Malaysian Online Journal of Instructional Technology Vol. 2, No.2, pp 27-40
August 2005
ISSN: 1823-1144

Innovation for Better Teaching and Learning: Adopting the Learning Management System

Nor Aziah Alias & Ahmad Marzuki Zainuddin
Institute of Education
International Islamic University Malaysia
Jalan Gombak, 53100 Kuala Lumpur,
Malaysia
noraziah@iium.net, marzuki@iiu.edu.my

Abstract

Planning for innovative teaching and learning technologies incurs more than just budgeting and coming up with figures that serves well in the top management's eyes. A common mistake made by educational practitioners in planning and implementing new technologies is to enthusiastically select a technological medium and imposing its use to solve educational problem when the staff are not being prepared well in advance nor are they kept on alert so they could be regularly integrated into such projects. This paper describes the concerns of a group of International Islamic University Malaysia (IIUM) lecturers regarding a technological innovation. Hall & Hord's stages of concern questionnaire (SoCQ) is employed for the purpose of gauging the participants' concerns about the use of a learning management system. An interesting show of positive attitude and open mindedness was observed from the participants' response despite them being from a predominantly traditional teaching environment.

INTRODUCTION

In the field of instructional technology, research on new innovation has focused on both the diffusion and adoption process. Scenarios of non utilisation of instructional technology by educators are not uncommon. Teachers have been said to reject technology and resist change. Ironically, they have also been coerced or perhaps, forced into adopting instructional technology innovation through directives from the education ministry. It is pertinent to understand both the diffusion and adoption process in order to ensure the success of implementing new technology in the educational setting.

General diffusion theories have been employed to build theories specific to instructional theories. Surry (1997) describes two major categories of instructional technology related diffusion theory, namely systemic change theories and product utilisation theories. Based on the philosophical view of technology as instrumentalism and determinism, two subcategories are created: (1) Developer Based Theories and (2) Adopter Based Theories. While the developer based theory's goal is to increase diffusion by maximising the efficiency, effectiveness and elegance of an innovation, the adopter based theories based on human, social and interpersonal aspects of innovation diffusion. This paper will focus on the adopter aspects of the diffusion process. It does not seek to address macro theories of organisational change, in this case the educational institution. It pertains only to the micro aspects of increasing the adoption and utilisation of a specific instructional product.

The purpose of this report is two fold. First, it provides an insight to the innovation that is a change in the learning system, specifically the use of the learning management system. The Learning management system (LMS)' s features and benefits are briefly discussed with respect to its possible adoption in the International Islamic University Malaysia (IIUM) postgraduate teaching and learning context. Secondly, the paper reports the results of a mini research that describes the phases in adopting educational change and to gauge the stage of concerns among the Institute of Education (INED) lecturers.

The scope of inquiry for this study is the INED's academic staff where only the early processes of diffusion will be evaluated since there is no formal directive from the management regarding the adoption of LMS in INSTED or IIUM for that matter.

The Learning Management System

A learning management system (LMS) is a software application or web-based technology used to plan, implement, and assess a specific learning process. Typically, a learning management system provides an instructor with a way to create and deliver content, monitor student participation, and assess student performance online. The LMS may also provide students with the ability to use interactive features such as threaded discussions, video conferencing, and discussion forums. LMS is also called Course Management System, or CMS. In the IIUM context, the learning management system is referred to as the IIUM LearningNet System.

The LearningNet system can do more than store contents and student information - it can be used to inform them of their obligations and to point them to appropriate learning resources. It tracks a student's progress, his or her completion of tasks assigned and provides tools for collaborative work. IIUM first adopted the learning management system for the provision of distance education that encompasses a high percentage of online learning. Almost often, facilitating an online or e-learning course involves managing an asynchronous discussion forum, a synchronous chat and e-mails. These among other tenets of e-learning system promotes interaction, a significant aspect of online instruction especially if there are minimum face –to-face sessions or none at all.

As e-learning takes centre stage in adult education, the pedagogical challenge of the online facilitation grows with the new developments of exciting e-learning technologies. Alongside with the emergent computer communication technology such as voice and streaming video, the role of the learning management system is further enhanced.

Besides IIUM, many Malaysian institutions of higher learning have also embarked in distributed learning that involves using various information technologies to help students learn. The LMS has been roped in as the platform for delivery which may take the form of course enhancement, hybrid learning and virtual classrooms.

In the case of hybrid delivery in IIUM, the instructor uses the LMS to provide more than just retrieval of his or her lecture. The student may be required to view introductory materials before attending a particular class session. These learning materials can also be made available for use in other courses by other faculty, multiplying their usefulness as teaching tools.

The MiTech Learning Management System in IIUM

The MitechPlus Learning Management System is a web-based integrated e-learning solution which consists of portfolio (courses) management, learning resources and learning portal system. Users are able to subscribe to courses (portfolios) available in their learning resources. Authorised users such as lecturers or administrators will be able to create and manage these portfolios from anywhere in the world. Portfolios may be in the form of courses, projects, tasks, clubs, communities etc. Originally, outsiders who do not have their account in the system may also join and subscribe to the portfolios available by accessing system. However, IIUM has since ruled against adapting the learning portal system as the university wanted only authorised individual and facilitators to use the system.

The benefits that it brings to the lecturers include:

- Time saving
- Organisation of lectures materials
- Provision of good and effective ways to evaluate students
- Enhancement of interaction between lectures and students by linking LearningNet to the existing IIUM email system.
- Provision of extra resources for lectures

To the students, the MiTech LearningNet System benefits through:

- Provision of easy access to the subject material
- Enhancement of students' abilities to use technology
- Increment in interaction between among student and lectures
- Provision of more educational resources

Most importantly, it has the potential to foster collaborative work and community building among members of the institution.

Diffusion and Adoption of Instructional Technology

Rogers as cited in Kosma (2003) introduced the theory of adoption of technology, *Diffusion of Innovations*, in 1960 , some forty years back; yet it has become a framework used frequently in publications and discussion for introducing new technology to academic staff.

Diffusion is defined as 'the process by which an innovation is communicated through certain channels over time among the members of a social system. In Roger's view, it is a kind of social change. Rogers' theory of individual suggested that people are inherently more or less predisposed to innovative behaviour. He theorised that individual adoption rates of innovation are usually distributed along a bell-shaped curve and can be grouped under five categories: innovators, representing 2.5% of the population; early adopters, representing 13.5% of the population; early majority, representing 34% of the population; late majority, representing 34% of the population, and laggards, representing 2.5% of the population.

The diffusion process outlined by Rogers (1995) has five steps as follows:

1. Knowledge
2. Persuasion
3. Decision
4. Implementation
5. Confirmation

According to this theory, potential adopters of an innovation have to learn about an innovation and be persuaded to try it out before making a decision to adopt or reject the innovation. Following adoption and implementation, the adopters decide to either continue using the innovation or stop using it. This theory shows that adoption is not a momentary, irrational act, but an ongoing process that can be studied, facilitated and supported.

With respect to innovation in education, a university of Adelaide survey on factors influencing the adoption and use of web-supported learning management system by academic staff found that respondents who had not used web-based teaching tools had a general desire to do so, and disclosed some of the barriers to their adoption of these tools. Prominent issues included (Shannon & Doube, 2003):

1. concerns about the quality of teaching and learning using web-based tools
2. concerns about lack of skills and knowledge
3. the need for staff development and training
4. pressures of work inhibiting use of web tools
5. the need for support from managers

A study conducted at a large research university in Canada confirmed a gap between early adopters and mainstream faculty (Anderson et al,1998). It concluded that 'comprehensive adoption strategies cannot be based on support of early adopters, but must be designed to appeal to the mainstream faculty', drawing from the mainstream faculty the role models that are essential for the diffusion of innovation, staff who are 'better integrated into the traditional administrative and social norms of faculty culture'.

While the work of the early adopters, their knowledge, skills and experience, can be built upon, the focus needs to be on the mainstream majority and the support they require. Wilson & Stacey (2003) propose a staged approach to the appropriation of technology, with design of a staff development programme that uses incremental steps to match readiness levels of the mainstream staff and exposes them to a less-risky journey. Wilson & Stacey (2003) further espouse the need for clear definition of the entry-level technical skills of academic staff and the content appropriate for each step. Several other approaches may be taken when disseminating new idea among academic staff. The attributes of adoption of an innovation can be used. If the reasons why they are more inclined to accept an innovation are analysed and emphasised, the potential advantages for staff, students and the institution can be provided as a credible rationale.

A focus on local and discipline-based ideas and practices, peer support and mentoring approaches can provide a relevant approach to staff development. When staff practices the newly learned skills as they are needed, and seek expert or experienced pedagogical advice as it is required, staff development will be relevant and implemented.

Roger's theory is regarded as a general diffusion theory. Surry & Farquhar (1997) divide diffusion theories into two broad categories – general diffusion theories, which are applicable to a wide range of organisations, and instructional technology diffusion theories, which are specific to innovations in instructional settings. A number of instructional technology diffusion theories have been developed in the past twenty years. These include (1) Burkman's (1987) User Oriented Instructional Development Model, (2) Concerns Based

Adoption Model (CBAM) developed by Hall & Hord (1987), (3) Ely's (1990) Conditions that Facilitate Implementation, (4) Critical Factors in Adoption Checklist developed by Stockdill & Morehouse (1992) and (5) Adoption Analysis developed Farquhar & Surry (1994).

Hall et al (1973) examined the failure of educational innovations to achieve widespread adoption. One explanation was that innovation adoption was not understood to be a developmental process in which the concerns of individual adopters and the relationship of these concerns to organisational structure and support played a major role. They felt that the complexity of educational innovation coupled with the individual differences in each organisation, classroom and teaching style was a large factor. Hall and Hord (1987) later characterised the **adoption process** known as the Concerns-Based Adoption Model (CBAM). Figure 1.0 shows the components of CBAM adapted from Hall and Hord (2001, p. 208).

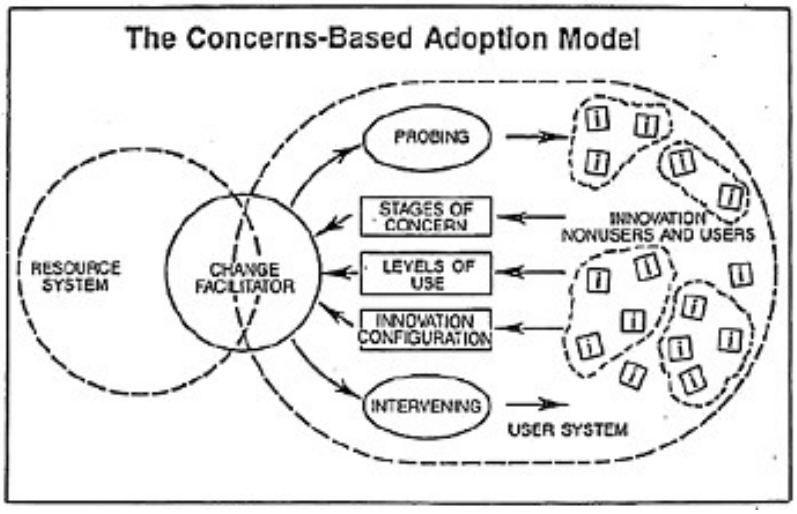

Figure 1: The Concern Based Adoption Model (Adapted from Hall & Hall (2001)

CBAM model has been employed in research, some focusing only on the stages of concern while others consider both the stages of concern and levels of use. The stages of concern proposed by the CBAM model are:

1. Awareness
2. Informational
3. Personal
4. Management
5. Consequence
6. Collaboration
7. Refocusing

Al Shammari (2000) for instance, carried out a survey on 248 teachers in Kuwait using the stages of concern questionnaire (SoCQ)and found the teachers to have four high concerns related to collaboration, personal, refocusing, and informational stages when the

Information Technology curriculum was implemented. He also reported low concerns at the management and awareness stages. Female teachers had higher concerns about management; males had higher refocusing concern. Al Shammari suggested further research to continue validation of the SoCQ in Arabic cultures.

On the other hand, in their study of 27 teachers and 6 administrators from three primary schools in Ankara, Askar & Usluel (2001) found 30% of the teachers showed no interest in using computers, 40% of the teachers had concerns between awareness and personal while 30% the teachers had management concerns. However, concerns may change due to better awareness or familiarisation with the innovation at hand. Theodore et al (2003) found significant changes in all seven dimensions of K-12 teachers' concerns about technology integration after they participated in a graduate online course.

An insight into the INSTED Lecturers' stages of concerns

The purpose of the research is to gauge the stages of concerns regarding the use of MiTech LearningNet System among INSTED lecturers. The participants may be regarded to belong to a rather traditional social system in the sense that their jobs are not highly complex and do not warrant the usage of technology. The traditional style of teaching is common and sufficient; most lecturers do not really need to indulge in new technologies.

The Concerns Based Adoption Model (CBAM) forms the theoretical framework of this research. The CBAM model is composed of three parts: (i) stages of Concern (ii) levels of Use, and (iii) innovation Configuration. Stages of Concern deals with expressed adopter concerns and issues related to his or her experience with, or perception of, the innovation. The purpose of this part is to analyse user (INSTED lecturer) feelings, observations, problems, successes, and failures while progressing through the change process of innovation adoption. This analysis should allow change facilitators and the director of INSTED to determine the readiness of lecturers to embrace the innovation. CBAM has seven Stages of Concern about the Innovation that are summarised as follows (Hall & Hord, 2001)

Table 1: Stages of concerns

Stage 0	**Awareness:** the unrelated concern in which the individual expresses little concern or involvement with the innovation.
Stage 1	**Informational:** general awareness and interest in the innovation.
Stage 2	**Personal:** concerns about personal ability, demands, adequacy, and role
Stage 3	**Management:** task concerns that include logistics and efficient use of resources.
Stage 4	**Consequence:** concerns related to student outcomes.
Stage 5	**Collaboration:** concerns about working with others to implement the innovation
Stage 6	**Refocusing:** concerns about modifications to the innovation

The research questions are:

i. What is the concern profile most associated with INSTED lecturers (participants)?
ii. What are the participants' predominant stages of concerns?
iii. What aspects of technology based education concerns the participants most?

METHODOLOGY

The research is a survey aimed at analysing the lecturers' stages of concern. The main variable incorporated in the study is the lecturer's concern at the early stage of the diffusion and adoption process. The participants are INSTED lecturers who have either used the LMS or attended a training session on the IIUM LearningNet System. They make up about 40% of the total number of INSTED lecturers. Data is gathered using a questionnaire adapted from Concern Based Systems International. The CBAM (Concern Based Adoption Model) questionnaire consisting of 35 items, each using an eight-point Likert scale, as a means of indicating the degree to which that item reflects the participants present concerns. Scoring is accomplished by summing the responses to the five items that make up each stage.

The total for each stage is the raw stage score. Percentile tables have been established which readily convert raw stage scores to percentile figures (see Hall & Hord, 2001, Appendix 2). From these percentile figures, stages of concern profiles can be plotted that identify the peak or predominant stages of concern and the relative intensity of other concerns. Since change is a developmental process, the concerns of any one individual adopter (user) about an innovation will not be static; instead, they will shift in time (assuming continued use of the innovation). A concerns profile may represent the user at different stages of concern such as that of a nonuser or very early user.

RESULTS AND DISCUSSION

The size and non random selection of sample does not justify the use of any statistical test. Hence, all findings reported will be descriptive but sufficient to answer the research questions posed.

The participants' concern profiles and predominant stages of concerns

The table below gives displays the raw scores of all the participants at each stage of concern.

Table 2: Raw scores

Participant	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
1	14	22	21	10	25	26	25
2	11	22	27	9	28	21	20
3	13	27	29	23	30	29	28
4	5	23	17	22	14	11	8
5	14	30	29	18	28	25	28
6	14	19	23	16	27	23	25
7	6	22	16	1	27	28	11
8	9	23	24	13	21	19	21
9	23	23	24	24	26	25	22
10	10	14	16	10	20	23	13
11	23	20	14	15	18	25	15
12	10	22	25	34	22	25	22
Mean	12.67	22.25	22.08	16.25	23.83	23.33	19.83

The mean raw stage scores for the entire group of participant determines the composite stages of concern profile for the INSTED group of lecturers. See Figure 2.

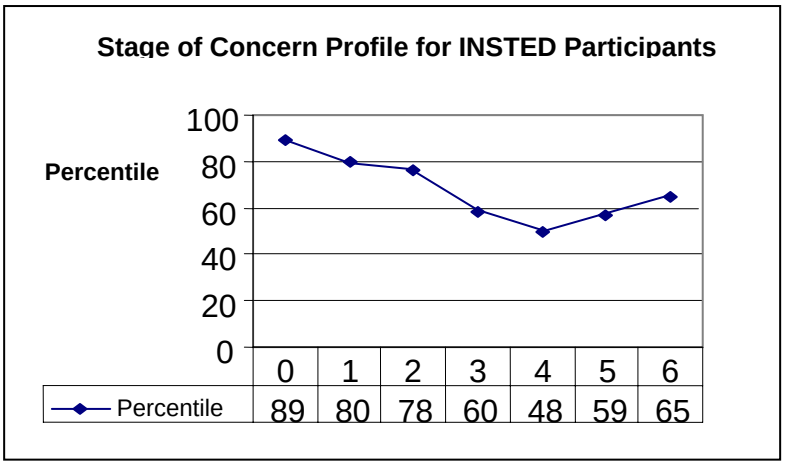

Figure 2: Stage of concern profile

Interpretations of the sample profiles are derived from instrument administration guidelines by Hall & Hord (2001) and its Stages of Concern theoretical framework. The scores of self-concerns (Stages 0, 1, and 2) are relatively high and within 9 % of each other , the task concern (Stage 3) is lower, and the impact concerns (Stage 4, 5, and 6) are also low. The high Stage 0 (Awareness) score indicates a low interest in the innovation relative to other activities. The high Stage 1 (Information) score reveals a lack of understanding of what the innovation involves, and the high Stage 2 (Personal) score gives an indication that the group is very concerned over the impact of the innovation on their professional duties, responsibilities, and day-to-day activities. The Stage 2 concerns are almost as high as Stage 1

concerns, indicating that the personal concerns are essentially the same as the informational concerns. The group is as concerned with the personal changes that this innovation may bring to them as they are with understanding more about the change itself.

The tailing-up of the profile at Stage 6 is an important finding. "Tailing-up" refers to the changing slope of the SOC profile, specifically, the condition where the relative intensity of Stage 6 (Refocusing) is greater than the relative intensity of Stage 5 concerns. This characteristic in a nonuser profile is interpreted by Hall & Hord (2001) as indicative of a resistance to the innovation, or possibly a desire to re-direct or modify the innovation. Moreover, Hall & Hord (2001) describe an individual with this type of profile (nonuser with tailing-up Stage 6) as "likely to be negative toward the innovation".

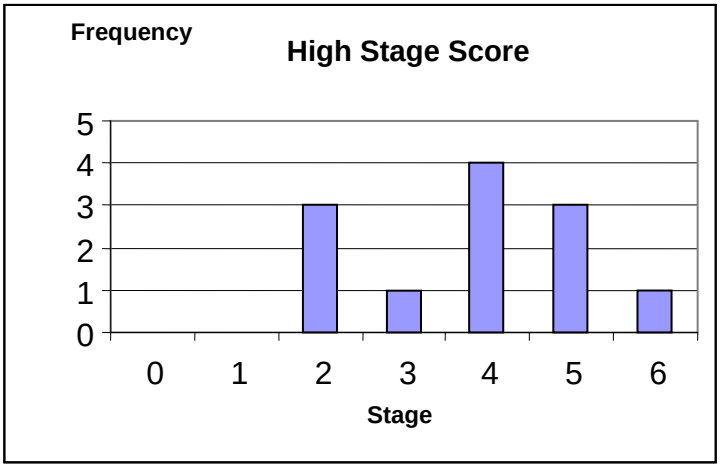

Figure 3: High stage scores of participants

The High Stage Scores are also examined for the participants. These scores are important primary indicators in the interpretation of concerns. Figure 3 shows that 3 out 12 of the participants expressed their highest concerns at Stage 2. Also, 4 chose State 4 as their highest stage, one participant chose stage 3 and another 3 chose Stage 5 as the highest. Since 67% of the participants had their highest Stage in either Stage 4, 5, or 6, this may reflect a "positive" nonuser profile. As a matter of fact, this depicts a positive concern towards collaborating and working with others in adopting the innovation. It also shows the faculty member's concern about the consequences of the innovation for the students. Most participants are not concerned about the management (stage 3) which shows that there is no concern about inadequate time or inability to adopt due to other tasks. To demonstrate participant's concern, individual concern profile is generated. The figures below show two of the participants' profiles.

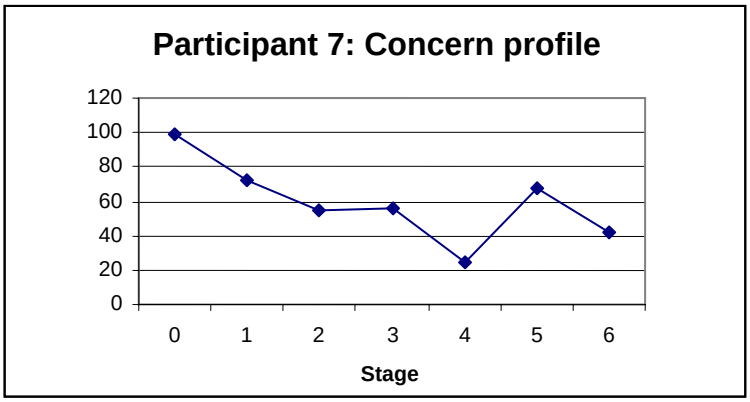

Figure 4: Participant's concern profile

This profile depicts an interested educator who is somewhat aware of and concerned about the innovation. This person has greatest concerns at Stage 1 (Information) and Stage 2 (Personal), indicating a need for more knowledge about the innovation itself and about the personal impacts this innovation will have. This person does not have a great deal of Management (Stage 3) concern and is even less concerned about the consequences of the innovation for the students (Stage 4) or how the faculty and students will use or modify the innovation on the future (Stages 5).

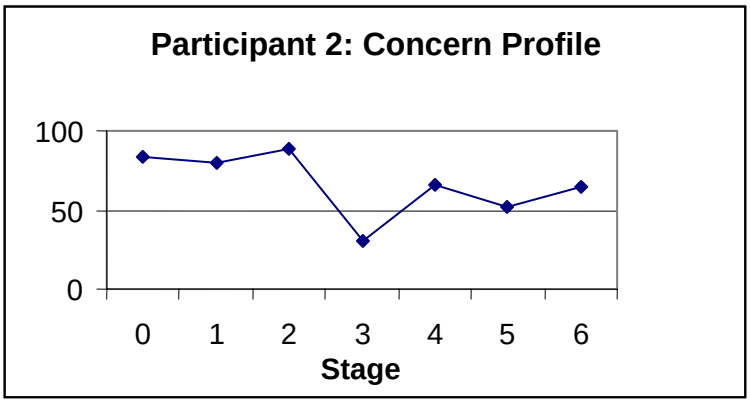

Figure 5: Participant's concern profile

Both participants' profiles show a strong dip where management is concerned but rather high concern at the awareness level. This is probably due to the fact that INSTED is at the early stage of introducing the LearningNet System to the faculty members.

Technology based education concerns

A qualitative analysis of the responses given by the participants gives an insight to their most pressing concern. A participant wrote,

> *"…Technology based education should be known and implemented by every lecturer and students as well. What concerns me most is the continuous evaluation of the results of using this innovation and the feedbacks from students in order (to) always improve the technique, the method and the methods of evaluation…"*

while another mentioned "*time and commitment*" as his concern without specifically mentioning whose commitment he is referring to.

Another participant sees the importance of "…*the content of education, not the method or process*". He states that "…*there is no proof that students educated using sophisticated devices and techniques would be better human beings*…" and stresses that priority must be set right and IIUM is supposed to "*work on developing better contents*" His sentiment is echoed in another participant's statement that sees technology as a mechanism and " …*we as human beings determine the purpose of using this technology*…"

A fifth participant dwells on the possibility of the system "…*to reduce the need for human interaction between students and students, students and teachers, and between lecturers…".* His concern lies in the alienation of students from lecturers that may stem from the adoption of the LearningNet system.

CONCLUSION

Even though there is evidence of a slight resistance towards the innovation, it is interesting to note that the concerns among the participants with regard to the use of the LearningNet system centres on the human issues such as its benefits to the students. Though there is an indication that the group is very concerned over the impact of the innovation on their professional duties, responsibilities, and day-to-day activities, the results show an open mindedness among the participants when dealing with the new technology. They are also looking for collaboration and working with other faculty members. Hence, there is a positive attitude and a high likelihood that the LearningNet System will be adopted by the participants.

The theorising and research about the diffusion of innovation have suggested that academic staff do not embrace change at the same pace, or in the same way, with some more reluctant than others to adopt new technologies into their practice. Such is not the case for INSTED since the lecturers surveyed accepted the advantages of the LearningNet system. However, the LMS may not be of a relative advantage over their current teaching practice. Some may find the LMS to be less compatible with their current beliefs of what an effective instructor – learner relationship. However, this study shows that other hindering factors such as complexity, non communicability or inability of trials before adapting are not significant. Despite being ingrained in a traditional mode of teaching, the participants do not display the profile of adamant, non favourable participants. What is pertinent then is to determine the design and content for staff development programmes aimed at integrating the LMS online environment into their teaching realms.

The diffusion and adoption of the MiTech LearningNet System requires communication between the Director of INSTED (the opinion leader who is also an early adopter), the centre's change agents, the lecturers of education faculty (potential diffusers) and other IIUM lectures (potential adopters) in order to reach a common base understanding of the

MiTech LearningNet System itself. For instance, it is imperative that potential adopters know what the MiTech LearningNet System is, how it works and why it works and a common understanding of the advantages, disadvantages and consequences of the system in the specific situation. It is also pertinent for the change agents or opinion leaders to carry out an analysis of the potential users' level of computer and technology competency. The LearningNet system can be regarded as a cluster innovation as it requires computing skills as well while most lecturers are not savvy computer users. Occurring over time but not necessarily in the following order, conceptual steps in the MiTech LearningNet System decision process include (Onsrud & Pinto, 1991):

- Knowledge - being exposed to the existence of the MiTech LearningNet System and gaining some understanding of how it functions, in other words undergo intensive training.
- Persuasion - forming a favorable or unfavorable attitude toward the MiTech LearningNet System
- Decision - engaging in activities that lead to a choice to adopt or reject the MiTech LearningNet System
- Reinforcement - seeking reinforcement of the MiTech LearningNet System decision already made or perhaps reversing a former acceptance or rejection decision.

An emphasis on innovation, rather than the technology should be adopted. If an environment that supports opportunities for staff to try new teaching and learning methods is created, and that encourages them to support each other and share knowledge and skills, it has a greater likelihood of success.

ACKOWLEDGEMENTS
The authors would like to thank Assoc. Professor Dr. Kamal Basha Madarsha and Ms. Suhair Ahmed Elyas for their assistance in gathering the research data.

REFERENCES

Alfieri, P.A. (1998). *Stages of Concern of Defence Systems Management College Faculty about Technology-Based Education and Training*, Doctoral Dissertation (Unpublished). Virginia Polytechnic Institute and State University.

Alshammari, B.S. (2000). *The Developmental Stages of Concern of Teachers toward the Implementation of the Information Technology Curriculum in Kuwait*. Doctoral Dissertation (Unpublished). University of North Texas.

Anderson, T., Varnhagen, S. & Campbell, K. (1998). Faculty adoption of teaching and learning technologies: Contrasting earlier adopters and mainstream faculty. *The Canadian Journal of Higher Education,* 28(2/3), 71-98.

Askar, P. & Usluel, Y. (2001). Concerns of administrators and teachers in the diffusion of it in schools: a case study from Turkey. *Proceedings of the Society for Information Technology and Teacher Education International Conference 2001*, pp. 2259-2261.

Burkman, E. (1987). Factors affecting utilisation. In R. M. GagnÚ (Ed.). Instructional Technology: Foundations: Hillsdale, NJ: Lawrence Erlbaum.

Ely, D.P. (1990). Conditions that facilitate the implementation of educational technology innovations. *Journal of Research on Computing in Education.* 23(2), 298-236.

Farquhar, J.D. & Surry, D.W. (1994). Adoption analysis: An additional tool for instructional developers . *Education and Training Technology International,* 31(1), 19-25.

Hall, G.E. & Hall, S.M. (2001). Implementing change: Patterns, principles and potholes. Allyn and Bacon: Needham Heights.

Hall, G.E. & Hord, S.M. (1987). *Change in Schools: Facilitating the Process.* Albany: State University of New York Press.

Hall, G.E., Wallace, R.C. & Dossett, W.A. (1973). *A developmental conceptualisation of the adoption process within educational institutions* (Rep. No. 3006). Austin, Texas: The University of Texas at Austin, The Research and Development Center for Teacher Education. (ERIC Document Reproduction No. ED 095 126).

Hall, G.E. & Hord, S.M. (2001). Implementing change: Patterns, principles and potholes, Allyn and Bacon: Needham Heights.

Kosma,W.T (2003), *Roger's diffusion and adoption research: What does it have to do with instructional technology*, [Online] Retrieved 12 January 2004 from http://www.gsu.edu/~mstswh/courses/it7000/papers/rogers.htm.

Onsrud H.J. and Pinto, J.K. (1991). Diffusion of Geographic Information Innovations. *International Journal for GIS, 5*(4), 447-467.

Rogers, E.M. (1995), *Diffusion of Innovations* (Fourth Edition), New York, Free Press

Shannon, S. & Doube, L. (2003) *Factors influencing the adoption and use of web-supported teaching by academic staff at the University of Adelaide*, Report prepared for the Deputy Vice Chancellor (Education) & Provost, University of Adelaide Learning and Teaching Development Grant.

Stockdill, S.H. & Morehouse, D.L. (1992). Critical factors in the successful adoption of technology: A checklist based on TDC findings. *Educational Technology,* 1*,* 57-58.

Surry, D.W. & Farquhar, J.D. (1997). Diffusion theory and instructional technology. *Journal of Instructional Science and Technology 2*(1). [On-line] Available WWW: http://www.usq.edu.au/electpub/e-jist/docs/old/vol2no1/article2.htm.

Surry, D.W. (1997). *Diffusion Theory and Instructional Technology.* [Online] Retrieved from://intro.base.org/docs/diffusion/, February 20, 1997.

The MiTech LearningNet System. http://help.learningcare.com/

Theodore, P., Lavelle, E. & Liu, Y. (2003). experimental effects of online instruction on k-12 teachers' concerns about technology integration. *Proceedings of the Society for Information Technology and Teacher Education International Conference 2003*, pp. 2418-2422.

Wilson, G. & Stacey, E. (2003). Online Interaction Impacts on Learning: Teaching Teachers to Teach online . In G. Crisp, D. Thiele, I. Scholten, S. Barker & J. Baron (Eds.). *Interact, Integrate, Impact: Proceedings of the 20th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education*. Adelaide, 7-10 December.