school setting. These findings are similar to the findings of a study conducted by Jacobsen (1998) on early and late adopters at two large North American universities who found that the most immediate barrier for faculty members in the incorporation of the Internet is the lack of Internet access in schools.

Likewise, this finding was also substantiated in Chiero's study (1998), which investigated 142 secondary public school teachers' perceptions of roles that computers play in the workplace. This study utilized both quantitative and qualitative research methodologies. A survey was used to collect initial data and follow-up telephone

interviews were conducted with 15 carefully selected teachers to provide in-depth information about their current Internet instructional uses.

The findings of the study revealed that the teachers' perceived Internet access at the workplace as extremely important as it enabled them to save time and create more effective instructional materials. However, Cheiro (1998) found that computers with Internet links were still inaccessible at the workplace for most of the teachers. Therefore, he suggested that more accessible Internet resources be provided at the workplace to enhance the rate of integration of the Internet into the school curriculum.

Further, McLennan (1997) also found that certain teachers never got access to the Internet at the workplace. McLennan's study was conducted through participant observation methods and e-mail dialogue. The data was based on thirteen teachers from schools in rural Wyoming and Canada.

His study showed that four of the thirteen teachers never obtained Internet access in the academic years of 1994 -1996. Only one teacher had access to the Internet but did not want to use the Internet. Thus, most of the teachers were only able to integrate the Internet by bringing in Internet accessed resources into the classroom setting and were not able to utilize Internet directly in the teaching and learning processes. Thus, the findings of this study implied that having Internet at the workplace did not ensure teachers will integrate the Internet into their teaching.

Similarly, other studies have shown that even if there is high Internet access at the workplace, educators might still not integrate it into the teaching and learning process. A report by the U.S. Department of Education (1999) reported that almost 90 percent of all K-12 public schools have Internet access. However, a report by Market Data Retrieval (1997) indicated that only 39 percent of teachers use the Internet at school with students. Similarly, a study by Solomon (1998) in twenty-one states in America reported that even though schools had Internet access, only 15 percent of student classroom time per week is spent using computers and/or the Internet.

These findings indicate that even though Internet access is high in the schools, the integration of the Internet in the teaching and learning process is still very low. Although Internet access is increasing in the American school education system, direct access to the Internet in American classrooms is still very restricted as the Internet access in American schools is confined to computer laboratories (Triacoff, 1997). Thomas (1996) reported that in 1995, about one-third of American schools had Internet connection, which was located mostly in school libraries.

This is also reflected in a 1995 report from the Office of Technology Assessment, Making the Connection, (ftp://gandalf.isu edu/pub/ota.teachers.tech/01readme.txt) estimated that less than "a quarter of teachers had managed to integrate these tools into regular classroom programs." This can also be attributed to the fact that Internet connections in the classrooms are still very low.

Similarly, Shanmugam's (1999) study has shown that teacher trainers in Malaysia are still not meaningfully diffusing Internet innovation into the teacher-training curriculum. Thus, one of the aims of this study is to determine if Internet access in the teacher training colleges in the Klang Valley affects the instructional integration of the Internet in the teacher-training curriculum.

2.6.6 Home Access to the Internet and Internet Integration

According to Sanger *et al* (1997), the use of ICT at home is an important aspect as it can provide the possibility of quality time for the individual learner as no classroom can. Sanger *et al* (1997) advocated that because of the current home Internet access of teacher trainees, teacher trainers need to structure the way they use the Internet at home because they need to have the necessary skills to use the Internet so that they can direct their trainees to do research at home rather than just allowing them to surf freely on the Internet.

This is also related to the fact that teacher trainers who are already using the Internet in the home can perceive many benefits for their students. According to Myint Swe Khine (2001), many teacher trainees have the opportunity to use computers either in school or at home. In the study, it was found that 76 percent of the teacher trainees in Brunei are already using computers at home and such an exposure affects their attitudes towards computers and the Internet positively in the teacher training colleges.

In accordance with this, Wellington (2001) found that home ICT access is an important aspect as it has the potential to fulfill many of the requirements of the national teacher education curriculum. In view of these developments, the teacher education sector needs to address the potential of having home access to ICT for pre-service and in-service teachers.

Similarly, Abdulla (2001) investigated the levels of adoption of the Internet among 42 teachers of English as a Second Language (ESL) at Ohio State University. The study also investigated variables that contributed to Internet use by utilizing a descriptive correlational research design that combined with follow-up interviews. The findings of the study revealed that three-quarters of the teachers had Internet access at home. Abdulla also found home Internet access to be the most important factor in predicting teachers' proficiency in the World Wide Web and e-mail applications as well as use of the Internet in the classroom.

Likewise, Matusevich (1999) found that students are already using the available technology in the classroom and at home. Matusevich (1999) provided the same computer configuration that students used in the classroom in their home settings, along with an Internet dialup connection. He found that students chose to utilize available technology and derived new ways of doing so, particularly at home, where they were totally self-directed. As a result of the home use of the Internet, learning became a two-way process, as the skills students developed on their own were shared with other teachers and their classmates.

These findings indicate that home influence is indeed strong (Gray and Wilcox, 1995) in encouraging the use of ICT among the teachers and their students. In addition, Dickerson and Gentry (1983) found that the characteristics of early adopters of IT innovation were that they spent more time with computers at home as compared to the late

In addition, Jacobsen's (1998) study at two large North American universities found that both home use and professional ownership of computers are completely diffused among the early and late adopters with only a small percentage of individuals not owning a computer for either of these purposes.

Becker and Anderson's (1998) study of teachers in 898 public and private American schools also found that 59 percent of teachers have Internet access at home and only one quarter (27%) have access either at home or in their classroom. They also found that teachers who use the Internet in lesson preparations had either home or classroom access. A very important finding in Becker and Anderson's study (1998) is that teachers who have combinations of both home and classroom access reported the most frequent use of the Internet in the classroom. According to Becker and Anderson (1998), an unexpected finding in their study was that teachers with Internet access at home were more likely to use the Internet in their teaching.

Becker and Anderson's (1998) study concluded that teachers with home Internet access also have stronger beliefs about the need for the Internet in their teaching. The statistics in their study suggest that the Internet has begun to be established as an information and communications resource in the working and home environment of most teachers. However, the issue of whether they are using it in their professional and instructional lives is still not ensured.

Even with adequate Internet access in the home, the study by Zenanko (1996) showed that 45 percent of teachers never use the Internet at school, and 88 percent of teachers do not teach their students how to use the Internet. In another case study by

Shearman (1997), he reported that mastering the tools of the Internet requires adequate access both in the home and school premises, time as well as having adequate training.

On the other hand, Carvalho (1999) found that home access to the Internet of 306 university undergraduate students did not strongly influence their later perceptions of the Internet. He found that longtime users who learned to use a personal computer at home were more likely to consider it useful for entertainment purposes than for educational ones.

In view of these varying results in western settings, it is the intention of the researcher to determine whether the instructional integration of the Internet in the teacher training colleges in the Klang Valley is affected by home Internet access.