International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2007, Vol. 3, Issue 1, pp. 105-115.

Integrating technology into the teaching-learning transaction: Pedagogical and technological perceptions of management faculty

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ABSTRACT

Despite research and testimony that technology is being used by more faculty, the diffusion of technological innovations for teaching and learning has not been widespread, nor has IT become deeply integrated into the curriculum. Although there are a growing number of faculty who are very enthusiastic about adopting technology because of the potential of newer tools for their students, there is still a large number of faculty who seem hesitant or reluctant to adopt technology for their teaching tasks. Given the size of investment in instructional technology in higher education, the increased demand for distance education in the future, and the demonstrated effectiveness with some educational outcomes, it seems reasonable to investigate why the integration of technology for teaching and learning is so appealing to some faculty, and not to others. The study examines the faculty perceptions about technology enabled constructivist pedagogy Vs the didactic pedagogy followed even today in most of the management education institutes. The study tries to evaluate the perception of management faculty about the impact of instructional technology tools on the teaching process, the perceived benefits and limitations of use of instructional technology tools. Also the study tries to find out that do factors such as age, experience, time for lecture preparation and academic background of the faculty members have an effect on the extent of use of instructional technology tools?

Keywords: *instructional technology; technology enabled constructivist pedagogy; technology enabled teaching; effective teaching pedagogy.*

INTRODUCTION

Colleges and universities invest billions of dollars per year for the acquisition of computer technology [Geoghegan, 1994]. Instructional technology may support and increase the efficiency of the teaching-learning transaction or even modify educational processes, especially with regards to distance education and "anytime, anywhere" access [Daniel, 1997]. Formal evidence linking this investment to higher productivity [Schwalbe, 1996] and changes and improvements in the teaching and learning process is accumulating [Kulik & Kulik, 1980, 1987] [Ehrmann, 1995], and new research approaches and methodologies are being developed to adequately study the unique issues involved in educational technology [Bull, et al, 1994] [Clark, 1989] [Reigeluth, 1989]. In some cases, integrating technology into the teaching-learning transaction has been found to transform the teacher's role from being the traditional "sage on the stage" to *also* being a "guide on the side", and student roles also change from being passive receivers of content to being more active participants and partners in the learning process [Alley, 1996] [Repp, 1996] [Roblyer, Edwards, & Havriluk, 1997].

Since management education requires inputs fro the fast changing internal/global business environment, it becomes imperative for management faculty to use information instructional

technology tools like business databases, statistical tools, library databases, internet, office tools, websites, online business games etc. to enhance learning outcomes. The faculty's planning of learning activities will be easier, less time consuming and expanded in scope with the availability of instructional technology and their skill in drawing from it will improve their teaching ability [Ololube 2006]. Information Technology is currently being used effectively in Management education for information access and delivery in libraries, research and development, as a communication medium, and for teaching and learning. Increased access to and use of the Internet is making a unique contribution to the teaching and learning process [Shaw, 1994] and will be an important part of future strategies to provide services to increased number of students in very diverse locations [Daniel 1997, Czerniewicz and Brown 2005].

Given the size of investment in instructional technology in education, it seems reasonable to investigate the integration of technology into teaching and learning. Although most of the faculty has adopted information and communication technologies like power point slides and internet into their teaching, they are still reluctant to adopt more complex computer-based activities or other teaching pedagogy innovations, such as active learning techniques involving video-conferencing and groupware solving of assignments. Decisions made by the teacher about the use of information and communication technologies in the classroom is likely to be influenced by multiple factors including: **demographic** factors (like age, educational background); accessibility of hardware; **experience** in use of instructional technology, perception about **usefulness** (encouraging interaction, teaching more systematic, creativity in the faculty and the students, intellectual enhancement of the faculty, number of years of existence of the institute etc (Samuel and Bakar 2006), **ease of use** (teaching process less personal, intimidating, highly training intensive, time saved in lecture preparation).

The study under review has three mains objectives: (1) to investigate the relationship between age of the institute and the adoption of instructional technology tools (H_{01}, H_{02}, H_{03}, H_{04}); (2) to investigate the relationship between demographic factors and the adoption of instructional technology tools (H_{05}, H_{06}); (3) to evaluate the relationship between perceived usefulness and choice of pedagogy (H_{07}, H_{08}, H_{09}, H_{010}); (4) to analyze the relationship between ease-of-use and choice of pedagogy (H_{011}, H_{012}, H_{013}).

H01 *Is the pedagogy followed significantly associated with the number of years the institute has been in existence?*

H02 *Is the use of the more advanced instructional technology tools like the business databases, statistical tools, library databases, dependent upon the number of years the institute has been in existence?*

H03 *Is there a relationship between the age of the institute and the access to instructional technology tools?*

H04 *Is the pedagogy followed associated with access to instructional technology tools?*

H05 *Is the age of the faculty related with the pedagogy followed?*

H06 *Is there a relationship between academic background (technical/non-technical) of the faculty and choice of pedagogy?*

H07 *Is there is a relationship between the choice of pedagogy and time saved in lecture preparation?*

H08 *Is there is a relationship between the choice of pedagogy and enhanced student involvement?*

H09 *Is there is a relationship between the choice of pedagogy and perception that instructional technology tools make teaching more systematic and creative?*

H010 *Is there is a relationship between the choice of pedagogy and perception that instructional technology tools encourage interaction between the faculty, students and between students?*

H011 *Is there is a relationship between the choice of pedagogy and perception that the use of instructional technology tools is intimidating and complex?*

H012 *Is there is a relationship between the choice of pedagogy and perception that the use of instructional technology tools is highly training intensive?*

H013 *Is there is a relationship between the choice of pedagogy and perception that the use of instructional technology tools makes teaching less personal?*

METHODOLOGY

Our study is based on the perceptions of the faculty on the use of instructional technology tools in management education, because management education teaches students to analyze and interpret the fast changing business environment and respond to the ever changing needs of the business. The present investigation surveyed faculty members from management Institutes offering Masters of Business Administration /Post Graduate Diploma in Business administration. Items gathered information about technology use patterns, computer experience and use of technology for teaching, the impact of instructional technology on the teaching process, using a survey instrument. The instrument had 36 questions. There were questions related to the age of the institute, pedagogy followed, effective pedagogy, age, academic background of the faculty, preference for which instructional technology tools, perceived ease-of-use, perceived usefulness etc. The responses were measured on a likert scale of 1 to 5. The survey was distributed using paper-based mail and e-mail. Complete data was obtained from 150 respondents, 25 of whom completed the web-based survey and 125 the paper-based version. Respondents were on 37.5 years old, had an average of 12.5 years experience as faculty member.

To find out the causal relationships between certain variables, some statistical tests were conducted to validate the results. The statistical methods used were Ch-square test, Z-tests and factor analysis. The researchers conducted a factor analysis (table 3 and table 4) to find out the most important factors which according to the sample determined the adoption of instructional technology tools for instruction. A factor analysis (Table 5 and Table 6) was also conducted to find out common perceptions related to instructional technology.

RESULTS

Our survey revealed that out of the respondents interviewed only 62% had access to PCs. About 40 % followed the lecture method to teach, 4% used only instructional technology while a majority (54%) used a hybrid mix of both methods.

In spite of 62% respondents having access to instructional technology tools, it was found that most of the respondents did not prefer using the various information and communication technology tools for the purpose of teaching. Internet and databases were the most preferred information technology tools used as teaching aids. LCD was also used to some extent as a teaching aid. The faculty hardly ever used videoconferencing and E-grouping technology as part of teaching pedagogy.

The respondents were asked to give their comparative assessments for both instructional technology and lecture method as Teaching-learning Tools as shown in Table 1.

Table 1: *Descriptive statistics for use of instructional technology tools vs. lecture method of teaching*

Perceptions of instructional technology -Vs -lecture method	Mean	SD
Use of instructional technology is complex	2.95	1.30
Use of instructional technology is intimidating	2.55	1.33
Use of instructional technology makes teaching more systematic	3.59	1.09
Use of instructional technology makes teaching more creative	3.48	1.37
Use of instructional technology lacks personal touch	3.24	1.40
Use of instructional technology requires high administrative support	4.10	1.14
Use of instructional technology is less time consuming	3.42	1.13
Use of instructional technology leads to greater student involvement	3.44	1.25
Use of instructional technology ensures greater instructor availability round the clock	3.20	1.49
Use of instructional technology leads to easier student assessment	2.87	1.34
Use of instructional technology gives a global orientation to students	4.08	1.32
Use of instructional technology leads to intellectual enhancement of the faculty	3.44	1.29

Table 2: *chi square tests to analyze the relationship between the variables*

Hypothesis	Pearson chi-square between	p value
H01	Pedagogy followed and perception about effectiveness of a pedagogy	.972
H02	Age of the institute and the pedagogy followed	.002
H03	Age of the institute and the use of more advanced instructional technology tools	.031
H04	Age of the institute and access to instructional technology tools	.000
H05	Pedagogy followed and access to instructional technology tools	.003
H06	Pedagogy followed and the age of the faculty	.698
H07	Pedagogy followed and academic background of the faculty	.501
H08	Pedagogy followed and the time saved in lecture preparation	.01
H09	Pedagogy followed and enhanced student involvement	.685
H010	Pedagogy followed and perception that instructional technology tools make teaching more systematic and creative	.327
H011	Pedagogy followed and intellectual enhancement of the faculty	.003
H012	Pedagogy followed and the perception that instructional technology is complex and intimidating	.008
H013	Pedagogy followed and the perception that instructional technology is highly training intensive	.694
H014	Pedagogy followed and the perception that instructional technology makes teaching less personal	.301

It was revealed that a majority of the respondents agreed that instructional technology is more complex than lecture method and felt intimidated by instructional technology (Mean 2.95, SD 1.30). The respondents found instructional technology to be more systematic and organized than lecture method and felt that instructional technology enabled them to be more creative than

lecture method (Mean 3.59, SD 1.09). However a large percentage felt that Teaching through instructional technology lost the personal touch factor that helps to connect with the students in as better way. With respect to administrative support required a large majority felt that instructional technology required high administrative support than lecture method. A large percentage of the respondents felt that instructional technology saved time and that there is greater student involvement and learning with instructional technology than with lecture method (Mean 3.42, SD 1.13).. Also the instructor availability is more with instructional technology than with lecture method mode of teaching. Respondents were divided on the issue of which method lend itself to easier assessment of student performance. A large majority agreed that instructional technology lead to the global orientation of the students (Mean 4.08, SD 1.32). An overwhelming majority of 80% respondents felt that instructional technology is highly beneficial for students, especially students pursuing a professional course.

DISCUSSION

Interestingly it was found that in spite of the faculty members feeling that the use of instructional technology tools was beneficial for students ,there was found to be no significant relationship between the pedagogy followed and perceived usefulness of instructional technology tools (H_{07},H_{08}, H_{09}, H_{010}).The question that comes to the fore is that despite the availability and access of technology tools to the faculty members and their preference for instructional technology, why were most of them still not using the various technology tools available to them to make their teaching more effective. There was found to be no significant relationship between the pedagogy followed and the effectiveness of pedagogy (H_{01} p value .972). This means that there could be certain other factors which limit the adoption of the instructional technology for teaching in spite of the fact that the faculty were convinced about the benefit of instructional technology. Could there be certain factors like age of the faculty, academic background, and the age of the institution, lack of training etc. which limit the integration of these tools into the teaching learning transaction?

The survey revealed that new age technology teaching was partly intimidating. A large population found it easier to prepare lectures on transparencies rather than use the computer. Most of them also felt that instructional technology was highly training intensive and they needed guidance for using instructional technology as a teaching Aid. Many faculty members felt that given a choice they would still prefer to use the lecture method for effective instruction in class. But on a positive note they also felt that they had more time to devote to intellectual enhancements as instructional technology has resulted in saving time for the respondents. Only a small percentage believed that instructional technology was more easily adopted by faculty who had IT/Engineering background. A very large population was of the strong belief that effectiveness of the lectures is still person oriented and not technology oriented, given the flux of technology enabled teaching environment in the country today. An Overwhelming majority felt that instructional technology enhanced their global orientation as it exposed the faculty to the best practices in the rest of the world.

Normally it is expected that as the institute builds up its infrastructure over the years and the faculty gains experience the pedagogy followed shifts from pure lecture method to instructional technology. The survey revealed that Hypothesis H_{02} is rejected as p value is less than .05 (p value is .002). This implies that there is a statistically significant relationship between numbers of years the institute has been in existence with preference for more advanced (read instructional technology) mode of teaching. Also it was found that as the institute became older, the faculty started using more advanced instructional technology tools (H_{03} p value .031).

It is usually expected that older faculty resist the use of technology enabled teaching and technology tools for research (Taylor & Todd 1995; Kwon & Chidambram 2000). The study revealed that there was no significant association between the two variables: age and pedagogy

followed (p value is .698), so the hypothesis H_{06} is accepted. The demands of professional education are especially high on faculty. Most professional institutes especially private institutes are imposing rigorous standards on the faculty to upgrade develop and deliver more effectively. Also there has been a significant shift from the traditional didactic style of teaching to a more interactive constructivist style of teaching. This requires that faculty across all age groups converge in terms of lecture delivery content as well as context. With an increased focus on quality in professional education gaining momentum instructional technology is an expected style of teaching across all age groups. The study also revealed that even the younger faculty members found instructional technology to be a complex and more demanding style of instruction which involved a lot of pre-preparation for instruction delivery. In spite of a unanimous agreement on the benefits of instructional technology there were doubts with respect to matching of their own personal teaching style with instructional technology.

It is usually felt that a pedagogy adopted by a faculty is dependent on perceived usefulness in lecture preparation (Davis et al 1989). The survey revealed that, there exists definite relationship between time saved and preference of instructional pedagogy. Thus the hypothesis H_{08} is rejected (p value is .01). This indicates that instructional technology has a major benefit in terms of time saved in lecture preparation and delivery. This could be majorly attributed to the time saved in preparing the course plan in the subsequent semester terms. Much of the repetition involved in drafting, designing, and lecture wise handouts is reduced with the active use of instructional technology in instructional pedagogy.

Usually more advanced professional institutes believe in providing complete facilities to its faculty, with the belief that the faculty would utilize these resources in course design, planning delivery, evaluation and up gradation. The purpose is intellectual enhancement of the faculty in terms of not only lecture design and delivery but also in terms of research capability. The survey revealed that the type of pedagogy followed is highly dependent on the access and availability of personal computers to a faculty. Thus the hypothesis H_{011} is rejected (p value .003 at 95% confidence interval).

Usually the academic background of a faculty in a management institute is assumed to have some impact on the ease with which a faculty adapts to instructional technology. The findings of the preliminary survey revealed that this might not always be so. Demands of professional education require quick adaptation to various technological tools and applications which the institute provides to the faculty. Also management as a discipline involves the large number of non-technical sub areas which also use technology in some way or the other such as scientific decision making. Thus the hypothesis H_{05} is accepted (p value .501).

The researchers conducted a factor analysis (table 3 and table 4) to find out the most important factors which according to the sample determined the adoption of instructional technology tools for instruction. Accordingly three factors emerged. The rotated component matrix revealed Eigen values of instructional technology more complex, instructional technology more intimidating, and instructional technology high administrative support with scores of .844, .780 and .551. Thus these components can be clubbed as **factor 1** and labeled as **technology intensive** attributes. **Factor 2** reveals components instructional technology more systematic, instructional technology more creative, and instructional technology more student involvement with scores of .719, .785 and .745. These components can be clubbed as factor 2 and labeled as **learning enhancement** attributes. **Factor 3** comprises components- instructional technology lacks personal touch and instructional technology is less time consuming and this factor can be labeled as **professional interaction**.

Table 3: *Total Variance Explained for factor analysis on instructional technology Vs lecture method*

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.113	26.412	26.412	2.113	26.412	26.412	1.888	23.601	23.601
2	1.571	19.641	46.052	1.571	19.641	46.052	1.717	21.464	45.065
3	1.274	15.921	61.973	1.274	15.921	61.973	1.353	16.908	61.973
4	.955	11.943	73.916						
5	.686	8.579	82.496						
6	.589	7.367	89.863						
7	.462	5.777	95.639						
8	.349	4.361	100.000						

Table 4: *Rotated Component Matrix for factor analysis on instructional technology Vs lecture method*

	Component		
	1	2	3
instructional technology more complex	.844	-.004	-.056
instructional technology more intimidating	.780	.052	-.004
instructional technology more systematic	.304	.719	-.069
instructional technology more creative	.085	.785	-.046
instructional technology lacks personal	.346	-.058	.735
instructional technology-HIGH adm support	.551	.146	.258
instructional technology less time consuming	-.156	.014	.853
instructional technology greater student involvement	-.143	.745	.083

Thus there are three principal areas where the major differences in perception exist as regards use of instructional technology and lecture method in teaching pedagogy. These relate to farads and doubts regarding the perceived technicality of the use of instructional technology, most faculty associate instructional technology with being more complex, and hence feel intimidated by the use of computers in classroom teaching. This could be more a question of mindset and resistance to new changes in the sphere of teaching, lack of computer training and short sightedness on the part of management. The factor 2 analyses revealed that most faculty members agree that there is greater student involvement with the use of instructional technology than with lecture method. The teaching by instructional technology was thought to be a more

creative process than lecture method as the students were exposed to more visual and multimedia presentations in the class which made information much more interesting and exciting. Consequently it was perceived that the students absorption capacity was enhanced leading to greater learning. Studies in communication theory have also supported that there is greater learning through a visual medium of expression. Instructional technology facilitates a more professional interaction and this is revealed by factor 3. Therefore in instructional technology, it is sometimes assumed that instructional technology lacks personal touch factor that helps to connect with students.

A factor analysis (Table 5 and Table 6) was also conducted to find out common perceptions related to instructional technology. Three factors were identified (see rotated component matrix). Components of factor 1 are instructional technology is intimidating, instructional technology is difficult to learn for non IT background faculty and given a choice, clear preference is for lecture method .**Factor 1** can be labeled as **negative presumptions**. **Factor 2** comprises lecture preparation high training intensive and effectiveness orientation; these components can be clubbed as **comfort factor**. **Factor 3** can be labeled as intrinsic **intellectual enhancement**

Table 5: *Total Variance explained for factor analysis on perceptions of instructional technology*

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.434	34.773	34.773	2.434	34.773	34.773	1.780	25.432	25.432
2	1.216	17.377	52.150	1.216	17.377	52.150	1.536	21.941	47.373
3	1.081	15.444	67.594	1.081	15.444	67.594	1.415	20.221	67.594
4	.788	11.256	78.850						
5	.549	7.847	86.698						
6	.472	6.748	93.446						
7	.459	6.554	100.000						

Table 6: *Rotated Component Matrix for factor analysis on perceptions of instructional technology*

Perceptions of instructional technology	**Component**		
	1	**2**	**3**
instructional technology intimidating	.555	.185	.578
lecture preparation	.327	.689	.010
background	.825	.042	.192
high training intensive	.037	.725	-.108
global orientation	-.010	-.056	.900
lecture method preference	.827	.194	-.139
effectiveness	.018	.677	.450

This analysis helped the researchers to club the faculty into three broad categories. The first category of faculty comprised those faculty members who had negative perceptions with respect to instructional technology and were unwilling to change. This category was labeled as Cynic and had strong pedagogical beliefs. The second category comprised those faculty members who with a little training and guidance could adopt instructional technology as classroom practices. These were labeled Moderates as they were ready to change and adapt to newer pedagogical practices. The third category was the intellectual leaders who used instructional technology as a means for intrinsic enhancement and greater global orientation. These were labeled as Adaptors and were continuously innovating their teaching pedagogy by introducing the latest technologies into classroom pedagogy.

CONCLUSION

The study has examined the relationships among teachers' levels of technology use and a number of key factors including years of experience, ease-of use, and access to resources. Achieving meaningful technology use is a slow process that is influenced by many factors. When educators and researchers look for ways to help teachers use technology effectively, it may be important to look at what they have (in terms of equipment) in addition to what they do not have (in terms of positive technology inclinations). Understanding teachers' visions for technology use and their beliefs about teaching and learning may be necessary if we want to initiate an adoption of modern technology interventions in teaching pedagogy.

Many exciting applications of information technology in classrooms validate that new technology-based models of teaching and learning have the power to dramatically improve educational outcomes. But, classroom computers that are acquired as panaceas end up as doorstops. Unless other simultaneous innovations in pedagogy, curriculum, assessment, and school organization are coupled to the usage of instructional technology, the time and effort expended on implementing these devices produces few improvements in educational outcomes - and reinforces many educators' cynicism about fads based on magical machines. To further the study, it is imperative to further research into whether teachers who use technology are smartly predisposed to democratic, collaborative, problem based pedagogy, or does technology bring these behaviors into the classroom? Does improved student learning occur only when technology is introduced along with different teaching practices? What teaching practices are best suited to maximizing the potential of technology to improve student learning?

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