CHAPTER I

PRESENTATION OF THE PROBLEM

1.1 Introduction

One of the most recent innovations in the field of education is the incorporation of the Internet in the process of teaching and learning. Many studies (Wallace, 2000; Lane Kelso, 2001, for example) have indicated the usefulness of this innovation in educational instruction. However, the current education scenario in Malaysia indicates that there is a serious lack of integration of computers (Mohammad Hasan, 1998) and the Internet in the educational system (Chong, 1998; Shanmugam 1999). Chong's (1998) study, for example, revealed that teachers in a large secondary school in Kuala Lumpur had yet to integrate the Internet into the teaching and learning process.

Although the educational authorities are promoting the incorporation of the Internet in schools and institutions of higher learning, current findings of local research studies pertaining to the use of this innovation in the education system are very disappointing. For instance, Abdullah's (1999) study on Internet use among secondary school teachers in Northern Malaysia found that these educators perceived the Internet more as a leisure tool than as a work tool for teaching and learning. Interestingly, the findings of his study also disclosed that the secondary school teachers lagged behind their students in the use of the Internet.

On the same note, the current Malaysian Minister of Education, Tan Sri Dato Sri Musa Mohamad has lamented on this sad state of affairs. At the recent National Education and Research Information Technology (IT) Conference (NERC) (The Star, April 10, 2002), he urged participants to come up with constructive ideas on how to effectively incorporate the Internet in the Malaysian education curriculum.

Despite this call from the Malaysian Minister of Education, a very recent study by the Knowledge-Information and Communications Technology Council (K-ICT) reported that teachers in secondary schools in a state in Northern Malaysia are still not instructing their students to use the Internet (K-ICT, The New Straits Times, September 19, 2002). The findings of this study revealed that computer classes at schools and the training provided by the school's computer clubs did not contribute significantly to Internet knowledge among secondary school students. Of the 611 respondents from secondary schools, about three-quarters of them claimed that they learnt more about the Internet through family and friends. The findings of the study also showed that less than half of the students are currently using the Internet for completing their school assignments. However, they are doing this on their own initiative and not because of teacher-directed instruction. The findings of this study imply that even in current times, teachers are hardly incorporating the Internet in the secondary school curriculum.

Another finding of the K-ICT study is that despite the efforts carried out by the Malaysian government to expand the use of information communication technologies (ICT) in the country, the usage of the Internet in its educational system is largely lacking. Hence, the lack of use of the Internet in Malaysian schools conflicts with the aspiration of the government to incorporate ICT in the country and thus help the nation progress and enhance the quality of its educational system. The seriousness of this aim is reflected in the efforts of the Government of Malaysia through its Energy, Communications and Multimedia Ministry which has allocated a sum of RM158 million for the year 2003 to increase access to information and communication technologies in the country.

Under this initiative, 1000 schools and 300 libraries in rural areas will be provided with Internet and telecommunication access and services. Each school will be equipped with a dedicated 64-mega byte per second Internet line and two telephone lines for teachers to utilize (K-ICT, The New Straits Times, September 19, 2002).

Another recent initiative by the Government of Malaysia to incorporate ICT in its educational system is reflected in the RM 979 million allocation in the 2003 Budget to equip primary and secondary schools teachers with notebook computers, LCD projectors and ICT equipment. This allocation also provides for Internet access in 250 schools in the interior areas of East Malaysia (The New Straits Times, September 29, 2002).

With regards to this allocation, Lee, an associate professor at the Faculty of Educational Studies, University of Science of Malaysia proposed that the government spend a substantial portion of this allotment on teacher training (The New Straits Times, September 29, 2002). According to Lee (2002), the easy part of incorporating ICT in the educational system is the purchase of hardware and enhancement of ICT access in schools. The difficult part, however, is the training of Malaysian teachers by the teacher education sector to incorporate the latest educational technologies in their teaching. If the teachers are not given appropriate training, the huge sums of money invested by the Government will be wasted.

Related literature in the use of new technologies has also shown that the recurring solution to the integration of the Internet in the classroom is teacher education (Burkholder, 1995; Kearsely & Lynch, 1994). Burkholder (1995) observed that since the teacher educators are the ones who will implement Internet innovation, they should be the focus of training programs. However, the level of incorporation of Internet innovation in the teacher education sector in Malaysia is still in its infancy stage. This is also related to the fact that a study pertaining to teacher education by Shanmugam (1999) indicated that the process of incorporating Internet in Malaysian teacher training colleges is still at a preliminary stage despite the fact that the fundamentals of Internet and its applications have been correctly identified and put in place in the latest teacher-training curriculum.

In his study on the information-seeking abilities of pre-service teacher trainees in a teacher training college in Southern Malaysia, Shanmugam (1999) also reported

that more than half of these pre-service teacher trainees do not know how to visit websites on the Internet to seek information. This could be attributed to the fact that the teacher educators themselves, have yet to see how the Internet and its applications can be used to improve their teaching or their students' learning.

Whilst there is no doubt that Malaysian teacher educators are being exposed to the Internet and its technologies, empirical research has yet to be carried out on the levels of incorporation of these technologies in the teacher education sector. In order to have a deeper understanding on the present levels of Internet integration in teacher education, there is a need to investigate the extent to which Internet innovation is integrated into the teacher-training curriculum and the factors that influence its integration in teacher training colleges in the Klang Valley.

1.2 Statement of Problem

There is a need for Malaysians to equip themselves with the knowledge of the Internet and its applications. This is especially true in the field of education where the use of these technologies has been shown to promote the interest of learners and produce students who have acquired the ability to take control of their own learning as well as develop enquiring minds, thereby providing the impetus to seek their own understanding (Rafferty, 2002).

Hence, the integration of the Internet is important in classroom instruction because it adds a new dimension to traditional teaching and learning methods. It also encourages critical thinking and the development of analytical thought processes (Dockstader, 1999). Dockstader (1999) also found that when the Internet is integrated into instruction, it adds more depth to the content area and promotes an intrinsic need to learn more about technology. Moreover, the Internet and its applications can be used for a wide range of purposes. These include informal dialogues, (keypals), cross-cultural studies, discussions and debates on social issues and consulting with professional scientists and authors. Apart from that, Internet applications can also be

used to find information on particular topics, collaborate on research, organize and participate in quizzes and publish online newspapers that include creative writing and art designing. Furthermore, a review of literature in this area suggests that when the Internet and its applications are integrated into the curriculum, they can support new teaching methods such as creative thinking in active and collaborative teaching as well as constructivist-teaching methods.

However, local research studies have shown that very few teachers in Malaysia have incorporated the Internet and its applications in their teaching (Chong, 1998; Abdullah, 1999; K-ICT, 2002). Hence, one of the ways to overcome this problem is for teacher trainers in teacher-education courses to ensure that before new Malaysian teachers enter the workforce, they are skillfully trained to integrate the latest technologies into their teaching. Education policy-makers in Malaysia have also realized that the most direct and cost-effective way to educate teacher trainees and indirectly, the nation's workforce, about the latest information technologies is through pre-service education courses offered via teacher training colleges (The Star, November 3, 2000).

On the other hand, the paradox that arises with teacher educators being the main agents of IT infusion in a country is that most teacher-education institutions have a long way to go in integrating new technologies into its curriculum (Shanmugam, 1999). Thus, there is a dire need for the nation's teacher-education institutions to narrow the teaching and learning technology gap between where they are now and where they need to be in terms of the integration of the Internet and its technologies. The first step in this direction will be for Malaysian teacher educators to experiment with the effective application of these technologies for teaching and learning in their own professional practice. However, the problem that arises is that teacher educators themselves may not be using much of these technologies in their own research and teaching. Besides, teacher-education faculties might have insufficient understanding of the demands on classroom teachers to incorporate new technologies into their teaching.

Thus, incorporating the Internet and its applications across the Malaysian teacher-education curriculum is a very challenging task as it involves bringing about a big change in the present teaching culture of teacher educators.

This challenge is further intensified by the fact that there are demands from the business world that schools in Malaysia prepare knowledge workers who can use IT effectively in the global marketplace. These knowledge workers will need the ability to solve problems creatively, process and manipulate information as well as transfer and apply their knowledge from one discipline to another (The New Straits Times, September 29, 2002).

This explains the current euphoria in Malaysia amongst policymakers and curriculum planners who are envisioning the creation of a knowledge-based society. Hence, integrating the Internet and its applications into the education system is seen as the foundation towards achieving this aim. The establishment of Smart Schools (Smart School Flagship Application, 1997) is also another evidence of the vision of Malaysian leaders to create a knowledge-based society. These schools emphasize IT literacy through the integration of knowledge and skills suited for the Information Age.

The pilot Smart Schools project will include ninety schools, which have been earmarked to be model Smart Schools. These are all linked to the Internet. The seriousness of the Malaysian government towards this end is echoed by the statement of the former Education Minister of Malaysia, Dato Seri Najib Tun Razak, who outlined a proposal to the Cabinet that 10,000 primary and secondary schools in the country should become Smart Schools by the year 2010 (Najib, The Star, January 22, 1999).

However, the aim to attain this target by 2010 may appear overly ambitious as Smart Schools or more commonly known as Charter Schools in western settings have shown that deficiencies exist in staff development programs which are designed to help teachers integrate technology into the curriculum (Moersch, 1998a). The main shortcoming is that the content in these staff development programs is too complex to

be mastered by the teachers in a short frame of time. Another shortcoming is that the administrators in these schools do not provide support for on-going training programs for teachers to become proficient in the instructional integration of technologies (Wise, 1997). Hence, even after participating in IT professional development courses, some of the teachers in the Charter Schools still do not use new technologies in their teaching. Moreover, Charter Schools have failed in their implementation due to teachers' lack of confidence in their computer skills and their inability to integrate computers into the classroom (Brummelhuis & Plomp, 1991).

Similarly, certain educators have claimed that the Smart School concept in Malaysia has failed (The Star, November 6, 2001). They have attributed this failure to unusable hardware and the low quality of teaching and learning materials in these schools. They also claim that the 'Smart School Management System' in these schools is still not efficient and that the Government should just stick to providing these schools with personal computers and Internet access than build a large and unworkable e-learning system. These allegations have shaken the confidence of schools, teachers and students in the Smart School scheme, thus complicating the Ministry of Education's efforts to gain their acceptance for this project. In addition, in-service teachers in Smart Schools who are inadequately trained by teacher educators will unequivocally further hinder the progress and the successful implementation of Smart Schools in Malaysia.

Chan, a Smart School Project Communications Unit Head reported that so far, in the implementation of Smart Schools in the country, installation of technology infrastructure has been completed at 87 of the 90 smart schools (The Star, November 6, 2001). However, according to Marcinkiewicz (1994), regardless of the number of computers available in the schools, elementary school teachers have typically underutilized them to the extent that, some have even completely avoided using them for instructional purposes. Further to this, Geoghegan (1994) stated that the mere presence of computers in classrooms did not by itself, change anything. Instead, it was the way in which educators managed teaching and learning, and their beliefs about

what they and their students could do differently with instructional technologies that fundamentally changed the quality of the educational process.

In the Malaysian context, several local studies have investigated the perceptions of educators on the use of the Internet in the teaching and learning process. For example, Letchmanan (1999) found that secondary school teachers viewed the integration of the Internet in their teaching positively as they realized that the Internet would be an important element in the future of the Malaysian education system.

In the same vein, Abdullah (1999) in his study on Internet use among secondary school teachers in Northern Malaysia also found that most of the respondents had been exposed to computers and were quite informed on the importance and capability of the Internet. Similarly, Teh (1998) who studied the perceptions of secondary school teachers in Kuala Lumpur on the use of the Internet in instruction reported that teachers perceive the Internet as a useful and effective teaching and learning tool. Thus, it can be concluded that the teachers are positive about using the Internet but they still need support and exposure in utilizing this innovation in their teaching.

The reason the teachers require this support could be that pedagogical techniques for teacher education in Malaysia provide little exposure to the use of the Internet as a teaching and learning tool in schools (Teh, 1998). Therefore, by virtue of the fact that they did not receive the necessary training, teachers in these schools do not use the Internet widely as a tool to improve their computing skills or instruction.

The lack of Internet integration in the Malaysian school curriculum is also indicated in the findings of Abdullah's (1999) study, which revealed that secondary school teachers in northern Malaysia mainly utilized the Internet for personal purposes rather than as a tool in the teaching process. Basically, the teachers were sending personal e-mails and reading news on the World Wide Web. This was in line with Lecthmanan's study (1999) that revealed that about eighty percent of the teachers in secondary schools in Kuala Lumpur were using the Internet for personal purposes. The

findings of her study indicate that although more Malaysian teachers are using the Internet, its inclusion in the teaching and learning process has not been widespread.

In the same light, Becker (1999) as cited in McKenzie (1999b) also reported that as many as seventy percent of American teachers fall into reluctant or late adopter categories when it comes to accepting new computer and Internet technologies. Becker (1999) attributed this problem to the Internet being a new innovation and teachers having limited opportunities in seeing how the Internet can be gainfully used in their teaching practices.

Similarly, in the local context, Kaur (2001) reported that primary school teachers in Kuala Lumpur were still not familiar with ways that the Internet could be exploited in a learning environment. Letchmanan's (1999) study on the usage of the Internet among government and private secondary schools in Kuala Lumpur also disclosed that the teachers' knowledge level of Internet hardware and software is still very low. As such, this had contributed to a low level of Internet integration in instruction in both types of schools.

Likewise, Nasirun's (1999) study on the use of computers among lecturers in a teacher training college in northern Malaysia showed that the current usage of computers in the teacher-training curriculum is still below average as teacher educators are still not familiar with the usage of the latest computer technologies.

In view of these developments, the Teacher Training Division of the Malaysian Ministry of Education has begun to initiate the incorporation of the Internet into the teacher-training curriculum in order to take up the challenges to produce a new generation of teachers who are familiar with IT and its related technologies. This was done by formally introducing the Internet and its applications into the Diploma in Education Curriculum programme (*Diploma Pendidikan Malaysia*) in 1997 (DPM Teacher Training Syllabus, 1997).

The Malaysian teacher trainers have also been exposed to the Internet via formal and informal courses (Teacher Education Division Online, 1999). Thus, the

question that arises is whether these endeavors in the teacher-education sector are successful in bringing about the diffusion of Internet innovation among teacher trainers in the teaching and learning processes.

Based on Roger's (1995) Diffusion of Innovations Theory, certain members in a social system will adopt and utilize an innovation first and are referred to as early adopters. On the other hand, members in same social system who utilize the innovation much later and who might even reject it are known as late adopters.

Hence, the receptiveness towards Internet-based innovations will depend largely on how well early adopters among the teachers make it work in an educational system (Jacobsen, 2000). In his study on the adoption of this innovation in two large universities in North America, Jacobsen (1998) found that through exposure from self-taught experiences and self-directed motivation, early adopters found creative ways to utilize the Internet in instruction. On the other hand, the late adopters in this study attributed their failure to accept Internet innovation as being unsure on how to effectively integrate it into instruction and the fact that it did not fit the course in the curriculum (Jacobsen, 1998).

As such, this study will seek to understand what differentiates the early adopters from the late adopters among teacher trainers in the adoption of the Internet and its applications in the Malaysian teacher-training curriculum. Prochaska et al's (1992) findings imply that the adoption of an innovation can be seen as a process of information diffusion, culminating in a rational choice by potential adopters to use or not to use the new technology.

In relation to this, the different choices made by the teacher trainers on whether to use the Internet or not in instruction would eventually decide the success or failure of the adoption of this innovation in the Malaysian teacher-education sector. With regard to this, Latham (1988) cited in Dooley (1999) found a number of features common to failed innovations, namely, people lacking training, certain members losing enthusiasm before others, inadequate funding, or the lack of support from the management. In

addition, potential adopters usually become disenchanted and disillusioned because the innovation is more difficult than expected.

Therefore, it is imperative to study the factors that affect the integration of the Internet and the differences that exist between potential adopters of Internet innovation as this will help avert failures in the efforts to incorporate effective innovations in the Malaysian teacher-education curriculum. The writer is also concerned about the fact that the integration of the Internet and its innovation into the teacher education sector may face many problems. Research in the use of the Internet in education has shown that one of the biggest stumbling blocks to the integration of the Internet in instruction among pre-service teachers is their lack of competencies in utilizing the Internet and its applications (Cardinale, 1992; McAulay, 1993; Anderson, 1993).

This problem is all the more serious in Malaysia given the fact that students here are more IT literate than their teachers as stated by Dr. Dato' Anuar Zaini Md Zain (2000), the Vice Chancellor of University of Malaya, at the seminar on National Coordination for Teacher Education 2000 (Anuar Zaini, The New Straits Times, May 8, 2000). Malaysian secondary school in-service teachers have also indicated that they need to enhance their Internet literacy as revealed in a study conducted by Chong (1998).

As such, teacher trainers themselves should be comfortable with the inclusion of the Internet in the teacher-education curriculum. According to the study on information seeking abilities of pre-service teacher trainees by Shanmugam (1999), teacher educators need to pave the way by internalizing values and modeling the habits related to learning and acquiring IT skills.

Hence, modeling of technology use by instructors and teacher educators is crucial to teacher trainees who reported that they value opportunities to share specific IT applications and experiences with their mentors (NCATE, 1993; Widmer & Amburgey, 1994). However, based on the United States Office of Technology Assessment (OTA) (1995) report, teacher trainees are seldom asked to create lessons

using technology or practice teaching with technological tools. The OTA (1995) report also indicated that a majority of teacher education faculties do not model technology use to accomplish objectives in the courses that they teach, nor do they teach students how to use information technologies for instruction.

Similarly, the lack of modeling of Internet innovation in instruction by Malaysian teacher trainers can hinder its integration into the teaching and learning process. This is because such exposure is critical for teacher trainees who are likely to adopt the beliefs and practices of their mentors during their teaching practice in schools (Calderhead, 1988; Hoy & Woolfolk, 1989; Kagan, 1993; Brown, 1999; Siegel, 1995).

Another problem faced in the adoption of the Internet is that educators are still very indecisive about utilizing this innovation in their teaching despite deriving personal gratification from its usage in their daily lives (Hunter, 1999). This paradox is attributed to the fact that educators face certain impediments that prevents them from deriving professional and instructional gratification from the use of this innovation. One of them is the daunting task of examining from the wide array of Web resources available for instructional purposes (Siegel, 1994). Another impediment faced by the educators is the overwhelming amount of information that is available on the Internet, which may result in them avoiding the use of this innovation. Thus, they will continue to use the teaching materials and strategies they already know rather than tackle challenges posed by the Internet for the enhancement of learning (Deal, 1999). These problems may also apply to the teacher trainers in the Klang Valley.

The next problem in the integration of the Internet in the teacher education sector is a likely reluctance on the part of teacher trainers to take on a completely different role in the teaching and learning process. Integrating technology into the teacher-learning transaction has been found to transform the teacher's role from being the traditional "sage on the stage" to being a "guide on the side", as students bring in information from the Internet to construct their own knowledge, leaving teachers to concentrate on cultivating higher-order thinking skills among their students.

Simultaneously, students' roles also change from being passive receivers of content to being more active participants and partners in the learning process (Alley, 1996; Repp 1996; Roblyer, Edwards & Havriluk, 1997; Jacobsen, 1998).

Accordingly, a substantial amount of the teacher trainer's time has to be spent on activities such as application of knowledge and critical examination of class discussions. Therefore, introducing this innovation in the teacher-training curriculum generates the problem of them having to conform to a paradigm shift in their roles as teacher educators.

Another hindrance in the incorporation of the Internet in the teacher-training curriculum, which is unique to the Malaysian situation, is the problem of accessing the materials on the Internet, which are in the English Language. Teacher trainees and teacher trainers alike in the teacher-education sector may have problems using articles accessed from the Internet since the medium of instruction is the national language, which is the Malay Language. As such, a majority of them lack the proficiency in English to be able to use the Internet accessed articles. According to the K-ICT (2002) study on the usage of the Internet in secondary schools, 43 percent of the students acknowledged that poor command of the English language hampered their ability to explore the full potential of the Internet (The New Straits Times, September 19, 2002). Thus, without the necessary proficiency in English, the Internet would not be useful for Malaysian teacher educators and teacher trainees as it is claimed to be.

Besides the language barrier in the instructional use of the Internet, another problem that teacher trainers may face is availability of time to use this innovation in their teaching. This is because the present workload of teacher trainers is already heavy and they may not have the time to carry out Internet-integrated teaching methodologies. This problem is also reflected in Letchmanan's (1999) study, which revealed that 79 percent of the secondary in-service teachers in Kuala Lumpur indicated that they did not have enough time to use the Internet, as they had to handle extra-curricular activities as well as complete the academic syllabus.

Hence, the various problems that educators may face in adopting Internet innovation indicate that the integration of the Internet cannot be assessed in an isolated manner. Internet integration and the organizing of technology in the curriculum must be done as a coordinated and harmonious whole (Dockstader, 1999). Eisenberg and Johnson (1996) suggest that there are two basic competency requirements for the effective integration of Internet technology skills.

First, integration skills must be directly related to subject content and classroom assignments, and second, integration skills need to be tied together in a logical and systematic model of instruction. Jacobsen (1998) also supported this by stating that the successful integration of technology for teaching and learning in higher education requires the development of two types of expertise among educators: pedagogical and technological. In relation to this, Jacobsen (1998) found differences between early adopters and mainstream faculty for self-rated computer expertise and the total adoption of technology for teaching and learning.

Thus, in view of the current euphoria related to IT and Smart Schools in Malaysia, it is important to focus on this aspect to find out the extent of Internet integration in the teacher-education sector as "adoption of the Internet in the classroom has been slow and it has been one that has been used ineffectively to accomplish educational objectives in Malaysia" (Zoraini, The New Straits Times, 1999, p.27).

Moreover, no systematic study on the instructional integration of the Internet in the teacher-education sector has been carried out in Malaysia. Given the current state of affairs with regard to the incorporation of the Internet and its applications in teacher education, the aim of this study is to investigate the extent of the adoption of the Internet by the teacher trainers who are either early or late adopters in the teacher-training curriculum. It will also analyze the different ways in which these two groups of teacher trainers integrate this innovation in instruction.

In addition, it will investigate the types of Internet applications that are being used by early and late adopters and the ways in which these applications are being used

for lesson preparations, personal and professional communications as well as in instruction with teacher trainees. Furthermore, it will identify the problems and needs of the teacher trainers in the instructional integration of the Internet. Additionally, it seeks to investigate the factors that best predict the integration of Internet innovation in the Malaysian teacher-training curriculum.

1.3 Background of the Study

The arrival of the IT era has prompted the United Nations Educational Scientific and Cultural Organization (UNESCO, 1995) to continuously re-examine the education systems in its quest to build an information society. In the same vein, the Goal 2000 America Project Plan (United States Congress, OTA, 1998b) reiterated this notion by stating that every classroom in the United States of America (U.S.A) is to be connected to the information superhighway with computers, good software and well-trained teachers.

Similarly, many large-scale studies in the United Kingdom have also documented positive learning outcomes from using ICT in schools (Silvin-Kachala, 1998; Savage & Tangney, 2000). These studies claim that ICT develops a culture of thinking; one that "engages students with challenging yet personally meaningful problems, draws on students' conceptual and cultural world of experiences and promotes active and independent learning among students" (Fisher, Dwyer & Yocam, 1996, p.10).

In tandem with the developments in the education sector in the west, the education scenario in Malaysia has to be realigned to meet challenges brought about by the technological advancements of the 21st century. Similarly, Malaysia also intends to transform its education system and this is one of the most important cornerstones of the national IT agenda in support of the nation's drive to fulfill Vision 2020.

This vision also calls for sustained productivity-driven growth, which will be achievable with a technologically literate, critically thinking work force, which will be

prepared to participate fully in the global economy or "borderless world" of the twenty-first century (Smart School Flagship Application, 1997).

Thus, Malaysia's National Education Philosophy (1993) calls for "developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally, physically balanced and harmonious" (p.3).

Therefore, to attain the aims that are outlined in Vision 2020 and the National Education Philosophy, the Malaysian government is aware that 21st century educators must have the ability to integrate the Internet and its applications in their teaching besides possessing the traditional teaching qualifications. It can be seen that to prepare teachers for the challenges of the new millennium, Malaysian teacher trainers need to take the first step to implement innovative instructional strategies that will develop their Internet literacy skills and methodologies of integrating the Internet into their instruction.

According to Cox (1995), Internet literacy is defined as the ability to compose, receive and manage electronic mail, to participate in listservs and netnews discussion groups, to upload and download text and binary files reliably, and to research and publish information on the World Wide Web. On the other hand, the instructional integration of the Internet is the capability to make the Internet and its applications an integral part of classroom learning, student productivity and information gathering for learners across a wide variety of academic disciplines (Dockstader, 1999).

In line with this, teacher educators not only need a general knowledge of computers and computer networks but, they also need to learn to use and integrate the Internet and its applications such as e-mail, listservs, newsgroups, file transfer protocol and the World Wide Web into classroom teaching (Egnatoff, 1999).

Thus, it is not surprising that, in the west, curriculum based on emerging technologies form part of the teacher-preparation curriculum under the Goal 2000 United States Technological Education Program. Similarly, in the United Kingdom

where, since 1998, all teacher trainees are expected to be IT literate and are assessed on a periodical basis on their pedagogic use of IT in their teaching (Department for Education and Employment, 1998).

Another developing trend in the universities in the United States and the United Kingdom is that they have started to introduce training in the integration of the Internet into their teacher-education curriculum (Russet, 1995; Waught & Rath, 1995). In line with these developments, the Malaysian government has made attempts to bring about the diffusion of Internet innovation into all levels of the education system.

Therefore, the Teacher Education Division of the Malaysian Ministry of Education has also initiated the training of teachers for the E-Learning and Smart Schools programs by introducing IT in their curricula. This is evidenced by the provision of thirty networked computers in each of the teacher training colleges in Malaysia (Zalina, 1997).

Similarly, the Ministry of Education has introduced Internet innovation in Malaysian schools. This has been done through projects like *Jaringan Pendidikan* (JP) (Education Network), *Pusat Sumber Elektronik* (PSE) (Electronic Resource Center) and Mobile Internet Unit (Access to the Internet, 1995; Ragavan, 1996; Zoraini, 1997b; Yong, 1996a; Yong 1996b; Zuhairi, 1994; The Star, August 7, 1999).

To implement these projects, teachers were trained in the different components of IT. For the *JP* teachers, the training content covered Internet skills like e-mailing, file transfer protocol, news reading with browser, browsing the World Wide Web and constructing homepages. On the other hand, the *PSE* teacher-training activities focused on the production of homepages for schools and the local administration of the *Rangkaian Munsyi* (Munsyi Network). A Mobile Internet Unit was also set up to bring Internet access to schools in rural areas. It consists of specially equipped buses that are transported from one place to another, providing Internet access and computer training to teachers and school children in rural areas.

In line with this, multi-national organizations such as Intel are also providing courses for teachers to integrate IT into the classroom (The Star, August 4, 2002). Intel is currently focusing on training primary and secondary school teachers on the pedagogical skills they need to effectively integrate technology into the classroom curriculum. However, this private organization has yet to expand similar training to pre-service teachers. Telekom Malaysia (TM) has also set up an online Internet project called 'TM School Online Learning' (TMSOL) for primary and secondary school students as well as for teachers (Rudy, Berita Harian, March 22, 1997).

Thus, it can be seen that the Ministry of Education and private organizations have initiated efforts to diffuse Internet innovation among educators in the learning environment in Malaysia. Despite these efforts, the digital divide problem exists in Malaysia where there is an information gap between schools with access to ICT and those without similar access.

According to the Malaysian Communications and Multimedia Commission (MCMC) (2002), the digital divide among the school systems is largely due to the lack of accessibility to Internet connection in schools that are located in the remote areas of Malaysia. Furthermore, this gap is also attributed to inadequate IT literacy of the population in rural areas, which in turn, is related to their lower education levels. The digital divide is also due to the low levels of Internet hardware and software content in schools in rural areas. This is related to the question of affordability and socio-economic issues that need to be resolved in rural rather than urban settings (Sunday Star, September 5, 2002).

Therefore, many factors contribute to the current digital divide in Malaysia. Hence, the digital divide will further impede the Government's efforts to incorporate the Internet into Malaysian schools. The digital divide is further exacerbated by the fact that Malaysian schools face their own set of problems in the instructional use of the Internet.

This is shown by Letchmanan's (1999) study, which revealed some of the factors that attributed to the lack of instructional use of the Internet among in-service secondary school teachers. She found that the most pertinent barriers that hindered the instructional use of this innovation were lack of time, absence of Internet connection and inadequate hardware as well as the lack of training to utilize the Internet as an effective classroom tool. Besides that, there was also a lack of administrative and peer support in the use of this innovation in the school curriculum.

Thus, it can be seen that many factors contribute to the educators' lack of usage and integration of the Internet in the teaching and learning process. Consequently, the process of the diffusion of Internet innovation and the factors that can have an effect on the integration of the Internet into the teacher-training curriculum are outlined in the conceptual framework of the study.

1.4 Conceptual Framework

The integration of the Internet as an innovation is seen as a new development in the teacher-education sector and it involves the process of changing mindsets of teacher trainers to embrace new ideas in their teaching as proposed by Rogers (1995). According to the National Council Accreditation of Teacher Education (NCATE) report (1997), one of the reasons for the lack of integration of the Internet innovation in the American teacher-education curriculum is that teacher trainers are out of touch with the vast transformations that are occurring in classrooms as a result of the introduction of new technologies. Consequently, these teacher trainers have very little understanding of how they need to change their own instruction to stay abreast with the diffusion of the latest educational innovations into the school curriculum.

Thus, this study on the integration of Internet innovation in the teacher-education sector premised on the theoretical perspective of Rogers' Diffusion of Innovations Theory (1995). The researcher is of the opinion that Rogers' (1995) Diffusion of Innovations Theory is the most appropriate theory to understand any

attempts by teacher educators to incorporate Internet innovation in the teacher-training curriculum as this theory provides an overview of how a new idea is diffused in a social system and the fact that it acknowledges the existence of resistance when change is introduced. It encompasses four dimensions: a) theory of innovation-decision process, b) theory of adopter categories, c) theory of perceived attributes and d) theory of individual innovativeness.

a) Innovation-Decision Process Theory (Rogers, 1995)

According to Rogers (1995), the innovation-decision process is the method by which an individual passes from mere knowledge of an innovation to the formation of an attitude towards that particular innovation.

Rogers (1995) suggests that the adoption of a new idea results from information exchange through personal networks. The first adopter of an innovation discusses it with the members of the system and each of these adopters passes the new idea along to other peers.

Based on Rogers' (1995) innovation-decision model, potential adopters of an innovation such as the Internet, progress over time through five stages in the innovation diffusion process. The individual adopter will decide to: (1) adopt or reject the idea, (2) implement the new idea, and (3) confirm the idea in the innovation-decision process. The innovation-decision process of potential adopters can be summarized in the following stages: knowledge, persuasion, decision, implementation and confirmation.

In the *knowledge* stage, educators learn and become aware of an innovation (Rogers, 1995). In this stage, an individual is exposed to the innovation's existence and gains some understanding on how it functions, resulting in increased knowledge and skill. The type of knowledge gained ranges from an awareness of the innovation to how it can be used properly. The perceptions or attitudes of potential adopters towards an innovation are also very important in this phase.

The next stage in Rogers' innovation-decision process is the *persuasion* stage. According to Rogers (1995), educators must be persuaded to use the innovation in this stage. Their decision to use the innovation will be influenced by the perceived attributes of the innovation. They also form an attitude or image (positive and negative) about the innovation through discussions and interaction with their colleagues.

If the innovation is not overly complex to learn and if they derive personal gratification from the innovation, they will use the innovation. Potential adopters will also judge the perceived value of the innovation by comparing it to other instructional technologies. If they perceive the innovation to be more useful, they will implement it in the teaching and learning processes.

In the next stage, *decision* occurs when an individual engages in activities that lead to a choice to adopt or reject the innovation. According to Rogers (1995), adoption refers to a decision to make use of the innovation as the best course of action available. On the other hand, a potential adopter can also make the decision to reject the innovation at this stage. The adopter can either make an active or passive rejection. Active rejection means considering and trying out the innovation on a limited basis, and deciding not to adopt it. However, after making the decision not to adopt, an adopter can also reverse his decision at this juncture and adopt the innovation. This phenomenon is known as later adoption.

On the other hand, passive rejection, which is also called non-adoption, consists of an individual never really considering the use of the innovation. If the adopter accepts the innovation, the innovation is then integrated into the teaching and learning process in the *implementation* stage. Rogers (1995) states that the implementation stage is important because adopters have the opportunity to try out the innovation and are able to see the effectiveness of utilizing the innovation in the teaching and learning process.

According to Rogers (1995), up to this stage, the innovation process has been a mental exercise. However, the implementation stage involves an overt behavior change

as new ideas about the innovation are actually put into practice. This stage may continue for a lengthy period of time until the innovation finally loses is distinctive and noticeable quality as a new idea. Adopters of an innovation can also change or modify the innovation at this stage. This phenomenon is known as re-invention of the innovation.

If a potential adopter finds the experience of adopting the innovation effective, it will confirm his or her decision to continue implementing the innovation in the teaching and learning process. Thus, in the *confirmation* stage, an individual seeks reinforcement of an innovation. The individual, may, however, reverse the confirmed decision if exposed to conflicting messages about the innovation. According to Rogers (1995), an individual can also gain awareness of an innovation in the knowledge stage, and simply forget about it. Further, an individual can also reject an innovation even after a prior decision to adopt it. This phenomenon is known as discontinuance.

Thus, it can be seen that potential adopters of an innovation undergo these five stages of innovation decision: knowledge; persuasion; decision; implementation and confirmation before implementing an innovation in the educational process.

b) Rogers' Adopter Categories Theory (1995)

Rogers' (1995) diffusion of innovations theory is based on five-adopter categories that is, innovators, early adopters, early majority, late majority, and laggards. These classifications are made based on the levels of exposure and understanding a potential adopter has towards an innovation.

According to Wallace (1998), a successful innovation will be adopted by members of a social system in the following order: (1) innovators, (2) early adopters, (3) early majority adopters, (4) late majority adopters, and perhaps (5) the laggards.

According to Rogers (1995), the first members in a social system to adopt an educational innovation and figure out ways to transform the classroom environment are known as innovators or early adopters. Roger's (1995) adopter category theory

advocates that there must be high consideration for the role of early adopters as they are the ones who blend an interest in an innovation with a concern for significant applications. They also look for breakthroughs in instructional methods or learning effectiveness that new innovations enable (Geoghegan, 1994).

According to Rogers (1995), the early majority and late majority adopter categories constitute the mainstream adopters in the adoption of an innovation. Rogers (1995) asserts that the unique position of mainstream adopters is that they lie between the very early to adopt and relatively late to adopt. Mainstream adopters usually consist of one-third of the total members of a social system and they are the ones who provide inter-connectedness in the innovation-diffusion system.

The innovation-decision period of mainstream adopters is relatively longer than that of the early adopters. Thus, it is important to study the case of the mainstream adopters because they form an important link between the early adopters and the laggards in the innovation-diffusion process.

The laggards, on the other hand are the last ones to adopt an innovation. According to Rogers (1995), the term 'laggard' refers to adopters who are usually the last members in a social system to adopt an innovation. Furthermore, the chances of them rejecting an innovation are also very high. They usually constitute about ten percent of the population in a social system (Rosen & Maguire, 1996). Further, Wallace (1998) stated that laggards are not only unlikely to employ an innovation, but also may be antagonistic to its use by others.

c) Roger's Perceived Attributes Theory (1995)

According to Rogers (1995), there are five attributes upon which an innovation is judged before it is adopted fully into an organization. The perceived attributes of an innovation are important because they play a major part in influencing the decision process of potential adopters in the innovation adoption process.

The five perceived attributes of an innovation are that: it fits in or is compatible with the circumstances into which it will be adopted (compatibility); it has an advantage over other innovations or the present circumstance (relative advantage); it is perceived as not overly complex to learn or to use (perceived complexity); it can be tried out (trialability) and its results can be observed (observability).

i) Compatibility

According to Rogers' Perceived Attributes Theory (1995), compatibility refers to the degree to which an innovation is perceived as being consistent with existing values, past experiences and needs of potential adopters. An idea that is incompatible with the values and norms of a social system will not be adopted as readily as an innovation that is compatible. Thus, the attitudes of teacher trainers towards the Internet would reveal how compatible this innovation is for them.

According to Rogers (1995), an individual is persuaded to accept an innovation when he or she forms a favorable attitude towards an innovation. Hence, if the Malaysian teacher trainers have compatible attitudes towards Internet innovation, they would implement this technology in the teaching and learning process.

ii) Relative Advantages

Rogers (1995) explains in his Perceived Attributes Theory that the extent to which an innovation will be adopted depends on the relative advantages that are being derived from the use of the innovation. According to Rogers (1995), the greater the perceived relative advantages of utilizing an innovation, the more rapid its rate of adoption. Thus, if the innovation is perceived as better than the practice it supercedes, potential adopters will utilize the innovation (Rogers, 1995). Therefore, Internet technology can fulfill the media needs of Malaysian teacher trainers and, if they perceive it as a useful instructional tool as compared to prior instructional technologies, they will utilize and integrate Internet innovation in the classroom.

iii) Perceived Complexity

Rogers' (1995) Perceived Attributes Theory also states that the perceived complexity of an innovation is related to its rate of adoption. According to Rogers (1995), perceived complexity is the extent to which an innovation is perceived as being relatively difficult to understand and use. Rogers (1995) advocates that some innovations are easily understood while others are more complicated and will be adopted more slowly. Thus, if Malaysian teacher trainers perceive Internet innovation as being relatively easy to use and manipulate, they will adopt it in their teaching.

iv) Observability and Trialability

According to Rogers' Perceived Attributes Theory (1995), the characteristics of an innovation as perceived by individuals tend to influence its rate of adoption. Hence, the characteristics of trialability and observability can also influence the decision process of potential adopters in the adoption of an innovation.

Trialability refers to the characteristic where an innovation may be experimented with on a limited basis. On the other hand, observability refers to the degree to which the results of an innovation are visible to potential adopters. According to Rogers (1995), the easier it is for potential adopters to try out and see the results of an innovation, the more likely they are to adopt it. Thus, if there is adequate Internet access in the work place or in their home settings, teacher trainers would be able to experiment with this innovation on a more frequent basis.

If potential adopters can try out new ideas and see the positive results of implementing an innovation, it would generally result in the innovation being adopted more quickly as opposed to an innovation that cannot be tested out as quickly (Rogers, 1995). Hence, experimenting with Internet innovation and seeing the results of utilizing this technology for themselves, both in the workplace or home setting within a short span of time may influence teacher trainers to adopt this innovation in the instructional process.

d) Individual Innovativeness Theory (Rogers, 1995)

Rogers' (1995) Individual Innovativeness Theory advocates that the diffusion of an innovation through a social system is determined largely by the attributes of the adopters whereby individuals who are risk-takers will adopt an innovation earlier in the diffusion process.

According to the Individual Innovativeness Theory, there are three related attributes to categorize potential adopters of an innovation, namely; social characteristics; personality characteristics and demographic characteristics. Social characteristics refer to the extent to which an individual participates either formally or informally with other community members. Thus, this theory suggests that early adopters usually have more social participation than late adopters (Rogers, 1995).

On the other hand, personality characteristics as identified in the Individual Innovativeness Theory acknowledge the fact that early adopters have specific traits, which differentiate them from late adopters. According to Rogers (1995), some of these traits are that early adopters are more venturesome, courageous, have greater empathy and are believed to be less dogmatic in the adoption of an innovation as compared to late adopters.

In relation to demographic characteristics, the Individual Innovativeness Theory by Rogers (1995) cites income, education and age as the three demographic factors that are most related to innovativeness. However, various studies conducted in the area of the adoption of the Internet innovation in teaching in the U.S.A have acknowledged that early adopters possess similar as well as different demographic characteristics. For example, studies in the area of adoption of the Internet for instructional purposes have identified early adopters as a group of Internet users with similar characteristics such as those who had been teaching for ten or more years, held one or more graduate degrees, and had been using computers for at least five years (Boulware, 1994; Hamilton & Thompson, 1992; Honey & Henriquez, 1993).
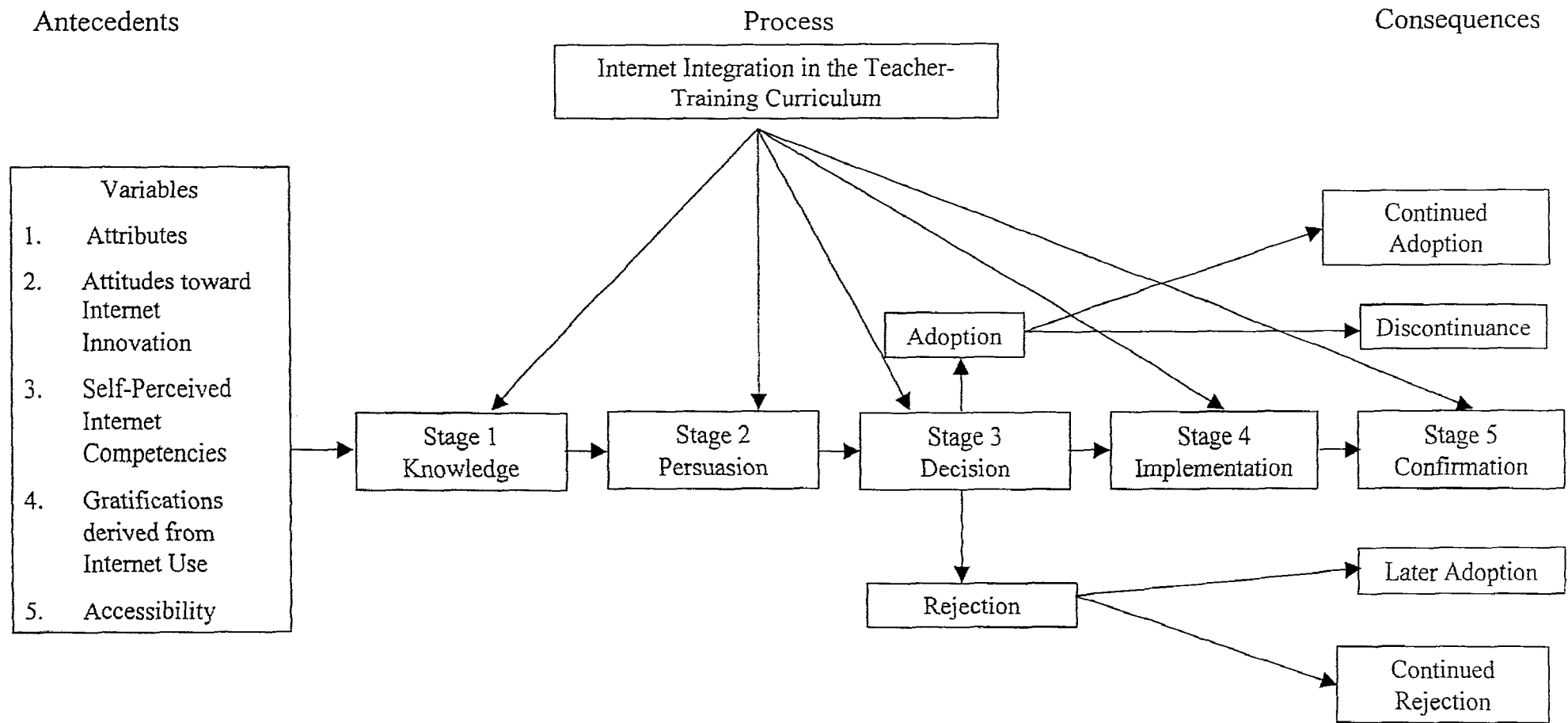
Despite the existence of research findings on Internet adoption among school systems and institutions of higher learning, many researchers have called for and emphasized the importance of the inclusion of Internet innovation in pre-service teacher training (Barron & Goldman, 1994; Carr & Bromley, 1997). Thus, it is important to identify the attributes of Malaysian teacher trainers since they may have an influence on the integration of Internet innovation in the instructional process. Hence, Rogers' Individual's Innovativeness Theory (1995) will be used to investigate if differences exist between attributes of early and late adopters among the teacher trainers.

It is therefore evident that the variables selected for this study are based on Diffusion of Innovations Theory, Innovation-Decision Process Theory, Adopter Categories Theory, Perceived Attributes of Innovation Theory and the Individual Innovativeness Theory (Rogers, 1995).

Based on Roger's Theory of Diffusion of Innovations (1995), a model was formulated to illustrate the Internet innovation adoption decision process and the factors relating to the integration of Internet innovation into the Malaysian teacher-training curriculum (Figure 1).

Figure 1: Model of Integration of the Internet into the Teacher-Training Curriculum

(adapted from Rogers, E.M., & Shoemaker, F. F. 1971)

Antecedents

Process

Consequences

Internet Integration in the Teacher-Training Curriculum

Variables

1. Attributes
2. Attitudes toward Internet Innovation
3. Self-Perceived Internet Competencies
4. Gratifications derived from Internet Use
5. Accessibility

Stage 1 Knowledge

Stage 2 Persuasion

Stage 3 Decision

Stage 4 Implementation

Stage 5 Confirmation

Adoption

Rejection

Continued Adoption

Discontinuance

Later Adoption

Continued Rejection

Besides attempting to comprehend the attempts made by teacher educators to incorporate Internet innovation in the teacher-training curriculum using Roger's Theory of Diffusion of Innovations, this study will also examine the factors that contribute to the integration of the Internet in the teacher-education sector. There are many factors that can affect the instructional integration of the Internet. However, the literature review in the area of Internet adoption indicates that the factors of attributes of network adopters' (Brown, 1999) and self-perceived competencies in utilizing the Internet (Ravitz, 1999) are very crucial to the instructional integration of the Internet.

Besides that, attitudes and concerns towards adopting Internet innovation (Thompson, 1998) and gratifications derived from the Internet (Hunter, 1999) have also been found to influence the integration of the Internet positively in the teaching and learning process.

Two other equally important factors that are also investigated are access to the Internet at the workplace (Foster, 2001) and access to the Internet from home settings (Wellington, 2001). These factors have been shown to have a strong effect on the integration of the Internet into the school and teacher-education curriculum. Factors that may affect the instructional integration of the Internet, mostly undertaken in Western countries, have not only yielded inconsistent results and may also not be applicable or generalizable to Malaysian samples.

1.5 Research Questions

Based on the above conceptual framework and the model of Internet integration (Fig. 1), this study will attempt to answer the following research questions:

1. What are the stages of the integration of the Internet into the teacher-training curriculum of selected teacher trainers in the Klang Valley?

2. What are the attributes of early and late adopters among teacher trainers in terms of:

    a)   educational background ?

    b)   teaching experience?

    c)   computer experience?

    d)   Internet experience?

    e)   home access to the Internet?

    f)   workplace access to the Internet?

    g)   indirect use of the Internet?

    h)   direct use of the Internet?

3. How can early and late adopters among teacher trainers be characterized with respect to:

    a)   self-perceived competencies in Internet use?

    b)   personal, professional and instructional gratifications derived from the use of the Internet?

    c)   attitudes toward adoption of Internet innovation?

4. Are there significant differences in the attributes of early and late adopters in terms of:

    a)   educational background?

    b)   teaching experience?

    c)   computer experience?

    d)   Internet experience?

    e)   home Internet access?

    f)   Internet access at the workplace?

    g)   attitudes towards Internet innovation via internal concerns and late concerns?

    h)   self-perceived competencies in Internet use?

    i)   gratifications derived from Internet use?

    j)   stages of integration of the Internet into instruction?

5. In what ways do early and late adopters differ in their personal and professional use of the Internet in the teacher training colleges in terms of:

    a)   usage of the newsgroup and listserv applications?

    b)   usage of the WWW and e-mail applications?

    c)   frequency of usage of the WWW and e-mail applications?

6. In what ways do early and late adopters differ in their instructional use of the Internet in the teacher training colleges in terms of:

    a)   perceived importance of integrating the Internet into the education syllabus?

    b)   using the Internet for classroom preparation?

    c)   directing their students' usage of different types of Internet applications?

    d)   directing their students' frequency of usage of Internet applications?

    e)   designing Internet-based activities for students in instruction?

    f)   designing Internet-based activities for students in extra-curricular activities?

7. With regards to the integration of the Internet in the teacher training curriculum, in what ways do early and late adopters differ in terms of:

    a)   problems faced in achieving this aim?

    b)   perceived needs to achieve this aim?

1.6 Purpose of the Study

       Given the size of investment in instructional technology in the teacher education sector, the anticipated increase in demand for Internet-integrated pedagogy and the demonstrated educational outcomes of using the Internet, it seems reasonable to investigate why the integration of the Internet and its applications for teaching and learning are so appealing to some teacher trainers, and not to others (Jacobsen, 2000).

Moreover, on the whole, no systematic study on the instructional integration of the Internet in the teacher-education sector has been carried out in Malaysia. As such, this study seeks to find the extent of integration and the ways in which the Internet and its applications are being incorporated into the teacher-training curriculum in the teacher training colleges in the Klang Valley as well as the problems and needs of the teacher trainers in this area. It also seeks to investigate if early and late adopters differ in their self-perceived Internet competencies, their gratifications derived from the use of the Internet, their attitudes towards Internet innovation, their educational background and teaching experiences, their computer and Internet experiences, their accessibility to the Internet in the home and workplace as well as the ways in which they utilize the Internet and its applications in teacher training colleges.

The first aim of the present investigation is to explore the extent of the adoption of Internet innovation among teacher trainers in the Klang Valley who are early and late adopters by ascertaining their stages of integration of the Internet into instruction.

In addition, the study aims to identify attributes of teacher educators who are using the Internet in the classroom. These attributes are, namely: educational background; teaching experience; computer experience; Internet experience; indirect use of the Internet and direct use of the Internet.

The identification of the attributes of the teacher trainers are in line with the Theory of Individual Innovativeness by Rogers (1995) which advocates that it is important to study the characteristics of educators who are utilizing the Internet for training and assessment purposes (Owen, 1999; Becker & Anderson, 1998).

The study also aims to investigate how Internet accessibility at the workplace and in the home settings affect the instructional integration of the Internet. This is because studies in this area have shown that home access and accessibility to the Internet at the workplace are vital for the integration of the Internet into the teaching and learning process (Facer et al., 2000; Wellington, 2001; Sanger et al., 1997; Owen, 1999; Ravitz, 1999; Becker, 2001).

In addition, the study will investigate the self-perceived competencies of the teacher trainers in their use of the Internet. Currently, there appears to be very few studies relating to the measurement of Internet competency of Malaysian educators. Most of the earlier studies were carried out on computer and Internet competencies of Malaysian students (Teoh, 1989; Recsam, 1986; Tang, 1987; Yong, 1997). At the same time, there is no standard instrument to assess the level of Internet competencies of teacher educators in using the Internet in Malaysia. As such, the Self-Evaluation Internet Competency Checklist (SICC) has been adopted and modified by the researcher to be used for this purposes. This study investigates the self-perceived Internet competency levels of Malaysian teacher trainers in Internet use, by classifying them into four areas of competency levels, namely unaware, aware, mastery and advanced.

This study will also look into the types of gratifications that teacher trainers in the Klang Valley are deriving from utilizing the Internet. Related studies in the area of incorporation of the Internet in instruction have found that educators are deriving more personal and professional gratification than instructional gratification from the Internet (Walsh, 1999; Ertmer et.al., 1994).

Besides gratifications derived from the Internet, related studies in the use of the Internet in teaching have shown that integration of the Internet is strongly influenced by teacher attitudes towards the adoption of Internet innovation (Algozzine, et. al., 1997, Cooperman, 1998). A study by Market Data Retrieval (1998) showed attitudes of teachers toward Internet innovation are directly related to the instructional integration of the Internet in classroom settings. These findings may also apply to Malaysian teacher trainers.

Hence, if educators are to use the Internet meaningfully in their classrooms, it is essential that the attitudes and perceptions of this new technology be brought to light. Therefore this exploratory research investigates teacher trainers' attitudes towards using the Internet to teach the education syllabus. It will reveal the attitudes of teacher

trainers toward Internet innovation by ascertaining their concerns in adopting the Internet for instruction.

Another aim of this study is to establish the factors that have significant relationships with Internet integration in the teacher-education curriculum. This will be done by investigating whether the attributes of early and late adopters, self-perceived competencies in using the Internet, attitudes in the adoption of Internet innovation and the gratifications received from utilizing the Internet and accessibility to Internet at the workplace and home settings play a role in the instructional integration of the Internet.

Another intention of the study is to investigate if there are differences in the way in which the two groups of teacher trainers are utilizing the Internet for personal and professional purposes. The study will also examine the differences between early adopters who readily adopt the Internet innovation for their teaching tasks, and the late adopters who are reluctant to adopt technology in the process of teaching and learning. Thus, this study will reveal these differences by exploring how both groups of teacher trainers perceive the importance of integrating the Internet into the education syllabus. In addition, it will investigate whether there are any discrepancies in the manner in which both groups of teacher trainers are using the Internet in their lesson preparations and teacher-directed student use of the Internet.

Besides that, the problems faced by the teacher trainers in the integration of this innovation in the teacher-training curriculum as well as their needs for the instructional integration of the Internet in teacher education will also be examined in this study. Thus, it is hoped that by studying the professional and instructional use of the Internet of the teacher trainers, the study will be able to identify new emerging Internet applications in teacher education and the current levels in which these applications are being used in the teacher-training curriculum. It is also hoped that the findings of the study will reveal the barriers faced as well as the future requirements of teacher trainers who are early and late adopters in relation to the adoption of new Internet technologies.

The study will also profile two individual cases selected from among the early and late adopters in their adoption of Internet innovation so as to provide a greater understanding of integration of the Internet into teacher education. By using case studies, this study will provide deeper insights as to what early adopters know and do in order to be successful at integrating Internet-related applications into their teaching. The case studies will also aid in the understanding of the barriers that are hindering the late adopters' use of Internet innovation in the Malaysian teacher-training curriculum.

1.7 Significance of the Study

A detailed search in the studies conducted in Malaysia has revealed that up to date, no in-depth exploratory study has been conducted. As such, this study will provide breakthrough information on the extent of incorporation of Internet innovation in the teacher-training curriculum. This is extremely important by the virtue of the fact that teacher trainers in Malaysian teacher-preparation programmes still have insufficient understanding of the demands on classroom teachers to incorporate the Internet and its applications into their teaching. Malaysian teacher trainers may also still have difficulty realizing the Internet's immediate and direct usefulness in their daily teaching practices. Thus, the findings of this study will be important as it would help the teacher education sector redefine Internet innovation within an educational context so that it can be perceived to help meet existing teaching needs and be incorporated fully into the Malaysian teacher-education curriculum.

This study regarding the incorporation of the Internet innovation in teacher education is both timely and relevant to the current effort on the part of the Teacher Training Division of the Malaysian Ministry of Education to incorporate the Internet in the teacher-training curriculum since 1997. Thus, this study will indicate the effectiveness of this initiative, as it will yield a current description of teacher trainers' adoption patterns of the Internet in the teacher training colleges in the Klang Valley.

The findings of this study will also be beneficial to policy makers in the Teacher Training Division, as it will ascertain the factors that most predict the instructional integration of the Internet in the teacher training colleges in the Klang Valley. By identifying the factors that contribute the most to Internet integration, it will allow the relevant authorities to plan for widespread adoption of Internet innovation across the teacher-education curriculum.

The findings of this study will also reveal the differences in the attributes, self-perceived Internet competencies, gratifications derived from use of the Internet and attitudes toward Internet innovation between the early and late adopters. Besides that, it will also reveal the differences in the way in which the two groups of teacher trainers perceive the importance on integrating the Internet into the education syllabus as well as the differences in their personal, professional and instructional use of the Internet. As a result, these findings will help the Teacher Training Division to narrow any existing technology gap in the adoption of Internet innovation.

This study will also reveal how teacher trainers both the early and late adopters use the Internet in their lesson preparation, professional communications and teacher-directed student use. Related research in the area of Internet integration advocates that, the more teachers use the Internet in various ways in the classroom, the more they can recognize the power of this tool in the educational context (Milken Exchange of Educational Technology, 1998). Besides that, the study will also reveal new and emerging Internet applications in teacher education and the current levels in which these applications are being used in the teacher-training curriculum.

Equipped with such revelations, Malaysian educators may be more ready to accommodate the Internet into their instructional practice. This is because educators from public and private educational institutions in the Klang Valley who are attempting to use the Internet in the classroom can see how the Internet can be used as an instructional tool and as a teaching aid to help them prepare for their classes. They will also see how it can be used to enhance their professional development. This is related to

the fact that there is growing trend of using the Internet as a vehicle for ongoing formal and informal professional development among educators (Dewalt, 1999).

The findings of this study will also will also reveal the specific barriers that are hindering the instructional integration of the Internet in the teacher training colleges in the Klang Valley. At the same time, the findings of the study will reveal the needs of the teacher trainers for the future integration of the Internet in the teacher-training curriculum.

Therefore, it is hoped that the insights on the current methodologies of the teacher trainers in using the Internet as well as their problems and needs of the teacher trainers in Internet integration can help the policy makers in the Teacher Training Division take relevant measures to stimulate more effective uses of the Internet and its applications in teacher-education programs as well as improve and expand its operations through greater uses of these technologies to other educational institutions in Malaysia.

The methodologies of using the Internet by the teacher trainers will also be very important for different academic groups in the education sector, namely: those in leadership positions, such as, university administrators, principals and headmasters of standard and Smart Schools as well as individual faculty members who are interested in further adoption of the Internet as an instructional tool in their teaching.

Another way in which the findings of this study will be beneficial to the policy makers of the Teacher Training Division is that it will aid in their understanding as to how an educational innovation is diffused into the teaching and learning processes among teacher trainers who are early and late adopters. The process of the diffusion of the Internet innovation is further revealed in the findings of the in-depth case studies of the teacher trainers who are early and late adopters. The individual experiences represent great diversity especially in the ways that the early adopters are integrating the Internet into their teaching methods to fundamentally improve the quality of education in the teacher training colleges in the Klang Valley.

Hence, early adopters who are already integrating the Internet in their teaching may have more positive attitudes and less internal concerns in adopting it. They may also have a better understanding of its instructional integration. The study will indicate and identify the attributes of early adopters as well as the motivations that are driving them to use the Internet. Thus, teacher trainers from other parts of Malaysia and even the present late adopters in the study can benefit from the experience and current practices of those who have integrated the Internet into the teacher-training curriculum in recent years. Besides that, teachers and lecturers from public and private colleges and training organizations should attempt to emulate the attributes of these individuals because they can play a very important role in accelerating the diffusion of Internet innovation in an organization.

According to Phillips (2000), a review of technology integration in schools in the United States, Britain, Australia, and New Zealand, reveals a strong commitment and involvement of initial adopters of technology who in turn have had a tremendous impact on technology integration in the education systems of these countries.

Thus, the Teacher Training Division of the Malaysian Ministry of Education can bring about more effective acceptance and integration of classroom usage of the Internet in the teacher-education sector by targeting these early adopters for Internet training programmes.

The case studies data will also reveal the resulting changes to the teaching and learning process in the teacher training colleges in the Klang Valley, the incentives for the integration of the Internet and preferred methods of learning with Internet technology. Hence, the findings of the case studies can be used to guide designs of future research that focus on the incorporation of the Internet to enhance the teaching and learning process.

In addition, the case studies data will reveal the specific barriers that are hindering the integration of the Internet of the late adopters in the teacher-education curriculum. It is also hoped that the findings on late adopters from the qualitative and

case studies data will contribute to raising the awareness of policy makers in the Teacher Training Division on the importance of planning specific strategies for this group of teacher trainers in future plans for the diffusion of educational innovations in the Malaysian teacher-training curriculum.

Besides diffusing Internet innovation in the teacher training colleges, the Ministry of Education is also attempting to do the same in schools in Malaysia. The Ministry has chosen fifty schools from all over the country to be involved in the *JP* (Education Network) pilot project and fourteen schools for the *PSE* (Electronic Resource Center) pilot projects. It is also trying to provide Internet access in schools in rural areas via the Mobile Internet Project.

As such, the findings of the study will help enlighten the teachers in these schools regarding the different ways in which the Internet is being utilized by early adopters in the instructional process. They can therefore be able to adopt similar patterns of instructional use of the Internet initiated by the early adopters in their own schools.

With the current emphasis on IT in Malaysia, the Government is going ahead with the setting up of Smart Schools, despite the country's economic slowdown from 1997 to 1999 (The New Straits Times, July 28, 1999). Therefore, this research can provide insights and useful information for the personnel involved in drawing up and implementing the Smart School curriculum. It will also be a reservoir of knowledge for IT implementators at the Ministry of Education and IT coordinators in primary and secondary schools under the Smart Learning Environment (SLE) who are planning to incorporate the Internet and its applications in the instructional process.

The designing of the instruments in the study, namely the Internet Integration Checklist (IIC) and Self-Perceived Internet Competency Checklist (SICC) are expected to contribute significantly to educators involved in the research of Internet utilization in the education system in Malaysia. This study, which intends to use reliable and valid

instruments, will enable researchers to ascertain the Internet integration levels and Internet competencies of Malaysian educators.

This study can also act as an instrument for policy makers in the Teacher-Training Division to carry out needs assessment studies for the development and implementation of future programs on Internet integration in the teacher-education curriculum in Malaysia. Thus, it is hoped that this study will assist decision makers to re-define the role in which the Internet will play in the teacher-education sector of Malaysia.

1.8 Operational Definitions of the Terms used in this Study

1) Levels of Internet
    Integration

It encompasses all the stages of adoption of the Internet in the instructional process in the teacher training colleges. It is measured using the six levels of adoption of the Internet in the Internet Integration Checklist (IIC) developed by Norris, C. & Solloway, E. (1999).

2) Early Adopters of the
    Internet Innovation

It refers to teacher trainers who are already integrating the Internet and its applications in the teacher-training curriculum. They will be identified based on the Adaptations to Other Contexts and Creative Applications to New Contexts stages in the Internet Integration Checklist (IIC) developed by Norris, C. & Solloway, E. (1999).

3) Late Adopters of

the Internet

Innovation

It refers to teacher trainers who are just starting to use the Internet and its applications in the teacher-training curriculum. They will be identified based on the Awareness, Learning the Process, and Understanding and Application Stages as well as Familiarity and Confidence Stage in the Internet Integration Checklist (IIC) developed by Norris, C. & Solloway, E. (1999).

4) Self-Perceived Internet

Competency Levels

It is the self-perceived confidence level of the teacher trainers' competencies in Internet use as outlined in the Self-Perceived Internet Competency Checklist (SICC) developed by Johnson, D. (1997).

5) Stages of Concern

It refers to the attitudes shown by the teacher trainers toward Internet innovation. For each subscale (stages of concern), item responses are summed up to obtain a measure for the seven stages of concern from the Stages of Concern Instrument (SOCI) developed by Anderson, D. K. & Wells, J. G. (1997).

6) Gratifications derived
from the use of the
Internet

It refers to the personal, professional and instructional benefits derived from utilizing the Internet. For each subscale (gratification), item responses are summed up in a measure for the three types of gratifications in the Gratifications derived from Utilizing the Internet Questionnaire (GUIQ) developed by Anderson, S. E. & Harris, J. B. (1997).