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STATUS OF INFORMATION TECHNOLOGY IN RELATION TO SELECTED VARIABLES: HIGHER EDUCATION TEACHERS' PERSPECTIVE

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ABSTRACT

Education institutions recognize the integration of information technology (IT) in the teaching and learning process as one of the most viable interventions towards educational reform. This paper is designed to help decision makers, implementers and technology users to prepare, collect and assess needed information about whether and how technology is being used in their school systems. Well-gathered data are required to make technology assessments which will serve as a basis for good decisions about the distribution and use of technology in the educational environment. Thus, this paper delved on the teachers' perception on the status of IT in relation to technology proficiency, and the organizational and instructional systems that are supportive of IT. The subjects of the study were sixty (60) teachers in a higher education institution. The data gathering instruments used in the study were researcher-made questionnaire and interview coupled with technology survey on resources and hardware and some available technology documents from different offices. The results indicated teachers' moderate perception on technology profile, organizational and instructional system which is supportive of IT. The status of IT in the institution was also perceived moderately. The correlation analyses revealed that the teachers' technology profile, their perception on organizational and instructional system significantly influenced the school's status of IT. Several recommendations concluded the study including further research that will analyze the capability of the school in improving its entire IT system and infrastructure.

Keywords: Information technology, technology proficiency, instructional system, organizational system

INTRODUCTION

Information technology (IT) in education is becoming an increasingly significant part of professional and higher education (Wernet, et.al., 2000). IT is defined in many different contexts and times. For AIJC (2005), IT refers to the processes (like defining, locating, selecting, analyzing, organizing and presenting information), applications (e.g. word processors, databases, multimedia and computer-aided design, CD-ROM encyclopedias, electronic databases, Internet, etc.) and equipment (like computers and associated peripheral devices such as scanners, plotters, modems and printers including audio-visual and broadcasting equipment such as television, VCRs, projectors, stereo system and the like) by which we access, create, organize, analyze, present and communicate information in a range of formats including text, images and sound. NCES (2002) on the other hand, referred to IT as the full range of computer and computer-related equipment and associated operating systems, networking, and tool software that provide the infrastructure over which instructional and school management applications of various kinds operate. It also includes how, how well, and by whom technology is used, as well as the resources that are required

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for user support. In this paper, IT is used specifically in the educational setting and instructional purposes like motivation, presentation, enrichment activities including teachers' administrative tasks such as grading, assessing, research and the like.

Educational institutions recognize that they must move apace with the technology-driven changes in the society. In today's information society, schools must ensure that learners possess the knowledge and competencies to apply these new information and communication tools productively and they must equip learners with the critical and analytical tools required of them to live and flourish in an information-saturated environment (NCTP, 2000). Higher education institutions acknowledge the integration of ICT in the teaching and learning process as one of the most viable interventions towards educational reform. The integration of technology into schools is in many ways like its integration into any business setting-technology is a tool to improve productivity and practice. Measures need to be available to assess effectiveness and yet some of the most significant effects can be difficult to measure. The most important reason for measuring, though, is the understanding that the impact of technology on schools is dependent upon how successfully technology is integrated (Education Week, 1997).

Since information technologies are continually evolving, and since their distribution throughout the education system is continually changing, responding to the demand for technology data requires ongoing information gathering. Deciding what levels and types of technology are required and/or deployed to accomplish instructional or management goals requires information and insight into the roles that technology plays in the education system. Much of the information needed about the status and use of technology resources in schools can be provided by existing information systems or obtained from available records that schools may keep about their computer and software purchases, use, and maintenance. But some information may be more appropriately gathered by way of specially designed and administered surveys using questionnaires focused on those specific issues (NCES, 2002).

LITERATURE REVIEW

A number of researchers have drawn its attention to assessing teachers' proficiency on technology-use. In order to obtain measures for the indicators of technology standards and integration, the Technology in Schools Task Force has looked for standards that might provide criteria to which behaviors and practices could be compared. Standards for proficiency in the use of technology by students, teachers, and administrators have been mapped through the work of the International Society for Technology in Education (ISTE) and other national groups. Bauer and Kenton (2005) found that teachers, who were highly educated and skilled with technology, were innovative and adept at overcoming obstacles, but they did not integrate technology on a consistent basis both as a teaching and learning tool. Lai, K.W. & Pratt, K. (2004) mentioned in their paper that teacher's time committed to teaching and amount of technology training are reliable factors of technology use in classroom. They asserted that teacher trainers and administrators should not only "provide extensive training on educational technology, but should also facilitate a contribution to teaching improvement. Sandholtz & Reilly (2004) claim that teachers' technology skills are strong determinant of IT integration, but they are not conditions for effective use of technology in the classroom. They argue that training programs that concentrate on IT pedagogical training instead of technical issues and effective technical support, help teachers apply technologies in teaching and learning. Brinkerhoff (2006) in his paper revealed that quality professional training program helps teachers implement technology and transform teaching practices. Teachers may adopt and integrate IT into their teaching when training

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programs concentrate on subject matter, values and the technology (Lawless & Pellegrino, 2007).

An understanding of organizational system that affects teachers' adoption and integration of IT into teaching is relevant. Becta (2003) presented five factors that influence the likelihood that good technology learning opportunities will develop in schools: resourcing, leadership, IT teaching, school leadership and general teaching. They also indicated that the success of the integration of new technology into education varies from curriculum to curriculum, place to place, and class to class, depending on the ways in which it is applied. Yee (2000) pointed out that a leader who implements technology plans and also shares a common vision with the teachers stimulate them to use technology in their lessons. Likewise, Lai & Pratt (2004) suggest that for effective utilization of IT by teachers, there is the need for a strong leadership to drive a well-designed technology plans in schools. Though infrastructure support is essential, school technology leadership is a stronger predictor of technology integration in teaching (Anderson & Dexter, 2005).

Researchers on instructional system include the practice of integrating and using technology for curriculum development, instructional design and assessment systems. Veen (1993) showed that teacher factors far outweighed the institutional or school factors. Despite essential technical support provided by the school and a positive attitude to IT from school leaders, the teacher factors that involved beliefs about the way the subject should be taught and skills associated with competence in managing classroom activities and technology skills were the most influential in teachers' technology integration. Lewis & Mann (1991) stressed that there is a compelling need for teachers to possess the technical skills and attitude and that the innovative teachers emphasized curricula and didactic competencies. They cited that technical competence and pedagogical efficiency are significant to integrate IT in teaching and learning processes. Moreover, curriculum should be designed such that that the learning outcomes are based on technological goals, objectives and competencies to be achieved (Witkin, E., & Altschuld, J. (1999). Instructional design and specifications should consider technology integration and application that will provide students with the opportunity to access alternative representations of concepts and theories that are often difficult to grasp. Verity (2004) stressed that technology and technology resources should be employed in assessing students using a variety of assessment techniques. It should also include an application of multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication and productivity.

OBJECTIVES

The study assessed the status of information technology which will serve as a basis for measures which are directed toward improving the institution's technology system, practices and design.

Specifically, this answers the following research questions:

1. What is teachers' technology profile in terms of:
    a. Technology Proficiency, and
    b. Professional Development Activities?
2. What are the teachers' perception on organizational system that is supportive of IT in terms of:
    a. Leadership
    b. Maintenance and Support
    c. Professional Development Activities, and

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d. Policies and Resources?

3. What are the teachers' perception on instructional system that is supportive of IT in terms of:
   a. Curriculum Development
   b. Instructional Design, and
   c. Assessment Systems?
4. What are the teachers' perception on the status of IT in terms of:
   a. Equipment and Infrastructure
   b. Technology Standards
   c. Technology Applications and Integration, and
   d. Access?
5. Is there a significant relationship between the teachers' perception on the status of IT and their perception on:
   a. Their Technology Profile
   b. Organizational System that is supportive of IT, and
   c. Instructional System that is supportive of IT

CONCEPTUAL FRAMEWORK

Figure 1 shows the paradigm of the study. Technology profile, organizational systems and instructional systems are the independent variables and the status of IT is the dependent variable. The one-headed arrow shows the hypothesized relationship between the independent and dependent variable.

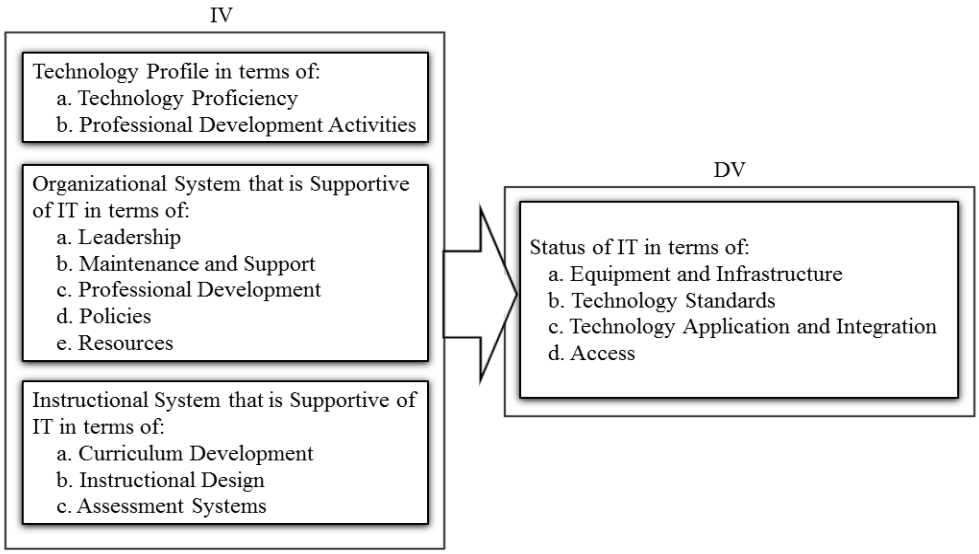

Figure 1. Conceptual Framework

METHODOLOGY

This is a quantitative-qualitative research. Quantitative because both descriptive and inferential statistics were used in the analysis and interpretation of data. Qualitative because it also involved a combination of interview, observation and document analysis in interpreting results of the quantitative survey.

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Sixty (60) of the seventy-three (73) teachers from the seven collegiate departments and the Graduate School professors of a higher education institution are the subjects of the study. Ten (10) of the teachers who were not included as respondents were requested to answer the questionnaire for reliability testing.

The data gathering instruments used in the study are interview and researcher-made questionnaire consisting of four parts. Part 1 of the questionnaire is a survey on teachers' technology profile in terms of technology proficiency and professional development activities. Part 2 is a five-part questionnaire on organizational system that is supportive of IT. Part 3 is a survey on the instructional system that is supportive of IT which consisted of three parts. The last part is a four-part questionnaire on the status of information technology. This instrument was supplemented by survey forms and analyses of existing documents on file in technology office of the school. This instrument was submitted to experts for their comments and suggestions for validation. Their comments and suggestions were incorporated before the instrument was subjected for reliability testing. The reliability coefficients obtained for each of the sub-items for each of the parts ranged from 0.68 to 0.91 which are all greater than the acceptable coefficient of 0.65. Thus, the instrument is reliable.

Permission to gather data was requested by the researcher from the College President and Deans of Academic Affairs and Graduate School prior to administration of the questionnaire. Interviews were also conducted with selected respondents to gather more data and validate information on some technological issues, concerns and practices in the school. Technology survey form on resources and hardware was given to technological staff and administrators which served as hard data for the study. Available documents in different offices were also looked into to supplement data gathered from interviews, questionnaire and technology survey forms.

Descriptive statistics such as the mean was used to answer research questions 1 – 4. A criterion which served as the basis for the interpretation of the mean ratings is as follows: 4.51 – 5.00 (Very high); 3.51 – 4.50 (High); 2.51 – 3.50 (Moderate); 1.51 – 2.50 (Low); 1.00 – 1.50 (Very low). For testing significance of the relationships between the dependent and independent variables of the study, Simple Correlation Analysis was used. The significance level was set at 0.05. To interpret the r-values, the following scale was used: 0.00 – 0.19 (very low correlation); 0.20 – 0.39 (low correlation); 0.40 – 0.69 (moderate/marked correlation); 0.70 – 0.89 (high correlation); 0.90 – 1.00 (very high correlation)

RESULTS AND DISCUSSION

Table 1. Mean Distribution on the Technology Profile of Teachers

Variables	*Sample Item*	*Mean*	*Descriptive Interpretation*
Technology Proficiency	Rate your experience and comfort level in using the following:	3.21	Moderate
a. Experience		3.22	Moderate
b. Comfort Level	a. Audio Equipment	3.20	Moderate
Professional Development Activities	Familiarization with the operation of technology equipment like computers, television, projectors etc. to carry out school tasks.	3.06	
	Overall Mean	*3.13*	*Moderate*

Table 1 shows a summary of the teachers' technology profile in terms of technology proficiency and professional development activities. The overall mean of 3.13 indicates a

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moderate technology profile. Technology proficiency, which is expressed in terms of the respondents' experience and comfort level, had a mean score of 3.21 which is also described as moderate. This shows that the teachers in general have some or little experience in the use of technology and are moderately comfortable or would need some help to feel comfortable with technology. Professional development activities obtained an overall mean rating of 3.06 which indicates that the teachers have some or little training in using technology. The result shows that though the teachers already have moderate proficiency, they still have a lot more to improve. As according to Recker (1997), technology training will not only assist teachers to become confident users of information technology but also will equip them with skills to shift their teaching styles from instruction to facilitation.

Table 2. Mean Distribution of the Teachers' Perception on Organizational System that is Supportive of IT

Variables	*Sample Item*	*Mean*	*Descriptive Interpretation*
Leadership	*Initiate a collaborative formulation of technology vision for the school.*	2.86	Moderate
Maintenance and Support	*There is periodic replacement of parts (like that of computer peripherals, etc.) and renewal of consumable supplies of technology resources.*	2.88	Moderate
Professional Development	*The objectives of the professional development programs in information technology are in line with the school's vision.*	2.95	Moderate
Policies	*There are established technology goals and directions in the school.*	2.60	Moderate
Resources	*There are support personnel with expertise in technology who can help users on their technological operations.*	2.96	Moderate
	Overall Mean	*2.85*	*Moderate*

Table 2 summarizes the mean ratings of the teachers' perception on organizational system that is supportive of IT. As shown in the table, all the indicators of organizational systems have moderate ratings with resources having the highest mean rating of 2.96 followed by professional development with 2.95. In summary, organizational systems that are supportive of IT obtain an overall mean of 2.85 which describes the teachers' perception on organizational systems as moderate. This means that they perceive the present organizational systems in the school as neither too high nor too low. This moderate rating identifies an entry point for improvement on the existing organizational systems in the school in terms of technology.

The summary mean ratings of the teachers' perception on instructional systems that are supportive of IT are presented in Table 3 below. The overall mean rating of 3.36 shows that the teachers' perception on the instructional systems that are supportive of IT is moderately good. This implies that the present system of instruction is supportive of IT has a lot more to improve to help achieve better instruction and more quality education in the school. Curriculum development is rated high by most respondents with an overall mean rating of 3.60. An analysis of the curriculum of each department, takes into account the technology needs of the students. Computer subjects and other technology-related subjects are required for all students (whether enrolled in a technology-based course or not) to be technology or computer literates. Instructional design (3.41) and assessment systems (3.09) are given moderate ratings by all respondents. Interviews conducted among selected respondents reveal their eagerness to integrate technology in their instructional tasks including student

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assessment but some other factors like accessibility of resources and cost hinder them from doing so.

Table 3. Mean Distribution of the Teachers' Perception on Instructional System that is Supportive of IT

Variables	*Sample Item*	*Mean*	*Descriptive Interpretation*
Curriculum Development	*The design of the curriculum is driven by the goals and performance indicators for student learning in technology that has been defined by the school or as required by the Commission on Higher Education (CHED).*	3.60	High
Instructional Design	*Applications of technology are incorporated in the design of teaching strategies to make learning activities more meaningful and relevant to students.*	3.41	Moderate
Assessment System	*Information Technology resources are employed to expand and strengthen the system of assessing student learning.*	3.09	Moderate
	Overall Mean	*3.36*	*Moderate*

Table 4. Mean Distribution of the Teachers' Perception on the Status of IT

Variables	*Sample Item*	*Mean*	*Descriptive Interpretation*
Equipment and Infrastructure	*The school's infrastructure has the capacity to support the school's technology needs.*	2.74	Moderate
Technology Standards	*Demonstrate knowledge, skills and understanding of concepts related to technology.*	3.26	Moderate
Technology Application and Integration	*Technology is applied and integrated in each of the following:* *a. Class Discussion*	3.04	Moderate
Access	*Technology equipment (e.g. computers, projectors, television, etc.) is available for use by teachers in instructional settings.*	2.79	Moderate
	Overall Mean	*2.96*	*Moderate*

Table 4 summarizes the mean ratings of the teachers' perception on the status of IT in DWCC. In general, the status of IT in the school is rated moderately by the teachers. This is a good indication that the school is at par in terms of its technological capacity that will ensure its competitiveness in providing high quality education to its clientele. All indicators of status of IT are given moderate ratings with technology standards and technology application and integration having the highest mean scores of 3.26 and 3.04, respectively. Equipment and infrastructure and access are perceived to have the lowest mean ratings of 2.74 and 2.79. These ratings show that the teachers maintain good technology standards to be able to carry-out their tasks and to set as good technological models to students. Comments in this regard specify their desires to ensure better technological standards as well as technology integration and application through better equipment and infrastructure as well as access to them.

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Table 5. Summary of r-values

IV		*DV: Status of IT*			
		r-values			
		Equipment and Infrastructure	*Technology Standards*	*Technology Application and Integration*	*Access*
Technology Profile	Technology Proficiency	0.338*	0.330*	0.492*	0.476*
	Professional Development Activities	0.496*	0.665*	0.548*	0.557*
Organizational System that is Supportive of IT	Leadership	0.400*	0.322*	0.558*	0.504*
	Maintenance and Support	0.607*	0.493*	0.664*	0.717*
	Professional Development	0.465*	0.443*	0.576*	0.569*
	Policies	0.590*	0.392*	0.592*	0.562*
	Resources	0.595*	0.427*	0.658*	0.691*
Instructional System that is Supportive of IT	Curriculum Development	0.688*	0.231	0.608*	0.681*
	Instructional Design	0.655*	0.654*	0.592*	0.625*
	Assessment System	0.649*	0.612*	0.522*	0.647*

df = 59, Critical value = 0.252, *significant at 0.05 level

Table 5 reveals that there is a significant relationship between the status of information technology and profile. The r-values showed a low to moderate relationship between the variables correlated. This implies that technology profile of teachers should be given special attention. This finding further suggests the need to increase the technology proficiency and professional development activities of teachers to obtain higher status of IT. Ross (1993) pointed out that substantial investment in hardware, infrastructure, software and content will be largely wasted if teachers and even students are not provided with the preparation and support they will need to effectively integrate information technologies into their teaching.

Significant relationship also exists between the teachers' perception on the status of IT and organizational systems that are supportive of IT with all computed values greater than the critical value. The r-values also revealed low to high relationship between the variables. This result shows that the existing status of IT in the school is highly dependent on organizational system which is moderately supportive of IT. This is consistent with the study conducted by Earle (2002) who pointed out some of the factors to the integration of technology in the classroom including both restraining forces that are extrinsic to teachers such as access, time, support, resources, and training and influences that are intrinsic such as attitudes, beliefs, practices, and resistance.

The foregoing table also summarizes the correlation analyses on the teachers' perception of instructional system and the status of IT. All the computed values show significant relationship except for technology standards relative to curriculum development with a

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computed r-value of 0.231 which is less that the critical value. This imply that regardless of what curriculum practices are being implemented in the school or in each department, they have not affected much the technology standards maintained by the teacher. But in general, the significance of the relationship between instructional systems that is supportive of IT shows that the instructional practices of the faculty influence the present status of IT in the school. This is consistent with the study conducted by Means (1993) who pointed out that the instructional value of technology lies in the way that it is used and in the activity structure that surrounds it rather than in the hardware or software itself.

CONCLUSIONS AND RECOMMENDATIONS

On the basis of the findings of the study, several conclusions were drawn. The teacher-respondents have some or little experience in the use of technology and are moderately comfortable or would need some help to feel comfortable with technology. The school's organizational system is perceived by the teachers as moderately supportive of IT. The system of instruction that is supportive of IT, which was also moderately perceived by the teachers, has a lot more to improve to help achieve better instruction and more quality education in the school. Likewise, the status of IT in the school is perceived moderately by the teachers. The present school resources and infrastructure can support the technology needs of the school but the teachers perceived that there will be more efficient operations in the school if technology advancements will be prioritized. The correlation analyses revealed that the teachers' technology profile, their perception on organizational and instructional system significantly influenced the school's status of IT.

In line with these conclusions, the following are recommended:

A training needs assessment should be made to level the training design with the present needs and proficiency of teachers. Teachers should also take the initiative to continually update him with the recent and current trends of technology integration to be able to share its benefits to students.

Technology goals, directions and policies should be well-established and defined to give the school specifically teachers and students a concrete guide in their technological practices as they apply and integrate technology in the teaching and learning process.

Leaders of the school should take the initiative of looking into the technological needs of teachers and students. Planning, maintenance and technology operations of the school should be centralized in an office with functions that are well-defined and properly coordinated.

Budget should be equitably allocated to the technological needs of each and every department. Technology expenditures should be best analyzed not on the basis of cost alone, but in terms of return on investment.

Maintenance and support should be accorded to departments who need to be technologically updated and supported.

Technology resources should be made available in instructional settings specifically in students' classroom. Teachers' should maximize the use of technology in their teaching pedagogy and assessment system.

Additional equipment like computers and computer peripheral should be provided at most for each classroom. Instructional software or applications should also be made available to teachers and students. Teachers should be provided with sufficient number of computers and other technology equipment to enable them to perform their instructional tasks in school.

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Teachers should strive to continuously raise their technological standards. They should have the eagerness and drive to optimize the infinite ways of integrating technology in their daily lives specifically in the teaching-learning process.

Technology resources should be made available to all students, regardless of their course (whether technology-based or not), even socio-economic status, race, ethnicity, gender, or special needs. Equity in access should be a central consideration in all programs dealing with the use of technology in education.

An IT program should be planned and implemented to guarantee an on-going systematization and organization of the school's technology resources and practices.

Further study that would analyze the capability of the school of improving its entire IT system and infrastructure should be conducted.

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