Impact of Training and Experience in Using ICT On in-Service Teachers' Basic ICT Literacy

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Abstract

The aim of this paper is to report on a study that explored the impact of ICT training and ICT experience on teachers' basic ICT literacy in terms of ICT knowledge, skills and attitude. The study employed a quantitative approach in the form of a survey. A total of 303 teachers were randomly selected as research samples. Data were gathered through a set of instruments consisting of an ICT attitude questionnaire, and ICT knowledge and skills tests. Data were analyzed descriptively and inferentially using mean, percentage, frequency and multivariate analysis of variance (MANOVA). Findings demonstrated that majority of the teachers had moderate basic ICT knowledge and skills, and perceived ICT positively. Formal ICT training and experience in using ICT were found to influence and contribute to teachers' ICT literacy significantly.

Introduction

Malaysia has embarked on several technology initiatives to spearhead the utilization of ICT particularly at the turn of the 21st century for rapid economic growth and development. With the vision of becoming a developed nation by the year 2020, the Ministry of Education (MOE) implemented several ICT programs in schools nation-wide in an attempt to bring technology into the classrooms starting with programs such as Computer Literacy Pilot Project, Computer in Education, Computer Aided Instruction and Learning, National Educational Network, Munsyi Network and Smart Schools (Mahmud, 2006). In 1999, a total of 88 schools were chosen to become smart schools which showcased the state-of-the-art teaching and learning using technology effectively and efficiently. Now, more than a decade later, in stages all schools are upgraded as smart schools. According to the master plan, all 10,000 schools in Malaysia will become smart schools by 2010 (Multimedia Development Corporation, 2005).

Background of Study

Realizing the immense importance of teachers in equipping students with ICT literacy that meets the demands of the 21st century, MOE implemented various training and ICT courses to in-service teachers and pre-service teachers. ICT training is conducted to pre-service teachers through subjects or courses by respective institutions of higher learning. By 1994, ICT is taught as a core course in all teacher training programs. To cater to the needs of in-service teachers, MOE conducted ICT-related courses such as one year special teacher certificate course in Information Technology, 14 weeks in-service course in Computer Education and Computer in Education. Parallel to these efforts, the ministry also conducted computer trainer-of-trainer courses, smart school teacher training courses and basic computer literacy to in-service teachers nationwide (Ministry of Education, 2001). In addition, in-service teachers are also provided with short term courses such as basic ICT skills courses and workshops in preparing educational courseware conducted by the Educational Division and its network, State Educational Technology Divisions and Teacher Activity Centers. By 2000, approximately 60,000 in-service teachers were trained through these ICT programs. Private organizations such as IBM and Intel too collaborate with MOE in training teachers to integrate technology in the process of teaching and learning. One fine example was the program by Intel in which 15,000 teachers were trained in using ICT (*Intel Teach to the Future* 2005). Educational portals and websites such as MySchoolNet, EducationNet, KPMNet and EDUWEBTV are created for the

teachers and students to access instructional and learning materials, resources and information. EDUWEBTV was introduced to teachers in 2009 and serves as the latest educational online resources for both teachers and students (Mahmud & Ismail, 2009).

Problem Statement

Bringing technology into schools has its implications to the pedagogical practice of teachers. Due to the rapid development and advancement in ICT, particularly the Internet and Web, students no longer rely on teachers as the main source of knowledge. Information is abundant and can now be accessed from anyplace and at anytime. Thus, the role of teachers is multi-faceted and no longer fit the well-known term 'sage on stage', depending on their function in students' learning. They can be facilitators, managers or coordinators of learning resources (Heinich et al, 2002), or navigators or consultants (MacLean & Munjanganja, 2000) at one point or another. The crux is that teachers need to be flexible and creative enough to integrate technology in the classroom so as to make learning not only effective but also fun and interesting. Nevertheless, these roles do not undermine the value of teachers for they create and structure students' learning experiences (Norton & Wiburg, 2003).

Although Malaysia has a long history of bringing technology into the classrooms, research findings show that teachers are not optimizing on what technology has to offer. ICT usage level among teachers is found to be still quite low (Ashinida et al, 2004;   Robiah et al. 2003; Mohd. Jasmy et al, 2003; Educational Technology Division, 1999; Ab. Rahim & Shamsiah, 1998; Norizan & Salleh-Huddin, 1997). Many factors are pointed out as barriers to teachers using and integrating ICT in their teaching. Factors such as knowledge, skills, attitude, perception, beliefs and commitment (Dusick, 1998), gender, age and experience in using ICT (Wong, 2002), access to computer, ICT training experience and support (Norizan Abdul Razak, 2003) are frequently cited and associated with barriers to successful ICT integration in schools. According to The British Educational Communications and Technology Agency (BECTA, 2004) the hindering factors that affect teachers include confidence level in using technology, access to facilities, courses and training attended that lacked focus on pedagogical skills and teachers reluctance to change teaching practice.

Teachers need to know exactly how to integrate technology in the classroom. They may tend to not fully understand the impact and potentiality of technology in instruction (Ritchie & Rodriguez, 1996), thus training and experience in using ICT can be seen as catalysts that jumpstart teachers to utilize technology effectively for the purpose of teaching and learning. How far the value of ICT training and experience in using ICT need to be explored further. Therefore the objective of this study is to determine the impact of training and experience in using ICT on teachers' basic ICT literacy.

Methodology

Research Design
The study employed quantitative research methodology in the form of a survey using questionnaire and two sets of tests.

Population and Sampling
The target population is non-ICT in-service teachers serving in government secondary schools in Malaysia. The accessible population is non-ICT teachers from four different states randomly selected based on four zones (N = 31,541). A total of 303 teachers were randomly selected from these zones (North, n = 46; South, n = 66; West, n = 94; East, n = 97).

Instrumentation
Data were gathered using the set of instruments which were adapted from Wong (2002).   The instruments consisted of ICT Knowledge Test, ICT Skills Test and Attitude towards ICT questionnaire. The ICT Knowledge Test consisted of 20 items related to factual knowledge, understanding/ comprehension,

and application. The ICT Skills Test consisted of 90 items related to word processing, spreadsheet, data base, presentation, basic Internet and e-mail. The Attitude towards ICT questionnaire consisted of 44 items (Likert scale ranging 1 – 5) related to use, confidence, aversion and anxiety. The instruments were validated by three subject-matter experts and two language experts. Based on pilot testing conducted on 30 teachers, the reliability for the instruments was follows: 0.73 (ICT Knowledge Test), 0.97 (ICT Skills Test, and 0.95 (Attitude towards ICT).

Data Analysis
Data were analyzed using SPSS v. 11.5 descriptively and inferentially using mean, standard deviation, frequency, percentage, and multivariate analysis (MANOVA).

Findings
Several interesting findings emerged from this study which managed to provide some insights to the knowledge about teachers' basic ICT literacy and the impact of training and ICT experience. Majority of the teachers were females (n = 207, 68.3%) while another 97 were male teachers (31.7%). Many of the teachers (n = 134, 44.2%) had experience using ICT less than 4 years. Another 105 teachers (34.7%) had ICT experience between 4 to 6 years, while 64 teachers (21.1%) had more than 6 years of experience. In terms of ICT training, a total of 159 teachers (52.5%) had attended some formal training in terms of short-term courses and workshops. Another 144 teachers (47.5%) had no formal ICT training.

For the performance in ICT Knowledge Test the mean score was 10.28 (S.D. = 3.45). Only 7.3% teachers (n = 22) were knowledgeable in basic ICT. Majority of the teachers (n = 256, 84.5%), however, only had average knowledge of ICT. Another 8.2% teachers (n = 25) demonstrated having very minimal knowledge of ICT.

For the performance in the ICT Skills Test, the mean score obtained was 63.75 (S.D. = 21.48). Only 6.27% teachers (n = 19) were able to execute the tasks assigned to them successfully. Once again, teachers were found to have moderate skills in using ICT (n = 243, 80.20%). A total of 41 teachers (13.53%) did not have the necessary basic ICT skills. Meanwhile, the mean for attitude towards ICT was 4.22 (S.P = 0.5), and majority of the teachers (96%) perceived ICT positively.

The multivariate variance analysis (MANOVA) employed was able to establish that ICT training (Wilks' value (λ) = 0.726. $F_{(3, 295)}$ = 37.046, $p < 0.05$) and experience in using ICT (Wilks' value (λ) = 0.595. $F_{(6, 590)}$ = 29.106, $p < 0.05$) contributed to the difference in mean for teachers' ICT literacy, particularly in acquiring ICT skills.

Further analysis found that there was a significant interaction effect between training and experience in using ICT on teachers' ICT skills ($F_{(2, 297)}$ = 4.597, $p = 0.011$). Teachers who had formal training and experience in using ICT for more than 6 years had the highest mean scores compared to those who had attended ICT training but with less than 6 years of experience using ICT. For teachers who had no formal training but had more than 6 years of ICT experience, their skills' mean scores were higher than teachers with no formal training and less than 6 years of ICT experience.

Discussion & Recommendation
The findings of this study are consistent with previous researches and literature that explored teachers' ICT literacy and readiness. In this study, the teachers had positive ICT attitude, and this result concurs with other studies such as by Norizan (2003), Mohd. Jasmy et al (2003), Ab. Rahim & Shamsiah (1998),) Norizan & Salleh-Huddin (1997) and Pak & Punyapinyophol (1988). These studies reported similar results whereby teachers do have faith and confidence in technology in promoting and enhancing instruction and learning. It seems, in terms of attitude towards ICT, or technology in a broader sense, Malaysian teachers have always demonstrated that they are very positive with the use and advantages of having ICT in the

classroom. Lee's study (2000) and Drent & Meelissen (2008) demonstrated that successful integration of technology in schools was also influenced by teachers having the right attitude.

However, having the right attitude does not necessarily translate into action. Low use of technology has been reported in local studies, for example by Hajar Mohd Nor (2005) and Wan Zah Wan Ali (2008), and studies abroad such as by Cuban et al (2001), Hughes (1997) and Bennett et al (1992). There are many barriers to teachers integrating technology in the classroom. According to Zhao et al (2002) successful deployment of technology in schools is influenced by the interrelated dimensions – teacher, school and technology. Undoubtedly, the teacher factor is crucial in determining high uptake of technology in schools. The success or failure of technology initiatives is found to rely heavily on teachers' skills and knowledge (Pelgrum, 2001). In this study, most of the teachers had moderate level of basic ICT knowledge and skills. They were familiar with application software such word processing and electronic presentation, but not with Internet applications and e-mail. Thus, this finding is in accordance with Ely's (1995) observation – teachers are not fully prepared to use technology when they lack knowledge, skills and information.

In this study too it was found that formal ICT training and ICT experience influence the teachers' knowledge, skills and attitude. Therefore, teachers especially the older ones and normally with more teaching experience need to be identified, and provided with specially designed training programs, in various forms of ICT courses and workshops. The younger teachers are usually more technology savvy than the teachers with more teaching experience (Love, 2002). As postulated by Rakes et al (2006) teachers need appropriate and satisfactory training to aid them integrate technology in schools.

Conclusion

Having high-end technology in schools does not necessarily mean high uptake by the teachers. Teachers need to equip themselves with adequate ICT knowledge and skills to be able to perform better as facilitators and designers of students' learning. There is a felt need for more dynamic and proactive measures to be taken by the relevant authorities to ensure teachers are fully prepared to teach the 21st century students who are heavy users of technology in the real world outside the classroom.

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