TECHNOLOGY INTEGRATION IN TEACHER EDUCATION: AN INFUSION OR A DELUSION?

Upasana Singh, *Ph. D.,*
Assistant Professor,
Department of Education,
Patna Women's College, Patna, Bihar, India.

ABSTRACT

The present study attempts to find out the state of technology integration in those teacher education institutions and schools of Patna in the State of Bihar, India that have the state of the art technology status. Sample of 150 pre-service and 64 in-service teachers was drawn for this purpose by purposive cum incidental sampling technique. The researcher studied the availability and accessibility of technology in the selected schools and teacher education institutions; the relationship between technology proficiency of pre-service and in-service teachers and their attitude towards integrating technology in education; and the relationship between frequency of faculty usage of technology in classroom instruction and attitude of pre-service teachers towards technology integration. Research outcomes showed that teacher education institutions are making efforts to use technology in teaching-learning while schools still follow the traditional method. However, the situation is far from attaining technology integration in educational practices. There is significant relationship between proficiency of in-service teachers and their attitude towards technology integration and between frequency of faculty usage of technology in classroom instruction and the attitude of pre-service teachers towards technology integration.

Keywords: Technology integration, technology proficiency, frequency of technology usage, attitude towards technology integration.

INTRODUCTION

Technology integration refers to possessing technology-skills and effectively using them for teaching such that there is a complete merger between technology and pedagogy. The ultimate aim of technology integration in education is to use the technology in a seamless manner in academics so that it leads to the diversification and achievement of curriculum objectives and engages students in meaningful construction of their knowledge bases. The meaningful cognitive processing of environmental stimulations enhances application based learning. When effectively integrated into a high-quality learning environment, researchers have demonstrated that technology can help deepen students' content knowledge, engage them in constructing their own knowledge, and support the development of complex thinking skills (Kozma, 2005; Webb & Cox, 2004; Kulik, 2003). Emphasizing the importance of cognitive or constructive learning, Clark & Surgure (1988) said that cognitive learning can be viewed as "the degree to which previously learned knowledge and skills can be transferred to new contexts and problems" (p. 20). Constructivist method of teaching enhances student learning (Matzen & Edmunds, 2007). It is particularly important in teacher education because of the close association between teacher education and school education and that between school education and social living. One of the major changes that the schools have undergone over the past decade has been the evolution of technology use; however most of the schools have not shown quick progress (Thorburn, 2004). Furthermore, teacher technology training has focused on administrative applications, rather than instructional applications (Zhao & Bryant, 2006). Just using technology in education is not sufficient to bring about positive change in the teaching-learning process. In cases where technology-based instruction has been successful, it is due to use of technology to deliver well-designed and well-managed instruction (Hasselbring & Glaser, 2000). Thus, the teacher's role in a classroom is significant to fabricate technology-based instruction and promote learner-centred learning making adjustment for individual learning styles for optimum application-based learning. With so much of emphasis being laid on practical and need-based education, it becomes imperative to change the conventional pedagogical practices and equip the school goers to retrieve, filter and process the most recent and relevant information under the guidance of their able teachers. This is in consonance with the cutting edge developments worldwide in areas such as connectivism, constructivism, collective knowledge, student-oriented learning, mobile learning and providing appropriate learning spaces to learners. Hattangdi and Ghosh (2008) contended that technology-integrated education leads to democratization of education and effective use of ICT for the purpose of education has the potential to bridge the digital divide especially in developing countries like India. However though technology has tremendous potential to bring about radical changes in teaching learning process; providing the maximum within the shortest time span available, most of the teaching-learning institutions of the State of Bihar in India predominantly make use of the conventional chalk-talk method for curricular transactions. With the initiative of the State Government, National Council of Educational Research and Training (NCERT) and State Council of Educational Research and Training (SCERT), efforts are being made to change the scenario at the school level, but in Higher education this change is less obvious. Under the aegis of ICT@School, all Government and Government-aided Secondary and Higher Secondary Schools are to be provided basic computer literacy courses through a computer lab with broadband internet connectivity, presently being implemented in 1000 schools. (ICT Policy of Government of Bihar, 2011). All Government and Government-aided Secondary and Higher Secondary Schools will be covered through ICT@School project by 2013. Beyond the Government's initiatives, the non-government schools affiliated to various boards have risen to address the popular demand of an ICT savvy environment in schools. However, in order to match pace with these developments, the pre-service teachers as well as the in-service teachers have to be made ready for radical changes. The technological and pedagogical skills of these teachers together, impact the transformation process significantly. Since grounding of teachers is the task of teacher education institutions, so a huge onus lies on actually what happens in teacher education institutions. Effective technology integration in education by the pre-service and the in-service teachers depends on four main factors, viz., their proficiency in using different technological applications for instructional activities, frequency of technology integration done by their faculty, their attitude towards the impact of technology integration on improving learning and the mutual relationship between these three (Singh, 2013).

In this context the following research questions emerged for investigation in the study:

What is the status of technology usage in teacher education institutions and local schools?

How is technology proficiency of pre-service and in-service teachers related with their attitude towards integration of technology in teaching-learning?

How is frequency of faculty usage of technology into classroom instruction related with attitude of pre-service teachers towards integration of technology in teaching-learning?

SIGNIFICANCE OF THE STUDY:

In Bihar, tremendous effort is being made by the Government and the non-Government organizations to enhance technology usage and to bring forth technology equipped leaders for significant changes in education sector, especially in schools. This study provides an opportunity to gather information pertaining to technology usage in those schools and teacher education institutions that are technology rich and have adequate man and material resources to integrate technology in the teaching-learning process. This would provide a firm ground to study the status of the pre-service and in-service teachers of the other educational institutions of Bihar and get a comprehensive picture of technology integration that is actually being done in the prevailing pedagogical practices.

METHOD:

RESEARCH DESIGN:

It was a quantitative descriptive study conducted on two teacher training institutions and four local schools of Patna, the capital city of Bihar. Two of the schools selected in the study were affiliated to the Central Board of Secondary Education (CBSE) and the other two were affiliated to Indian Certification of Secondary Education (ICSE Board). These institutions were selected on the assumption that since they have the state of the art technology status, a better picture could be drawn about technology usage and its integration in the teaching-learning process.

PARTICIPANTS:

A sample of 150 pre-service teachers (B.Ed. trainees) and 64 in-service teachers, teaching at secondary and senior secondary levels were selected from the chosen institutions by purposive cum incidental sampling technique.

APPARATUS:

The researcher constructed a questionnaire to collect data from the sample selected in the study. The questionnaire had different sections to gather data related to demography, availability and accessibility of technology, proficiency of pre-service and in-service teachers in using the available technology, frequency of technology usage done by the faculty of pre-service teachers and their attitude towards integration of technology in the teaching-learning process. The test-retest reliability of the part related to their attitude towards integration of technology in the teaching-learning process was found to be 0.68. Content validity of the questionnaire was also established.

ANALYSIS:

Data was analysed using simple statistical techniques such as percentages, measures of central tendency, standard deviation and correlation. Microsoft Excel and Statistical Package for Social Sciences (SPSS) were used for data entry and analysis.

The solution to the first research question was sought by collecting factual data from the participants in the sample. To answer the second and the third research questions, null hypotheses were framed.

FINDINGS AND DISCUSSION:

Table 1: Characteristics of the participants

		*Pre-service	*In-service
Gender	Males	35 (23)	30 (53)
	Females	115 (77)	34 (47)
Age	<25 yrs	80 (53)	1 (2)
	26 yrs-35 yrs	63 (42)	15 (23)
	36 yrs-45 yrs	7 (5)	23 (36)
	>45 yrs	0(0)	25 (39)
Technology expertise	Beginners	67 (45)	26 (41)
	Average users	80 (53)	30 (46)
	Advanced users	3 (2)	8 (13)
Received technology training outside the institution	Yes	90 (60)	36 (56)
	No	60 (40)	28 (44)
Received technology training in the institution	Yes	127 (85)	18 (28)
	No	23 (15)	46 (72)
Total		**150**	**64**

*Figures in parentheses are in percentage

Once the data was collected, it was observed that among the pre-service teachers, 77% were females and only 23% were males. Though teaching is said to be a female occupation (Apple & Jungjk, as cited in Tercanlioglu,2001) and females have higher teacher efficacy than males (Raudenbush, Rowan & Cheong, 1992), there were 6% more male in-service teachers than female teachers in the schools taken in the study. More than 50% of the pre-service teachers were less than 25 years of age while 75% of the in-service teachers were 36 years and above in age. This is noteworthy from the point of view of technology usage as studies have revealed that younger individuals have stronger belief that technology can effect significant changes than older individuals (Posthuma & Campion, 2009; Reed, Dotty & May, 2005). Both the pre-service and the in-service teachers were average users of technology; however there is a marked difference between the two as regards the percentage of advanced users. It was more for in-service teachers (13%) than the pre-service teachers (only 2 %). More than 50% of both of them reported to have received some kind of training in technology usage or done some courses by personal initiative. 85% of the pre-service teachers accepted receiving training in technology usage in their institutions but 72% of the in-service teachers denied receiving such training in their institutions. This suggests that though both pre-service and in-service teachers are aware of the importance of technology usage in teaching-learning, it is more of self endeavour for in-service teachers. The in-service teachers are more mature in terms of age and experience and are self motivated to teach with technology. This is contrary to the studies mentioned above, however it needs more thorough investigation on a larger and more representative sample.

RESEARCH QUESTION1:

What is the status of technology usage in teacher education institutions and local schools?

Table 2: Technology availability

	*Pre-service		*In-service	
	Yes	**No**	**Yes**	**No**
Glass Boards	150 (100)	0 (0)	64 (100)	0 (0)
OHP	57 (38)	93 (62)	22 (34)	42 (66)
LCD Projectors	123 (82)	27 (18)	35 (55)	29 (45)
Computers	150 (100)	0 (0)	61(95)	3 (5)
Internet	119 (79)	31 (21)	31 (48)	33 (52)
Video Camera	68 (45)	82 (55)	17 (27)	47 (73)
Interactive Boards	131 (87)	19 (13)	34 (53)	30 (47)
Multimedia Room	57 (38)	93 (62)	8 (13)	56 (87)
Printed Materials	138 (92)	12 (8)	62 (97)	2 (3)
E-learning Resources	43 (29)	107 (71)	11 (17)	53 (83)

*Figures in parentheses are in percentage

Table 2 shows the availability of technology in teacher education institutions and local schools as reported by pre-service and in-service teachers. The pre-service and the in-service teachers could not provide a clear picture about availability of technology except for glass boards, computers and printed materials. The uncertainty in clearly reporting the availability of technology suggests the low level of technology usage in these institutions for curricular transactions, though they are considered to have state of the art technology. There is lack of uniformity in technology usage as some teachers reported while the others denied the presence of many technologies mentioned in the table above. The institutions still depend on traditional methods of teaching and technology is occasionally incorporated in the pedagogical practices as an outside element. Print dominates as the main learning resource and access to e-books, e-journal and e-magazines is either absent or is to a very limited extent. The scenario in teacher education institutions is slightly better than the schools as pre-service teachers are more aware of the technologies that are available to them at their institutions. It is important to expose pre-service teachers to various technologies that can be utilized to support many diverse teaching and learning activities (Pan & Carroll, 2008) when they join schools as full time teachers later on. So, it can be interpreted that the teacher education institutions have raised to the need of the hour and in future may serve as model institutions for other upcoming and flourishing institutions to prepare technology-equipped teachers of tomorrow.

The proficiency of pre-service and in-service teachers in using various technological applications available to them was reported by them on a four point scale: Never Used=0. Novice=1, Competent=2 and Proficient=3. A summary of the result obtained has been presented in Table 3.

Table 3: Technology proficiency of pre-service and in-service teachers

	*Pre-service				*In-service			
	Never Used	Novice	Competent	Proficient	Never Used	Novice	Competent	Proficient
Glass Boards	0 (0)	20 (13)	92 (62)	38 (25)	0 (0)	3 (4)	10 (16)	51 (80)
OHP	93 (62)	34 (22)	13 (9)	10 (7)	42 (66)	12 (19)	7 (11)	3(4)
LCD Projectors	27 (18)	25 (16)	43 (29)	55 (37)	29 (45)	23 (36)	7 (11)	5(8)
Computers	0 (0)	28 (19)	79 (53)	43 (28)	3 (5)	11(17)	38 (59)	12 (19)
Internet	31 (21)	34 (23)	59 (39)	26 (17)	33 (52)	19 (29)	9 (14)	3 (5)
Video Camera	82 (55)	50 (33)	12 (8)	6 (4)	47 (73)	10 (16)	5 (8)	2 (3)
Interactive Boards	19 (13)	20 (13)	81 (54)	30 (20)	30 (47)	4 (6)	8 (12)	22 (35)
Multimedia Room	93 (62)	30 (20)	19 (13)	8 (5)	56 (87)	4 (6)	3 (5)	1 (2)
Printed Materials	12 (8)	12 (8)	101 (68)	25 (16)	2 (3)	8 (12)	28 (44)	26 (41)
E-learning Resources	107 (71)	34 (23)	6 (4)	3 (2)	53 (83)	8 (12)	2 (3)	1 (2)
Word Processors	15 (10)	31 (21)	64 (43)	40 (26)	22 (35)	18 (28)	13 (20)	11 (17)
Spreadsheets	64 (43)	46 (31)	27 (18)	13 (8)	44 (68)	10 (16)	5 (8)	5 (8)
Presentation Software	16 (11)	24 (16)	72 (48)	38 (25)	16 (25)	28 (44)	12 (19)	8 (12)
Search Engines	18 (12)	21 (14)	71 (47)	40 (27)	26 (41)	20 (31)	11 (17)	7 (11)
Electronic Mail	70 (46)	46 (31)	23 (16)	11 (7)	26 (41)	20 (31)	10 (16)	8 (12)
Chats/Discussion Forums	105 (70)	11 (7)	28 (19)	6 (4)	45 (70)	11 (17)	5 (8)	3 (5)
Instructional Films	85 (57)	36 (24)	20 (13)	9 (6)	32 (50)	18 (28)	9 (14)	5 (8)

*Figures in parentheses are in percentage

The table shows that both pre-service and in-service teachers are competent in using glass boards, computers, interactive boards and printed library resources. Major differences can be seen in the use of LCD projectors, internet, word processors, presentation software, search engines and chats / discussion forums. In all these, pre-service teachers are competent and are way ahead of in-service teachers. Technologies such as over head projectors (OHP), video cameras, multimedia room and software applications such as e-learning resources, spreadsheets, electronic-mails and instructional films are either never or rarely used. The entries in the table further substantiate the researcher's contention that technology is being used in the teacher education institutions more than in the schools. This is line with the findings of Schellens, van Keer and Valcke (2005) who argued that learning afforded by new technologies is increasingly becoming important in pre-service teacher education. However integration of technology in the pedagogical practices is still an objective to achieve.

RESEARCH QUESTION2:

How is technology proficiency of pre-service teachers and in-service teachers related with their attitude towards integration of technology in teaching-learning?

The following null hypothesis was framed:

H_{02}: There is no significant relationship between technology proficiency of pre-service and in-service teachers and their attitude towards integration of technology in teaching-learning.

Pearson's product moment correlation was calculated to find out the significance of :

1. relationship between technology proficiency of pre-service teachers and their attitude towards integration of technology in teaching-learning
2. relationship between technology proficiency of in-service teachers and their attitude towards integration of technology in teaching-learning

Relationship between technology proficiency of pre-service teachers and their attitude towards integration of technology in teaching-learning.

Table 4 : Correlation between proficiency and attitude of pre-service teachers

		Proficiency	Attitude
Proficiency	Mean	32.02	-
	Std. deviation	7.85	-
	N	150	150

	Pearson Correlation	1	0.08
	Sig. (2-tailed)	-	0.329
Attitude	Mean	-	88.35
	Std. deviation	-	10.48
	N	150	150
	Pearson Correlation	0.08*	1
	Sig. (2-tailed)	0.329	-

p>0.05, not significant

Table 4 shows that there is no significant relationship between technology proficiency of pre-service teachers and their attitude towards integration of technology in teaching-learning. Hence the null hypothesis was accepted in this case.

Relationship between technology proficiency of in-service teachers and their attitude towards integration of technology in teaching-learning

Table 5: Correlation between proficiency and attitude of in-service teachers

		Proficiency	**Attitude**
Proficiency	Mean	20.56	-
	Std. deviation	6.47	-
	N	64	64
	Pearson Correlation	1	0.34*
	Sig. (2-tailed)	-	0.006
Attitude	Mean	-	87.14
	Std. deviation	-	14.65
	N	64	64
	Pearson Correlation	0.34*	1
	Sig. (2-tailed)	0.006	-

*p<0.01, significant

Table 5 shows that there is a significant relationship between technology proficiency of in-service teachers and their attitude towards integration of technology in teaching-learning. Hence the null hypothesis was rejected in this case.

Previous studies have revealed the importance of technology proficiency of individuals in deciding their attitude towards technology usage (Pan & Carroll, 2008; Hill, Smith, & Mann, 1987). In this study, absence of significant relationship between technology proficiency of pre-service teachers and their attitude towards technology integration suggests that there may be other vital factors affecting their attitude than their own technology proficiency which need further investigation. The covariance between technology proficiency of in-service teachers and their attitude towards technology integration in teaching-learning implies that the educational institutions as well as the teachers must update their technology skills at regular intervals. In this context, Chen (2008) said that the pre-existing beliefs and experiences of teachers are significant in their technology integration into instructional practices. These pre-existing beliefs lead to the development of further beliefs regarding technology integration and related instructional practices.

RESEARCH QUESTION3:

How is frequency of faculty usage of technology into classroom instruction related with attitude of pre-service teachers towards integration of technology in teaching-learning?

The corresponding null hypothesis was:

H_{03} : There is no significant relationship between frequency of their faculty usage of technology into classroom instruction and attitude of pre-service teachers towards integration of technology in teaching-learning.

Relationship between frequency of their faculty usage of technology and attitude of pre-service teachers towards integration of technology in teaching-learning.

Table 6: Correlation between faculty technology usage and attitude of pre-service teachers

		Frequency	**Attitude**
Frequency	Mean	21.30	-
	Std. deviation	5.67	-
	N	150	150

	Pearson Correlation	1	0.28*
	Sig. (2-tailed)	-	0.001
Attitude	Mean	-	88.35
	Std. deviation	-	10.48
	N	150	150
	Pearson Correlation	0.28*	1
	Sig. (2-tailed)	0.001	-

*p<0.01, significant

Table 6 shows a highly significant relationship between frequency of their faculty usage of technology into classroom instruction and attitude of pre-service teachers towards integration of technology in teaching-learning. The null hypothesis stands rejected in this case. This means that it is important for a teacher to know how to use technology as a tool for effective teaching (Oblinger & Oblinger, 2005). This can positively influence the attitude of their students towards integration of technology in curricular practices.

CONCLUSION:

The study clearly reveals that integration of technology in the teaching-learning process is not present in the institutions taken in the study, though they are assumed to have the state of the art technology status. Technology usage has started in teacher education institutions but there is a long way to cover before reaching the stage of seamless technology-integrated education. The technology skills of the teachers must be sharpened to make them more proficient as this is not only related to their own attitude but also with the attitude of their students towards technology integration in the instructional transactions. Since this study was conducted on institutions that have acquired many technologies, it is important to extend this study to the other teacher education institutions and government and government-aided schools of and outside Patna, to draw a better picture about the state of technology usage and its integration in the teaching-learning process in the state of Bihar.

REFERENCES:

[1] Chen, C. H. (2008). Why do teachers not practice what they believe regarding technology integration? Journal of Educational Research, Vol. 102, No. 1, 65-75.
[2] Clark, R. & Surgrue, B. M. (1988). Research on instructional media, 1978-1988. In D. P. Ely, B. Broadbent, and R.K. Wood (Eds), Educational Media and Technology Yearbook, Vol. 14, 19-36. Englewood, CO: Libraries Unlimited, Inc.
[3] Department of Information Technology, Government of Bihar (2011). Information and Communication Technology Policy. GoB, Patna, pp.8-10. Retrieved February 10, 2012, from http://gov.bih.nic.in/Documents/IT-Policy-2011-English.pdf
[4] Hasselbring, T. S. & Glaser, C. H. W. (2000). Use of computer technology to help students with special needs. The Future of Children, 102-122. Retrieved May 31, 2013, from familiestogetherinc.com/wp-content/uploads/2011/08/computertechneeds.pdf
[5] Hattangdi, A. & Ghosh, A. (2008). Enhancing the quality and accessibility of higher education through the use of Information and Communication Technologies. In 11th Annual Convention of the Strategic Management Forum. IIT Kanpur.
[6] Hill, T., Smith, N. D. & Mann, M. F. (1987). Role of efficacy expectations in predicting the decision to use advanced technologies: The case of computers. Journal of Applied Psychology, Vol. 72, No. 2, 307-313.
[7] Kozma, R. (2005). National policies that connect ICT-based education reform to economic and social development. Human Technology, Vol. 1, No. 2, 117-156.
[8] Kulik, J. (2003). Effects of using instructional technology in elementary and secondary schools: What controlled evaluation studies say (Final Report No. P10446.001). Arlington, VA: SRI International.
[9] Matzen, N. J. & Edmunds, J. A. (2007). Technology as a catalyst for change: The role of professional development. Journal of Research in Technology in Education, Vol. 39, No. 4, 417-430.
[10] Oblinger, D. G. & Oblinger, J. L. (2005). Educating the Net Generation. Boulder, CO: Jossey-Bass.
[11] Pan, A. C. & Carroll, S. Z. (2008). Preservice teachers explore instructional software with children. The Educational Forum, Vol. 66, No. 4, 371-379.
[12] Posthuma, R. A. & Campion, M. A. (2009). Age stereotypes in the workplace: Common stereotypes, moderators and future research directions. Journal of Management, Vol. 35, 158-188.

[13] Raudenbush, S., Rowan, B. & Cheong, Y. (1992). Contextual effects on the self-perceived efficacy of high school teachers. Sociology of Education, Vol. 65, 150-167.
[14] Reed, K., Dotty, D. H. & May, D. R. (2005). The impact of aging on self efficacy and computer skill acquisition. Journal of Managerial Issues, Vol. 17, 212-228.
[15] Schellens, T., van Keer, H. & Valcke, M. (2005). The impact of role assignment on knowledge construction in asynchronous discussion groups. Small Group Research, Vol. 36, No. 6, 704-745.
[16] Singh, U. (2013). Factors relating to technology integration in education by the pre-service and the in-service teachers. IOSR Journal of Humanities and Social Science, Vol. 11, No. 3, 3-12.
[17] Tercanlioglu, L. (2001). Pre-service teachers as readers and future teachers of EFL Reading. TESL-EJ, Vol. 5, No. 3. Retrieved May 20, 2013, from http://tesl-ej.org/ej19/a2.html
[18] Thorburn, D. (2004). Technology Integration and Educational Change: Is it Possible? Retrieved Nov. 29, 2012, from http://www.usask.ca/education/coursework/802papers/thorburn/
[19] Webb, M. & Cox, M. (2004). A review of pedagogy related to information and communications technology. Technology, Pedagogy and Education, Vol. 13, No. 3, 235-286.
[20] Zhao, Y. & Bryant, F. L. (2006). Can teacher technology integration training alone lead to high levels of technology integration? A qualitative look at teachers' technology integration after state mandated technology training. Electronic Journal for the Integration of Technology in Education, Vol. 5, 53-62.

*****