

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study was concerned with the ways in which the Internet and its applications are being incorporated into the teacher-training curriculum in the Klang Valley as well as the problems the education teacher trainers faced when doing so. It also sought to examine if early and late adopters differed in their self-perceived Internet competencies, the gratifications derived from the Internet, attitudes towards Internet innovation, access to the Internet and educational background as well as teaching, computer and Internet experiences. These variables have been found to have significant influences in the integration of the Internet into the teaching and learning processes (Wallace, 1998; Herring, 1999; Westfall, 1998; Chmielewski, 1998; Hogle, 1999; Ravitz, 1999, Zakari, 2000; Abdulla, 2001; Chao, 2001, Philson, 1999; Wellington, 2001).

The study utilized both quantitative (surveys) and qualitative (interviews, open-ended-questionnaire, case studies, personal documents) methods to investigate the extent of Internet integration in the teacher education sector.

5.2 Summary of the Procedures

The subjects of the study consisted of fifty-five teacher trainers who specialized in the education discipline, out of which fourteen teacher trainers were identified as early adopters and another forty-one as late adopters. A total of four survey instruments; namely, Stages of Concern towards Internet Instrument (SOCI, 1999, Appendix C), Gratifications in Utilizing the Internet Questionnaire (GUIQ, 1997,

Appendix D), Internet Integration Checklist (IIC, 1998, Appendix E) and the Self-Evaluation Internet Competency Checklist, (SICC, 1995, Appendix F) were administered to all the education teacher trainers in the five teacher training colleges in the Klang Valley. The Internet Use open-ended questionnaire (IUQ, 1998, Appendix G) was administered to the fourteen early and late adopters identified among the teacher trainers. In addition, face-to-face interviews were carried out with the fourteen early and late adopters based on the questions outlined in the Semi-structured Interview Schedule (SIS, 1998, Appendix H).

Prior to administering the actual study, pilot tests were carried out for the four quantitative instruments; SOCI, GUIQ, IIC and SICC. The Cronbach Alpha reliability coefficients for these instruments are as follows: a) SOCI; Stage 0 - 0.8529, Stage 1 - 0.8040, Stage 2 - 0.8102, Stage 3 - 0.8285, Stage 4 - 0.8481, Stage 5 - 0.8263, b) GUIQ; Professional gratification - 0.8937, Personal gratification - 0.8319 and Instructional gratification - 0.8307, c) IIC - 0.8472 and SICC - 0.9685. The IUQ and the SIS were also pilot-tested on two teacher trainers to check for content validity and clarity of items.

Qualitative data from the open-ended questionnaires were collected over a period of one month and interview data were collected over a three-month period. Documents reflecting proof of the integration of the Internet into the teacher-training curriculum were also collected in the form of academic and extra-curricular portfolios with Internet integrated activities, Internet articles that were integrated in lesson plans of teacher trainers as well as Internet-integrated PowerPoint presentations submitted by the teacher trainers. Professional and instructional e-mail exchanges between the teacher trainers and students were also examined (Appendices N - S).

Two case studies describing the two-adopter types (early adopter and late adopter) as classified by Roger's innovation theory (1995) were also selected to highlight the differences that existed between the teacher trainers in the integration of

the Internet in the teacher-training curriculum to present a better understanding of the innovation decision process in the teacher-education sector (Appendix I).

A number of statistical analyses were employed to analyze the quantitative data gathered in the research. These included descriptive statistics, *t*-tests and chi-square tests. Statistical comparisons of the scores were made using the Statistical Package for Social Sciences Version (SPSS 7.5 for Windows). The level of significance was set at 0.05.

The qualitative data from the open-ended questions were analyzed by coding the important themes and in terms of frequency of responses for each of the categories outlined in the IUQ. Emerging themes were also analyzed from the transcribed interviews based on the semi-structured questions in the SIS by quick word counts and in-depth line-by-line method of analysis.

Validations of five randomly selected interview transcripts were carried out and feedback from the respondents confirmed that the transcripts were reliable and accurate. In the case study analyses, cross-case comparison methods were used for ascertaining differences that existed between the two-adopter types identified in the study.

The findings of the study are organized into the following sections for discussion. The four sections of this chapter are: a) Summary of the findings; b) Conclusions of the study; c) Limitations of the study; d) Recommendations of the study and e) Suggestions for further research.

5.3 Summary of the Findings

The summary of the findings is presented in accordance with the seven research questions in the study.

5.3.1 Stages of Integration of the Internet into the Teacher-Training Curriculum

In relation to the first research question, the findings of the study showed that 25.5 percent of the teacher trainers had fully adopted the Internet innovation in the teacher training colleges in the Klang Valley. This finding implies that 74.5 percent of the education teacher trainers have yet to fully adopt Internet innovation in the teacher education sector.

The results of the Internet Integration Checklist also proved that the early adopters who had adopted Internet innovation were in the higher stages of integration of the Internet as identified by the IIC. Twenty percent of the early adopters were in the adaptations to other contexts stage while about another 5.5 percent were in the creative applications to new contexts stage. This implies that early adopters had not only adopted the Internet innovation but were also adapting it and applying it in different and creative ways in the teacher education sector.

Although 74.5 percent of the teacher trainers qualified as late adopters, it was encouraging to note that 50.9 percent of them were in the familiarity and confidence stage of integration of the Internet. In accordance with Rogers' (1995) theory of diffusion of innovation, these groups of teacher trainers form the mainstream adopters, as they are the next target group to adopt Internet innovation.

Another 21.8 percent of the late adopters who were in the 'understanding and applications stage' of Internet integration are just beginning to comprehend Internet innovation. According to Rogers (1995), at this stage, the characteristic of trialability is important as potential adopters are in the process of trying out the educational innovation. They usually start by trying out the innovation for personal purposes. Thus, they are in a position where they can either adopt or reject Internet innovation.

There were no teacher trainers who were in the 'learning the process stage' of Internet integration. In addition, only one teacher trainer was in the 'awareness stage' of Internet integration. As propounded by Rogers (1995), teacher trainers who are in

these stages are referred to as laggards as they are usually the last people in a social system to accept an innovation. This finding implies that almost all the teacher trainers in the Klang Valley already have some understanding of Internet innovation.

5.3.2 Attributes of Early and Late Adopters among the Teacher Trainers

With reference to the second research question, 71.4 percent of the early adopters possessed a Master's degree. However, 68.4 percent of the late adopters with similar qualifications failed to qualify for the rank of early adopters. The findings also showed that even teacher trainers with a PhD did not meet the requirements for early adopter status.

It also showed that 50 percent of the early adopters had one to ten years of teaching experience. On the other hand, 39 percent of the late adopters with the same range of teaching experience failed to qualify for the status of early adopters. The findings of the study also revealed that teacher trainers who had more years of teaching experience did not fall in the category of early adopters.

The findings of the study also showed that all the early adopters had used computers for a longer time period compared to the late adopters. Related literature in this area indicates that educators who had longer computer experiences had less computer anxieties and higher computer self-efficacies. This resulted in them having higher levels of confidence to utilize computer-related applications such as PowerPoint and Internet applications like the WWW, e-mail, newsgroups and listservs.

The early adopters also had longer Internet experiences than the late adopters. This finding implies that Internet use was still a relatively new experience among 75.6 percent of the late adopters, reflecting that they needed to increase their Internet use.

In addition, all the early adopters perceived home access to the Internet as extremely important in the light of the difficulties they faced in getting access to the Internet at the workplace. Nonetheless, this was only important for 65.9 percent of the

late adopters. This may partly be attributed to the fact that the late adopters indicated that they had more access to the Internet at the workplace. However, 48.8 percent of the late adopters who claimed to have more access to the Internet at the workplace were in the lower rungs of integration of the Internet in the teacher-training curriculum.

On the other hand, although 64.3 percent of the early adopters claimed less access to the Internet at the workplace, they were still able to integrate this innovation into the education syllabus in the teacher-training curriculum.

This is related to the fact that all the early adopters and 73.2 percent of the late adopters were integrating the Internet indirectly in the teacher-training curriculum. Only three early adopters were integrating the Internet directly in the teacher-training curriculum by bringing in their own computer and Internet resources into the classroom. However, this endeavor was not being carried out on a regular basis.

5.3.3 Attitudes towards Internet Innovation, Self-Perceived Internet Competencies and Gratifications derived from Use of the Internet of Early and Late Adopters

With reference to the third research question, none of the early and late adopters had high awareness concerns pertaining to their existing knowledge of Internet innovation. However, 39.1 percent of the late adopters had medium awareness concerns compared to 21.4 percent of the early adopters. This finding implies that currently more of the late adopters than early adopters were concerned about their lack of current information levels of Internet innovation.

A marginal difference was also found between the early and late adopters in the category of high informational concerns. Thus, an important implication of this finding is that slightly more of the late adopters (36.5%) compared to 35.7 percent of the early adopters were very anxious to learn more about Internet innovation. However, the interview data revealed that informational concerns were varied, as both groups of

teacher-trainers were apprehensive about learning different aspects about Internet innovation.

A minor difference also existed between the early and late adopters in their personal concerns with slightly more of the early adopters (35.7%) having high personal concerns compared to the late adopters (29.3%). This finding is surprising because it is usually the late adopters who have more high personal concerns than the early adopters based on Rogers' (1995) theory of diffusion of innovations.

However, the qualitative findings gave further insights into the higher personal concerns of the early adopters. It revealed that the early adopters had self-concerns in dealing with their roles as diffusers of Internet innovation among the other education teacher trainers as they indicated their frustration in dealing with their colleagues who had yet to embrace new technologies and to incorporate these tools into the teaching and learning process.

In addition, more of the late adopters (61%) had medium management concerns in using Internet innovation effectively and efficiently compared to 50 percent of the early adopters. Besides that, the results of the data analyses showed that more of the late adopters (14.6%) had high management concerns compared to 7.1 percent of the early adopters. This finding implies that more of the late adopters were worried about issues pertaining to the lack of time in utilizing Internet innovation in the teacher-training curriculum.

With regard to internal concerns, a marginal difference was found between the two adopter-types with 80.6 percent of the late adopters having medium internal concerns compared to 78.7 percent of the early adopters. Thus, this finding is consistent with Rogers' (1995) theory, which states that late adopters have more internal concerns than early adopters. This finding also implies that a high number of early and late adopters had their respective self-related concerns in meeting the demands of Internet innovation.

On the other hand, a major difference existed between the early and late adopters in the category of high consequence concerns. More of the early adopters (35.8%) were highly concerned about the effects of Internet innovation on their students compared to only 9.8 percent of the late adopters.

A marked difference was also found between the early and late adopters in their collaborative efforts on the Internet. About 71% percent of the early adopters were very concerned about interacting and gaining knowledge from other educationists via the Internet compared to 34.1 percent of the late adopters.

Similarly, a noticeable difference existed in the high refocusing concerns of the early and late adopters. More of the early adopters (64.3%) were very interested in exploring the universal benefits that could be derived from adopting and utilizing Internet innovation as compared to 36.5 percent of the late adopters.

A distinct difference in external concerns towards Internet innovation was also found between the two adopter-types with 57.1 percent of the early adopters having high external concerns compared to 22 percent of the late adopters. Thus, this finding indicates that more of the early adopters than late adopters were highly concerned about the effects of Internet innovation on their students and the impact of their collaborations via the Internet with other educators as well as the consequences of exploring the universal benefits that could be derived from the use of the Internet and its applications.

With regard to their abilities in using the Internet, a marked difference was found between the early and late adopters in the perceptions of their existing Internet skills. More than 57.1 percent of the early adopters perceived themselves to be in the advanced and mastery levels of Internet competencies as compared to only 7.3 percent of the late adopters. On the other hand, the findings of the study revealed that 60.9 percent of the late adopters still lacked personal conviction in their capabilities to use the Internet.

In relation to the benefits derived from the use of the Internet, the early adopters derived higher professional, personal and instructional gratifications from their use of the Internet than the late adopters. This is attributed to the fact that 64.3 percent of the early adopters derived high personal gratification from the use of this innovation as compared to 29.3 percent of the late adopters. The implication of this finding is that more of the early adopters than late adopters were getting self-fulfillment from their use of the Internet.

More of the early adopters (78.6%) also derived high professional gratifications compared to only 21.9 percent of the late adopters. Thus, a marked difference existed between the early adopters and late adopters in the professional advantages that they are reaping from the use of the Internet and its applications.

The finding implies that more of the early adopters were deriving benefits from the academic discussions with educators and interactions from the key-pal projects. One important benefit is that these professional communications were enhancing their instructional use of the Internet.

This is related to the finding whereby 50 percent of the early adopters derived high instructional gratifications from their use of the Internet compared to only 7.3 percent of the late adopters. Thus, a major difference existed between the early and late adopters in the academic and instructional advantages that they are obtaining from use of the Internet. This can be attributed to the advantages derived from the early adopters' involvement in self-directed and teacher-directed student activities using the Internet. Due to their high instructional motivations, the interview data revealed that the early adopters had extended the use of the Internet both to academic and extra-curricular activities in the teacher-training curriculum.

5.3.4 Differences between Early and Late Adopters in Variables of the Study

With reference to the fourth research question, the relationship between integration of the Internet in the teacher-training curriculum and the educational background of the teacher trainers was found to be not significant. Although there were more early adopters with postgraduate qualifications than the late adopters, the differences were not big enough to warrant a significant relationship between educational background and Internet integration.

The findings of the study also revealed a non-significant relationship between teaching experience and the level of Internet integration. Although there were more early than late adopters with teaching experiences of ten years and below, there was no significance in the relationship between teaching experience and Internet integration.

On the other hand, a significant relationship existed between computer experience and Internet integration, with the early adopters having more computer experience.

A significant relationship was also found between Internet experience and Internet integration, with the early adopters having longer Internet experience than late adopters. The main implication of these findings is that adequate computer and Internet experience were vital for the instructional integration of the Internet in the teacher-training curriculum.

There was also a significant relationship between home access and Internet integration. This was proven in the chi-square analyses with more of the early adopters having access to the Internet in the home environment. The finding indicates that home access to the Internet was contributing positively to the integration of the Internet in the teacher-training curriculum.

Surprisingly, the relationship between integration of the Internet in the teacher-training curriculum and Internet access at the workplace was not significant. Although more of the late adopters claimed that they had access to the Internet at the workplace

and less of the early adopters claimed similar access, the differences were not major enough to warrant a significant relationship between Internet access at the workplace and Internet integration.

In relation to the attitudes of the teacher trainers towards Internet innovation, the relationship between awareness concern and Internet integration was found to be not significant. Since both groups had their own sets of concerns pertaining to their existing knowledge of the Internet, this may have attributed to the non-significance in the relationship between awareness concerns and Internet integration.

No relationship was also found between informational concerns and Internet integration. This finding implies that both groups of teacher trainers were trying to find out more about Internet innovation but in different ways and for different purposes. Thus, differences in the types of Internet information sought may have attributed to the non-significance in the relationship between informational concerns and Internet integration.

Integration of the Internet in the teacher-education curriculum was also not significant with regard to personal concerns. This finding revealed that both groups of teacher trainers had unique sets of self-concerns in adopting Internet innovation. As such, these differences may have caused the non-significance in the relationship between personal concerns and Internet integration.

Management concerns was also found to be not significant with Internet integration. This finding implies that both groups of lecturers lacked time to utilise Internet innovation in the teacher training colleges. Although more of the late adopters than early adopters faced this problem, the difference was not big enough to cause a significant relationship between management concerns and Internet integration.

Overall, the relationship between internal concerns of the teacher trainers and Internet integration was found to be not significant. The implication of this finding is that the intrinsic motivations of teacher trainers in utilizing Internet innovation were not

contributing positively to the instructional integration of the Internet in the teacher-training curriculum.

There was also a non-significant relationship between consequence concerns of the teacher trainers and Internet integration. Although the early adopters were more concerned about the effects of Internet innovation on their students as compared to the late adopters, the differences were not major enough to form a significant relationship between consequence concern and Internet integration.

There was no relationship found between collaboration concerns and Internet integration. More early adopters were interested in teaming up with other academicians for professional purposes as compared to the late adopters. However, the differences were not major enough to cause a significant relationship between collaboration concerns and Internet integration.

On the other hand, refocusing concerns were found to be significant in relation to Internet integration with a larger number of the early adopters than late adopters being concerned about exploring the universal benefits of the Internet and its applications. The implication of this finding is that the refocusing concerns of the teacher trainers had an important effect on the integration of the Internet in the education syllabus.

On an overall basis, external concerns were not significant with regards to Internet integration. Although more of the early adopters had higher external concerns than the late adopters, the differences were not big enough to warrant a significant relationship between these concerns and Internet integration.

On the other hand, the relationship between self-perceived Internet competency and Internet integration was significant. The qualitative analyses indicated that the early adopters definitely had higher competencies in Internet use as this was reflected in their professional and instructional use of the Internet. This finding also implies that self-

perceived Internet competencies of the teacher trainers were contributing positively to the instructional integration of the Internet in the education syllabus.

The findings of the study also showed that personal gratification was not significant in relation to the level of Internet integration. Since both groups of teacher trainers derive some measure of personal gratification from their use of the Internet and its applications, this may have attributed to the non-significance in the relationship between personal gratification and Internet integration.

However, professional gratification was found to be significantly related to Internet integration with more of the early adopters obtaining professional benefits from their use of the Internet. This finding implies that professional gratifications that are being derived by the teacher trainers by collaborating with other educators via the Internet were contributing positively to the integration of the Internet into the education syllabus.

The relationship between instructional gratification and Internet integration was also significant with more of the early adopters deriving more benefits from their use of the Internet. The implication of this finding is that the instructional fulfillments that were being obtained by the teacher trainers definitely aided them in the integration of the Internet into the education syllabus.

It was also found that the difference between the early and late adopters as far as their levels in the stages of integration of the Internet into instruction are concerned was significant with more of the early adopters being in the higher levels of integration of the Internet into instruction. The implication of this finding that there is a definite statistical difference between the early and late adopters in the adoption of Internet innovation.

This finding is also reflected in the qualitative analyses of the study, which showed that the early adopters were higher in the instructional and non-instructional integration of the Internet in the teacher-training curriculum.

5.3.5 Personal and Professional Use of Internet Applications and Frequency of Usage of Early and Late Adopters

With reference to the fifth research question, the newsgroup and listserv applications were diffused more highly among the early adopters than among late adopters with regards to personal use. This is related to the fact that the newsgroup application for personal purposes had been diffused among 42.9 percent of the early adopters but only among 35.7 percent of the late adopters.

For the listserv application, it had been diffused among 28.6 percent of the early adopters as compared to 14.3 percent of the late adopters. These findings imply that more of the early adopters were utilizing these Internet applications for self-related purposes.

For professional use, the newsgroup and listserv applications also were more highly diffused among the early adopters than among late adopters. This is reflected in the findings of the study whereby 21.4 percent of the early adopters were using these applications for professional purposes as compared to 7.1 percent of the late adopters. The findings of the study also revealed that the early adopters were posting opinions and suggestions on the newsgroups and listservs to enhance their professional communications. However, the professional uses of these applications were rather restricted among the early adopters. On the other hand, the late adopters were hardly using these applications for professional purposes.

For use of personal purposes, a marginal difference was found in the diffusion of the WWW application between the early and late adopters, with it being diffused slightly higher among the late adopters. On the other hand, the e-mail application had been diffused among all the early adopters but only among 57.1 percent of the late adopters.

These findings imply that slightly more of the late adopters perceived the WWW application useful for personal purposes. On the other hand, more of the early adopters perceived the e-mail application useful for similar purposes.

This study also provided evidence of total diffusion of the WWW application among all the early adopters and to 71.4 percent of the late adopters for professional purposes. Generally, these diffusion rates indicated that the early adopters perceived the WWW application as being more useful for professional purposes compared to the late adopters.

This is related to the fact that more of the early adopters had adopted the WWW application for a variety of uses for professional purposes in the teacher education sector. Nearly 43 percent of them were using the WWW to source for new ideas on teaching methodologies compared to 14.3 percent of the late adopters, proving that instructional-related issues form the main component of their professional communications. Close to 36 percent of them were also browsing current articles in their areas of specialization for academic purposes compared to 28.6 percent of the late adopters.

In addition, 14.3 percent of the early adopters had acquired web-building skills and were using them to put up academic materials on the college homepage. However, none of the late adopters had acquired similar skills. In addition, 28.6 percent of the early adopters compared to 14.3 percent of the late adopters were contributing ideas and articles pertaining to the education syllabus for their homepages in their respective teacher training colleges.

Besides that, 14.3 percent of the early adopters were also engaging in research for professional development activities such as mentoring and collaborative learning as well as for motivational seminars compared to only 7.1 percent of the late adopters. In contrast, 21.4 percent of the late adopters perceived the Internet more useful for conducting professional research projects on current pertinent issues in the teacher

education sector. However, none of the early adopters were engaging in this activity, as they were more interested in using the Internet for instructional purposes.

As for the e-mail application, there is a marked difference between its diffusion among the early and late adopters for professional use. This is reflected in the findings of the study, which indicated that 85.7 percent of the early adopters were using it for professional purposes as compared to 64.3 percent of the late adopters.

The implication of this finding is that a larger proportion of the early adopters compared to the late adopters perceived the e-mail beneficial for professional communications, which was basically being carried out to improve the quality of their teaching.

This is related to the fact that 35.7 percent of the early adopters compared to 14.3 percent of the late adopters were engaging in professional communications via the e-mail to keep in touch with colleagues in their respective teacher training colleges.

In addition, 35.7 percent of the early adopters compared to only 7.1 percent of the late adopters were engaging in professional communications with educators and individuals outside of their teacher training colleges on educational and professional matters.

In addition, 28.6 percent of the early adopters compared to 7.1 percent of the late adopters were using the e-mail to collaborate with key pals on joint projects to liaise on administrative and teaching matters.

The findings of the study also revealed that the early adopters were heavy Internet users, with 42.8 percent of them using it a few times a week, 28.6 percent of them using it once a day and another 28.6 percent of them using it once a week. Conversely, none of the late adopters were using the WWW once a day. In addition, 35.7 percent of them were using the WWW a few times a week and another 21.4 percent were using it once a week. Thus, the qualitative analyses indicated that the

WWW application has become an integral part of the lives of the early adopters but not for the late adopters.

As for the e-mail application, 28.6 percent of the early adopters were using it once a day. However, only 14.3 percent of the late adopters were using the e-mail application with the same intensity. In addition, 35.7 percent of the early adopters were using the e-mail a few times a week compared to 21.4 percent of the late adopters. Thus, the e-mail application was used less regularly than the WWW by the early adopters and even lesser by the late adopters. This is also related to the fact that the use of the e-mail for professional purposes was not so widely diffused as the WWW application.

5.3.6 Differences in the Instructional Use of the Internet of Early and Late Adopters

In relation to the sixth research question, the qualitative analysis of the study revealed a marked difference between the early and late adopters in the way in which they perceive the importance of using the Internet in their teaching. This is related to the fact that all the early adopters perceived integrating the Internet as important for the teaching of the education syllabus. On the other hand, 35.7 percent of the late adopters still had doubts of the significance of incorporating the Internet into their teaching. One late adopter was still not sure about the importance of this endeavor in the teaching and learning process.

On the aspect of self-directed use of the Internet, 92.8 percent of the early adopters were using it for the preparation of their lessons. On the other hand, only 35.7 percent of the late adopters were using the Internet for similar purposes. Another 35.7 percent of the late adopters indicated that they had just started using the Internet towards this end. Thus, a marked difference existed between the early and late adopters in this self-directed use of the Internet.

With regard to directing their students to use the Internet, all the early adopters and 78.6 percent of the late adopters were directing their students to incorporate the WWW application in the teacher-training curriculum. On the other hand, 57.1 percent of the early adopters were directing their students to use the e-mail as part of the teacher-training curriculum with 35.7 percent of the late adopters doing likewise.

The findings of the study also revealed that 42.9 percent of the early adopters as compared to 35.7 percent of the late adopters were already directing their students to use the WWW a few times in a typical academic semester. In addition, only 14.3 percent of the early adopters were asking their students to use the WWW more than once in a typical academic semester. Thus, these findings indicate that more of the early adopters were directing their students to use the Internet on quite a regular basis.

With regard to the frequency in which the teacher trainers were directing their students to use the e-mail application, 21.4 percent of the early adopters were already directing their students to use the e-mail few times in a typical academic semester compared to 7.1% of the late adopters.

Besides that, 14.3 percent of the early adopters were directing their students to use the e-mail application more than once in a typical academic semester compared to none of the late adopters. These findings indicate that the low use of e-mail among the late adopters is reflected by the low intensity rates in which they were directing their students to use this application. Another implication of this finding is that the early adopters were asking their students to use the e-mail application on a less frequent basis than the WWW application for instructional purposes.

The findings of the study also showed that all the early adopters and 85.7 percent of the late adopters were directing their students to use the WWW for research activities for their coursework portfolios and assignments. This finding provides the evidence that there is diffusion of the WWW innovation for instructional purposes in the teacher-education sector.

In addition, 50 percent of the early adopters were already directing their students to use the e-mail for instructional purposes. The early adopters were already directing their students to send in web addresses, assignments and to make queries about college assignments using the e-mail application. On the other hand, the diffusion of the e-mail application for similar purposes was restricted only to one late adopter.

This finding implies that although 35.7 percent of the late adopters were already directing their students to use this application, it was more for the purposes of communication with their trainees.

The low diffusion rate of the e-mail for instructional purposes among the late adopters is linked to the their lower competencies in Internet use and the fact that they are still unable to see the relative advantages of utilizing this innovation in the teaching and learning process.

A new development in teacher-directed student use is that 28.6 percent of the early adopters had taken the initiative to extend the use of the WWW application into the extra-curricular activities (Gerko) that are conducted in the teacher training colleges. These initiatives showed that the early adopters had experienced greater success in integrating the WWW application in creative ways in the teacher-training curriculum compared to the late adopters. This was also evident in the feedback from the early adopters in the interview data, which indicated that the Internet-integrated 'Gerko' portfolios of students were more creative and interesting compared to the portfolios that were created with traditional methods.

One of the early adopters had also taken the initiative to extend the use of the e-mail for mentoring purposes for the practicum program conducted in the teacher training colleges. The feedback from the interview data indicated that the quality of the mentoring process was also enhanced due to the constant communication between the teacher trainer and her students. However, none of the late adopters had adapted Internet innovation for 'Gerko' and e-practicum related activities.

5.3.7 Problems and Perceived Needs of Early and Late Adopters in the Integration of the Internet in the Teacher Training Curriculum

In relation to the last research question, the findings of the study revealed that the main barrier hindering the integration of the Internet was the lack of Internet access in the teacher training colleges in the Klang Valley. However, this problem was considerably felt by 85.7 percent of the early adopters as compared to 64.3 percent of the late adopters. More of the early than late adopters also indicated that there was lack of sufficient computer hardware for lecturers. This is related to the fact that 71.4 percent of the early adopters compared to 57.1 percent of the late adopters perceived this problem as an important barrier preventing their use of the Internet in the teacher training colleges in the Klang Valley.

This finding implies that the early adopters wanted to utilize more of the Internet and its applications for the teaching of the education syllabus but were currently unable to do so because of the lack of computers with Internet connection in the teacher-training colleges. The findings also suggest that more than half of the late adopters were beginning to realize the perceived advantages of using the Internet for professional and instructional purposes. It is highly likely that these groups of late adopters had been influenced by the ways in which the early adopters were integrating the Internet into the education syllabus and are most likely to qualify for the status of early adopters in the near future.

In addition, 21.3 percent of the early adopters were concerned about the lack of their skills in utilizing the Internet and its applications for instructional purposes compared to 14.2 percent of the late adopters.

The other problem that troubled 14.2 percent of the early adopters and 7.1 percent of the late adopters was related to maintenance and breakdown in computer and Internet hardware and software. Consequently, 14.2 percent of the early adopters indicated that there was a need for electronic maintenance officers to handle such

technical problems, as they do not have the time or the expertise to handle such problems.

The late adopters seemed to face different kinds of barriers in the integration of the Internet into the teacher-training curriculum. The main problem faced by 35.7 percent of the late adopters compared to 21.3 percent of the early adopters was of lack of time to utilize the Internet during office hours although they claimed to have more access at the workplace. This was also confirmed in the finding that more of the late adopters had time-related concerns in the adoption of Internet innovation. Thus, this was one of the main hindrances faced by the late adopters especially in the integration of the Internet in the teacher-training curriculum.

In addition, 21.3 percent of the late adopters also found the process of translating Internet articles from the English Language to the National Language both a time-consuming and tedious process. Another difficulty more prominently faced by 14.2 percent of the late adopters was lack of availability of materials in the National Language on the Internet. However, the language problems did not seem to trouble the early adopters.

Pertaining to the needs of the teacher trainers in the instructional use of the Internet, the data of the study revealed that 85.7 percent of the early adopters and 71.4 percent of the late adopters had indicated that the most crucial element in enhancing the integration of the Internet into the education syllabus would be to have Internet accessibility in the education departments in the respective teacher-training colleges. About twenty-one percent of the early adopters also expressed the need to have Internet access in special rooms in the teacher training colleges for ease of use.

The findings of the study also indicated that 57.1 percent of the late adopters as compared to 21.4 percent of the early adopters expressed the need to enhance their existing Internet competencies. Besides that, 28.6 percent of the early adopters also

indicated the need for training in relevant pedagogies and teaching methodologies to enable them to utilize more creative methods of Internet use in the classroom.

This was indicated in the data analyses where 14.2 percent of the early adopters expressed the following needs for more serious incorporation of the Internet into teacher-training curriculum; a) lecture notes pertaining to the education syllabus to be posted on the WWW as a source for student reference, b) addresses of relevant Internet websites to be incorporated into the education curriculum, as this would hasten the search process for materials that are useful for the teaching of the education syllabus and c) electronic maintenance officers to handle computer and Internet trouble shooting problems.

In addition, another need expressed by 21.4 percent of both the early and late adopters was for Internet use to be integrated in the education syllabus in a more serious and systematic manner, along with provisions to be made by administrators for assessment-based procedures in the teaching of this syllabus.

Thus, it can be seen that the current needs of the teacher trainers were geared towards the enhancement of integration of Internet innovation in the teacher-training curriculum.

5.4 Conclusions of the Study

Based on the quantitative and qualitative analyses, the following conclusions can be made:

1. Internet innovation has been diffused partially into the teaching and learning processes in the teacher education sector as about a quarter of the teacher educators have managed to implement changes in the educational process from traditional-driven pedagogies to Internet-driven pedagogies. This is reflected in the fact where the diffusion of the Internet innovation is higher among the early

adopters for instructional purposes both in their self-directed and teacher-directed student use of the Internet.

2. The early and late adopters differ significantly in the variables that contribute to the integration of the Internet in the teacher education sector with the early adopters scoring significantly higher in each of these variables:
 - (i) computer experience
 - (ii) Internet experience
 - (iii) home access to the Internet
 - (iv) refocusing concerns in the attitudes toward Internet innovation
 - (v) self-perceived Internet competencies
 - (vi) professional gratifications derived from use of the Internet
 - (vii) instructional gratifications derived from use of the Internet
3. The main barriers to higher levels of instructional integration of the Internet as expressed by more of the early adopters are lack of adequate computer hardware and non-accessible Internet links at the teacher training colleges. The other barriers that are troubling more of the early adopters are lack of maintenance and breakdown in computer and Internet hardware and software as well as the lack of pedagogical skills in utilizing the Internet for instructional purposes. On the other hand, more than half of the late adopters are concerned about acquiring basic Internet training
4. A high number of the early and late adopters indicated the need for Internet access that is strategically placed in the education departments or in special rooms.
5. An equal number of early and late adopters also expressed the need for more serious incorporation of the Internet in the education syllabus in the teacher-training curriculum via modifications of the current assessment procedures for Internet-integrated work.

5.5 Limitations of the Study

This study focused on examining the extent of integration of the Internet and its applications among education teacher trainers in the teacher training colleges in the Klang Valley. Although this study has made progress in answering the research questions, these results should be interpreted with awareness of some of its methodological limitations.

The first limitation is related to the small sample size of fifty education teacher trainers. Therefore, it may not be appropriate to generalize the overall results to a larger population, which may give a more comprehensive picture of Internet integration. Moreover, Internet applications that are being utilized and the methodologies of integrating these applications may differ for bigger samples. However, this sample size was crucial for the study as it was conducted only among education teacher trainers in the five teacher training colleges in the Klang Valley and Internet availability was also a prerequisite for this study.

One more limitation of the study is that not all the early and late adopters were interviewed because of restrictions of time and cost. However, for the purpose of making recommendations for plans for the incorporation of the Internet in the teacher-education curriculum, the sample size for the interviews can be regarded as adequate.

Another limitation of the study is that the results cannot be generalized and applied to the other teacher training colleges outside the Klang Valley. Although Internet access is available in these colleges, it would not be appropriate to compare this sample to education teacher trainers outside Klang Valley since the Internet availability levels in these teacher training colleges and the demographic attributes as well as the self-perceived Internet competencies of the education teacher trainers may be different.

One more drawback of this study is that it is carried out only among the education teacher trainers in the Klang Valley. Teacher trainers from the other

disciplines in the teacher training colleges were not included in the study. Teacher trainers from other disciplines may be integrating the Internet into the teacher-training syllabus in different ways and at different intensities from the education teacher trainers.

Another limitation of this study is the fact that the extent of Internet integration was only investigated in the time frame of one academic semester. Internet integration patterns that are investigated over longer time frames may yield a more accurate picture of the incorporation of the Internet and its applications by education teacher trainers.

5.6 Recommendations of the Study

The findings of this study on the extent of Internet integration in the teacher-training curriculum in the Klang Valley are relevant in view of the recent move taken by the Malaysian Teacher Training Division to provide direct Internet access in every classroom and lecture hall in five teacher training colleges in West Malaysia under a pilot 'Campus Networking Project' by December 2002 (Campus Networking Project Blueprint, 2000). Two out of the five selected teacher-training colleges are located in the Klang Valley. Eventually, this project will be expanded to the other twenty-five teacher training colleges in Malaysia. Using the findings of this study as a point of reference, the Malaysian Teacher Training Division can design effective strategies to ensure that its teacher trainers are ready to incorporate Internet innovation into the teaching and learning process.

As part of this study, it is proposed that six main steps be implemented in the teacher education sector, namely; a) Internet training structured to the needs of early adopters, b) Internet training structured to the needs of late adopters, c) utilization of early adopters in Internet training programs, d) review of the education syllabus, e) trouble shooting and maintenance course training and f) Internet access be installed in education departments or in special rooms.

5.6.1 Internet Training Structured to the Needs of Early Adopters

The findings of the study revealed that early and late adopters indicated the need to acquire different types of Internet competencies (Table 4.48). As such, there is a need for the relevant authorities to provide differentiated Internet training to meet the requirements of both groups of teacher trainers. The interview data also indicated that the early adopters were keen in mastering more advanced Internet skills. Thus, the main recommendation of this study is for the Teacher Training Division (*Bahagian Pendidikan Guru* or BPG) of Malaysia to design structured Internet training programs that cater specifically to the needs of the early adopters.

The structured Internet training programs should be targeted initially at the early adopters because the findings of the study indicated that these groups of teacher trainers are already convinced about the benefits of integrating this new technology in the education syllabus in the teacher-training curriculum. Another reason why the early adopters should receive this specialized training is related to the fact that the interview data of this study indicated that some of the late adopters in the study were persuaded to use Internet innovation when they saw the early adopters utilizing it in different ways in the teaching of the education syllabus. The data analyses in the case studies also revealed that an early adopter is already helping out a few of her colleagues who are late adopters in matters pertaining to the instructional use of the Internet. According to Rogers (1995), early adopters help to increase the observability and trialability of technology integration in an educational organization.

The components of the structured Internet training programs for the early adopters should focus on three main aspects; namely, i) Internet competencies specific to needs of early adopters and ii) hands-on pedagogical methods of direct and indirect modes of Internet integration.

The first aspect of the structured Internet training programs for the early adopters who have higher levels of self-perceived-Internet competencies is to get more training in

newsgroups, listservs and file transfer protocol applications as well as web building and web publishing skills.

Training in the use of the listserv application would enable early adopters to send and receive group mailings and post messages to discussion groups and locate subject specific discussion groups as well as create their own mailing lists. The exposure gained from the structured Internet training would also allow the early adopters to integrate their own course-specific Listservs in the teaching and learning process.

Meanwhile, training in the use of the newsgroup application would enable early adopters to send group mailings, post messages for discussion groups, utilize applications such as Nuntius, Newswatcher or the News feature on a World-Wide Web browser as well as utilize interactive online newsgroups to connect them electronically outside of the classroom.

As part of the structured Internet training, the early adopters should also be taught to use an Ftp client to upload files to a server as well as be able to compress files in Zip, Exe, and/or PDF formats. The information retrieved via the ftp files can be utilized as teaching and learning resource by the early adopters with their students.

With their web building and web publishing skills acquired via the Internet structured training programs, the early adopters would be able to produce presentations incorporating various multimedia elements such as sound, video clips, and graphics. As a result, the early adopters would be able to post education notes and teaching and learning activities more creatively in their respective college homepages.

This recommendation is considered pertinent by the researcher in view of the launch of the College Homepage Project that is currently being initiated by the Malaysian Teacher Training Division.

Another aspect of the structured Internet training program for early adopters should focus on the acquisition of hands-on pedagogical methods of integrating the Internet into teaching and learning. Such training courses designed for the early adopters

can be based on models of Internet training as advocated by MacMillan *et al* (1999). In this model of exemplary Internet training, teachers were involved in its design and the training was designed to respond to differences in teachers' Internet expertise. There was also continuous professional development rather than loading Internet training into a few restrictive sessions. Teachers also had opportunities for self-directed exploration of software as well as hands-on training in utilizing Internet-related pedagogies.

A similar hands-on training in utilizing Internet-related pedagogies should be given to early adopters since the interview data revealed that they had expressed the need for more serious incorporation of the Internet in the teacher-training curriculum.

As part of the structured Internet training program, hands-on pedagogical methods involving both the indirect and direct mode of Internet integration should be included. Indirect mode of Internet integration could involve the early adopters getting trainees to interact with key pals via the e-mail application so as to share ideas about the various topics outlined in the education syllabus or an expert in one of the fields pertaining to the education topics that trainees are researching as part of their coursework projects.

Another indirect mode of Internet integration that can be incorporated in the structured training programs for the early adopters is showing them how to join existing online teacher education projects on web sites set up for teacher educators to post projects. Early adopters can learn to browse through the current online projects and identify projects that fit their instructional objectives in the education syllabus.

The direct mode of Internet integration, on the other hand, should involve training the early adopters to utilize the computers with Internet access, the LCD projectors and screens set up in the classrooms and lecture halls.

As such, the early adopters need to be exposed to hands-on methodologies of using online Internet connection that is linked to a LCD projector or to a large TV, which acts as a multimedia chalkboard. Therefore, it is imperative that they be trained in the techniques of displaying Internet visuals via a LCD projector in lecture hall

settings. Some of these include enlarging the text using Netscape preferences-fonts so that information displayed can easily be read by the teacher trainees sitting farthest away. The early adopters should also be exposed to the techniques of modifying the background color of selected websites such as making the text dark and the background white using Netscape preferences-color. These skills are especially useful when the selected websites by the early adopters have a busy background or if the designer has used colors with poor contrast. Although this recommendation stresses more on the technical aspects of integrating Internet innovation directly in the teaching of the education syllabus, it is deemed relevant by the researcher as the effectiveness of the teaching and learning process in an Internet-integrated environment depends heavily on its visual presentation and effects.

The early adopters should also be given hands-on training on how to design web-based teaching and learning activities that incorporate graphic organizers and worksheets with the relevant questions so that the online time of teacher-trainees remains focused on the intended objectives of a lesson. At the same time, they should be taught how to facilitate the note-taking process of the trainees in an online classroom. As such, it is hoped that with the structured Internet training, the early adopters would be able to utilize the correct methodologies in preparing work sheets pertaining to the web sites that are displayed online for their trainees. It is also hoped that early adopters would eventually be able to plan teaching and learning activities, which relate to the discussion of the contents and ideas presented in online websites and their relevancy to the topics in the education syllabus.

In relation to Internet integration, which is to be carried out directly with a computer connected to a LCD projector, some hands-on Internet-based activities are also proposed by the researcher for inclusion in the Internet structured training programs designed for the early adopters.

For example, one such activity is to train early adopters to display news about current events pertaining to the topics outlined in the education syllabus. This is related to the fact that one of the strengths of the Internet is its ability to provide current information on a variety of topics, as there are numerous online television, radio and newspaper sites available.

Hence, the early adopters should to be exposed to hands-on pedagogical methodologies of utilizing websites that screen for news in this direct mode of Internet integration. They also should be exposed to techniques, which involve procedures such as visiting these news sites beforehand and verifying the time of the news program to ensure that it ties in with their lecture time. They also need to acquire the skills of checking on the appropriateness of the content of the news web sites and their relevancy to the teaching of the education syllabus.

Another way in which the Internet can be utilized directly in lecture hall settings is for the early adopters to select more resources for the coursework portfolio research projects of their trainees. This is related to the fact that students are currently required to source resources from the Internet as part of their research projects and assignments.

As such, it is recommended that early adopters be exposed to hands-on pedagogical modes of integrating the Internet for researching information directly from the Internet. Such pedagogical methodologies would entail the early adopters carrying out advance work to locate specific websites relating to the topics of the research projects of their trainees.

After compiling these websites, the early adopters should be taught the techniques of launching Netscape with the addresses of these websites in the form of bookmarks of a start page. Such pedagogical exposure would enable the early adopters to maximize the timing for this Internet-integrated activity in the lecture hall optimally as these websites can be screened on the LCD projector as soon as a lecture commences.

It is also recommended that in the direct mode of Internet integration, the early adopters be trained in hands-on pedagogical methodologies that are rooted in collaborative learning environments, which rely on group discussions rather than one-to-one mentoring. The rationale for this is that the early adopters need to focus on constructive pedagogies that stress on exploring questions via reflect and respond methodologies as they have been found to enhance Internet integration (Becker & Anderson, 2001). Therefore, constructive pedagogies would aid to the knowledge building process and provide intrinsic motivations for the early adopters to utilize Internet innovation directly in the teacher-training curriculum to achieve a more focused and professional learning experience.

5.6.2 Internet Training Structured to the Needs of Late Adopters

A study by Sherry (1998) found that early adopters among faculty members at the School of Education at the University of Colorado tended to be intrinsically motivated, whereas late adopters often required extrinsic coercion for instructional uses of the Internet. Thus, bearing this in mind, it is further recommended that relevant personnel in-charge of incorporation of IT in the teacher-education sector should take the initiatives to provide the “external coercion” by looking into the exact training the late adopters need to acquire to integrate the Internet into the education syllabus.

This is related to the fact that the findings of this study revealed that there were significant differences between the early and late adopters in their self-perceived Internet competencies, with the early adopter having higher Internet literacies (Table 4.25). Thus, this study recommends that the Teacher Training Division of Malaysia design a separate structured Internet training program to specifically suit the needs of the late adopters. This recommendation is also in accordance with Herring’s (1999) observation that after undergoing structured Internet training, the late adopters were

more confident to utilize the different Internet applications in the teaching and learning process.

The components of the structured Internet training programs for the late adopters should be carried out in two phases, namely; i) short-term structured Internet training programs and ii) long-term Internet training programs

For the late adopters whose self-perceived competencies of the Internet are still at a low level, it is recommended that the short-term structured Internet training programs expose them to basic computer literacy courses before introducing them to the various Internet literacies. This is related to the fact that the *interview data* revealed that some of the late adopters were still submitting handwritten work to the early adopters. Hence, this research study recommends that the short-term structured Internet training programs encompass training in basic computer literacy courses which would enable late adopters to be familiar with Windows operations and to open, type, edit, save and print documents using Microsoft Word as well as do classroom presentations using Microsoft Power Point.

The late adopters should also be taught how to use Microsoft Excel, as this training would enable them to tabulate tables and computer-generated graphs. As part of the structured Internet training, the late adopters should also be exposed to basic Internet literacy courses that would enable them to conduct an efficient search for Internet resources using directories like Yahoo or search engines like Excite, Lycos, or Infoseek as well as to use advance search commands to specify and limit the number of search hits. With the search skills acquired via the structured Internet training programs, the late adopters would be able to use a variety of search strategies including the use of Boolean searches to help target a specific search on the Internet.

As part of the structured training, the late adopters should also be trained in the use of the e-mail application and its different services. It is hoped that this exposure

would enable them to utilize the attachment feature in the e-mail, keep an address book as well as maintain mail folders in an organized manner.

The late adopters should also be taught how to use the listserv application. Training in the use of Listserv application would enable the late adopters to subscribe and unsubscribe easily to discussion groups. The late adopters should also be exposed to the techniques of using the newsgroup application, as this training would enable them to read and navigate through newsgroups easily.

Training in the Ftp application is also deemed vital for the late adopters, as it would enable them to find files to Ftp by using applications such as Archie or Anarchie and to manually use Ftp files.

It is also recommended that the short-term structured Internet training programs for the late adopters be designed to progress from basic operations to advance operations for each of these computer and Internet competencies.

Based on the existing grouses of the late adopters from the interview data, it is also recommended that the short-term structured Internet training programs be held on a regular and uninterrupted basis. There should also be constant follow-up and monitoring of the computer and Internet competency levels of the late adopters by the personnel in charge of these training programs.

In relation to the structured Internet training programs for the late adopters, it is also recommended that the Teacher Training Division conduct its training programs as soon as it possibly can in view of the developments in the new Remuneration Scheme recently initiated by the Government of Malaysia. Under this scheme, one of the requirements for educators to be promoted will depend on the number of professional courses that they attend. Hence, the late adopters would now be more motivated to attend any computer and Internet training courses that are organized by the Malaysian Teacher Training Division.

This research study also recommends that long-term Internet training programs be carried out for the late adopters by the Teacher Training Division to ensure that there is a systematic follow-up to the short-term structured Internet training programs.

The findings of the study indicated that both the early and late adopters indicated the need for discussion forums on the use of the Internet to be held regularly in the different teacher training colleges (Table 4.48). As such, as a long term measure, it is recommended that discussions on Internet integration between early adopters and late adopters be held on a regular and on-going basis as a means for early adopters to share their experience, skills and knowledge to further enhance the integration of the Internet among the late adopters in the teacher-training curriculum.

Another recommendation that is suggested in the long-term Internet training programs is for college administrators to ensure that late adopters who have acquired the desired level of basic computer and Internet literacy to attend the same structured Internet training programs designed for the early adopters.

As such, it is hoped that the short term and long-term recommendations specifically targeted for the late adopters would ensure that Internet innovation is diffused among all the education teacher trainers and not just restricted to the early adopters.

5.6.3 Utilization of Early Adopters in Internet Training Programs

The findings of the study revealed that the early adopters had adopted Internet innovation in creative ways in the teacher-training curriculum. However, none of the late adopters had initiated similar methods of incorporating the Internet into the teacher-training curriculum (Table 4.46).

Hence, early adopters play a very important role in the teacher training colleges as they play a pivotal role in the utilization of Internet innovation in their teaching. Consequently, by observing the early adopters, the late adopters would be less skeptical

and be more enthusiastic about incorporating this innovation in their own teaching. As such, this study recommends that recognition be given to early adopters who initiate Internet-based methodologies in the teacher-training curriculum.

This is related to the fact that the findings of the study showed that about half of the late adopters are already in the familiarity and confidence stage of integration of the Internet. In accordance with Rogers' (1995) diffusion of innovations theory, this group of teacher trainers are the next target group to adopt Internet innovation as they are already partly convinced about the perceived benefits of utilizing this innovation in the teaching and learning process.

Hence, by utilizing early adopters in Internet training programs, the late adopters can be further convinced to adopt Internet innovation into their own teaching. This is related to the findings of Jacobsen (2000) who found that if early adopters modeled or demonstrated strategies for successful uses of technology one-on-one or with small groups of their mainstream peers, the technology gap between the convinced and the unconvinced would be addressed.

In relation to this, it is recommended that administrators in the teacher training colleges in the Klang Valley make early adopters central figures in future Internet training programs, by providing them opportunities to be key personnel members in Internet-related staff development programs held either at college or department level. According to Rogers (1995), early adopters frequently serve as opinion leaders who can persuade others to adopt the innovation by providing evaluative information (Rogers, 1995).

MacMillan *et al* (1999) also advocated that in successful exemplary Internet training, stating that early adopters should deliver most of the training sessions. As such, in future Internet training programs, the early adopters should also be given opportunities to model ways in which they have incorporated Internet innovation into the education syllabus to the late adopters. Some of these efforts should include

extended uses of the e-mail in instruction and practicum experience as well as uses of the WWW for academic, professional and extra-curricular activities in the education syllabus. As such, through such collaborations and discourse, the instructional uses of the Internet of the early adopters can be extended to the late adopters.

This is also in line with the findings of Macmillan *et al.* (1994) who advocated that early adopters had the characteristics to convince other teachers to integrate the Internet in the instructional process. As early adopters are strong believers in the value of the innovation they are demonstrating, they can consciously try to persuade mainstream adopters and late adopters that they would also be successful in similar endeavors.

5.6.4 Review of the Education Syllabus

With regard to incorporating the Internet in the education syllabus, the findings of the study revealed that more of the early adopters were ready for the Internet to be integrated in the education syllabus in a more structured and systematic manner. However, considerably fewer of the late adopters had similar intentions. Therefore, to further close the technology chasm between the early and late adopters, another recommendation for the Malaysian Teacher Training Division is to review the education syllabus in the teacher-training curriculum to further enhance the integration of the Internet.

This is related to the fact that both the early and late adopters are aware of the fact that Internet integration into the education syllabus has not reached its highest potential. This was shown in the interview data where both groups of teacher trainers indicated the need for stricter Internet assessment-based procedures in the teacher-training curriculum to increase Internet use among educators in the teaching and learning process (Table 4.48).

Currently, marks allocated for Internet-integrated work are too insignificant to motivate some of the teacher trainees. Moreover, the late adopters tend to focus less on the Internet integrated component, as the weightage given to this component is only ten to eleven percent of the total coursework and the fact that it is not compulsory for students to source articles from the Internet as they can also refer to the other bibliographic sources for their coursework portfolios.

In line with this, more emphasis should be accorded to Internet-related work in the education syllabus. As such, this study recommends that the Teacher-Training Division increases the weightage accorded for the Internet component in future education coursework and assignments pertaining to the education syllabus in the teacher-training curriculum.

A specific example of how this recommendation can be carried out is based on the present Semester 3 Diploma in Education Program pedagogy coursework outline shown in Appendix T. This outline has been prepared for pre-service teachers registering for this course in the 2003 academic session. This education coursework consists of two questions. As it can be seen in Appendix T, the total weightage for the bibliography section is eleven out of fifty marks allocated for this coursework. In this section, teacher trainees are directed to source material from various print sources and the Internet. However, sourcing materials from the Internet is not made a compulsory endeavor among the teacher trainees, as they are free to choose any three bibliographic source of their preference.

Therefore, to further enhance the incorporation of Internet innovation in the education syllabus, it is recommended that the weightage for the Internet-integrated work in the education syllabus be increased from eleven to sixteen marks for the two questions as shown in Appendix U. It is also recommended that the teacher trainers make finding sources from the Internet compulsory by specifying the exact number of websites that the teacher trainees have to refer to in their coursework (Appendix U). To

further motivate the teacher trainees to use the Internet, it is also recommended that they be awarded higher marks for articles that are sourced from the Internet as compared to articles that are acquired from other sources (Appendix U).

It is further recommended that teacher trainers validate the relevancy and authenticity of the websites submitted by their trainees before awarding them marks for the references that are sourced from the Internet.

Hence, measures such as these will encourage or 'force' the educators, especially the late adopters to use Internet innovation and they will be able to see the perceived benefits of utilizing this new technology in the teacher-training curriculum. It will also ensure that both teacher trainers and their trainees give more serious attention to the incorporation of the Internet in the education syllabus.

5.6.5 Trouble Shooting and Maintenance Course

The findings of the study also showed that more of the early adopters faced problems that were related to maintenance of existing hardware and trouble shooting support from the college authorities (Table 4.47). The findings of the study also showed that the early adopters indicated the need for an electronic maintenance officer in their respective teacher-training colleges because they did not have the time nor the expertise to handle problems dealing with breakdowns in computer and Internet connections.

Hence, this study recommends that Internet training encompass courses pertaining to maintenance and trouble shooting with Internet-related methodologies, as they are deemed vital when educators adopt instructional media into their teaching.

For example, Kaur (2001) in her dissertation, suggested that Malaysian teachers should be taught how to identify simple computer hardware problems and rectify these problems.

A long term and more effective recommendation for this problem would be for teacher training colleges to employ full time expert maintenance officers to rectify

troubleshooting problems so that early adopters can be relieved of these mundane tasks and concentrate on enhancing their pedagogical skills and methodologies of integrating the Internet into the teaching and learning process.

5.6.6 Access to the Internet

The findings of the study also proved that home access had a significant influence on the integration of the Internet in the teacher training colleges in the Klang Valley (Table 4.21). This implies that there is potential of home Internet ownership to fulfill many of the requirements of the teacher-education curriculum. Therefore, it is recommended that college authorities look into ways to encourage the late adopters to purchase computers under the special computer loan scheme initiated by the Malaysian government for educators in the country. There is also a need for the Teacher Training Division to probe further into the frequency and purposes of home Internet use of teacher trainers and how it can be capitalized to promote higher rates of Internet integration in the education syllabus in the teacher-training curriculum.

With regard to the relationship between Internet access and Internet integration, the findings of the study showed that current access to the Internet at the teacher training colleges was not a significant factor in the integration of the Internet in the teacher-training curriculum (Table 4.21). The findings of the study indicated that this was due to the physical location of the Internet access, which was restricted to computer laboratories and libraries in the teacher training colleges in the Klang Valley.

With regard to physical access, this study recommends that personnel who are in-charge of installing computers with Internet access in the teacher training colleges to ensure that these are located within easy reach of the teacher trainers so as to maximize the rate of incorporation of the Internet and its applications into the teaching and learning process. To further maximize the rate of incorporation of the Internet in the teacher-training curriculum, it is also recommended that a policy of one computer per

teacher trainer be implemented in the education departments of the teacher training colleges in the Klang Valley.

However, if this is not feasible, it is recommended that administrators in the teacher training colleges prepare a resource room with adequate computers with Internet links that it is located on the same floor as where the departments of the teacher-trainers are located.

The rationale for this recommendation is that if the facilities are within reach, teacher trainers will be more motivated to use the Internet. Consequently, the teacher trainers would be able to utilize the computers in this resource room to check on their e-mail accounts and to interact with other educators and professionals who are based locally and overseas. They also would be able to download lesson plans as well as post lecture notes pertaining to the education syllabus on the WWW as a source for student reference.

By engaging themselves in these Internet-related activities, the late adopters especially can derive more professional and instructional gratifications and develop more positive refocusing attitudes towards Internet innovation as these factors are contributing positively to the integration of the Internet in the teacher-training curriculum. Therefore, remedial measures such as these would help to bridge the existing technology gap between the early and late adopters in the teacher-training colleges in the Klang Valley.

Thus, it is hoped that the set of recommendations suggested would be useful for developing guidelines for the design of Internet-related professional development initiatives, especially for the late adopters who are just beginning to integrate Internet innovation into the teaching and learning process.

5.7 Suggestions for Further Research

Internet innovation appears to be widely diffused among respondents who are early adopters as far as professional and instructional tasks are concerned. On the other hand, the late adopters were utilizing the WWW more for personal purposes although they claimed to have more Internet access in the teacher training colleges in the Klang Valley.

Therefore, further research needs to be carried out on the roles of early adopters in adopting IT innovations in Malaysian educational settings and to what extent they influence their counterparts in accepting new technologies in their teaching.

Late adopters still do not have compelling reasons to integrate Internet into their teaching. This could also be attributed to the lack of readiness among the late adopters to accept and incorporate Internet innovation in their teaching. As such, it is suggested that future research studies investigate the Internet readiness levels of the late adopters before asking them to integrate this innovation into their teaching.

Under the Campus Networking Project in selected teacher training colleges in Malaysia, Internet access of the lecturers would be greatly enhanced. Thus, it is recommended that further research be undertaken to investigate if this increased Internet access will bring about a higher rate of incorporation of Internet innovation in instruction among the education teacher trainers.

Currently, the direct use of the Internet among the early adopters is still minimal and non-existent among the late adopters. More research also needs to be conducted on direct modes of Internet integration in classroom settings. There is also a pressing need to increase the observability of the instructional use of the Internet in a direct manner in the teacher-training curriculum.

Thus, it is recommended that future researchers study the implementation of Internet-based strategies in real classroom situations via observation techniques. This study only utilized interview techniques. However, studies utilizing observation

methodologies in the mode of use of the Internet will provide a more accurate, reliable and up-to-date picture of how the Internet is being incorporated directly in the teacher-education sector. It would also yield a wider range of results that would give insights into the different pedagogical methods of integrating the Internet directly into the instructional process.

Further research studies, which engage in experimental research design, should also be carried out to determine the most effective pedagogical methods of integrating the Internet into teaching and learning and learning process.

As this study only investigated two case studies from one of the teacher training colleges, it is recommended that more research be carried out on profiles of teacher trainers who qualify as early adopters in the various disciplines from the different teacher training colleges in the Klang Valley as this will give deeper insights into the factors that motivate these teacher trainers to adopt and integrate Internet-related technologies into the teacher training curriculum. Profiles of late adopters among the teacher trainers can also be studied to understand their reluctance to incorporate the Internet in their teaching and to facilitate comparisons with early adopters.

The current survey concentrated on teacher trainers. A similar research study can also be carried out in Malaysian university settings since educators in higher education in Malaysia are also moving towards the use of Internet innovation in the teaching and learning processes.

Follow-up research studies can also be carried out to evaluate Internet integration levels of in-service teacher trainees in the school curriculum. This is related to the fact that these teacher trainees are exposed to computer technology courses in the teacher-training curriculum. It is also suggested that the Internet Integration Checklist (IIC) be utilized to ascertain the integration levels of these teachers in the primary school curriculum. In relation to their current integration level, further research can also

be carried out to determine as to how far teacher trainers influence their trainees to incorporate Internet innovation into the teaching and learning process.