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ABSTRACT

A study to determine the best predictors of teacher technology use in the classroom was conducted for small rural schools in southeastern Idaho. A 40-item survey was completed by 3,500 teachers in 55 school districts. Results indicated that one third to one half of the teachers never actually used technology for any instructional purpose. Over 70 percent of teachers never used the Internet in the classroom. More than one half of the teachers perceived themselves as novices in the use of technology in all items of the survey. Overall, teachers rated themselves as novices in computer literacy. The educational level of the teacher was the best predictor of the teachers' actual use of technology in preparation of instructional material, attendance reporting, and word processing. The number of computers in the classroom was the second best predictor of teachers' actual use of technology. Educational level was the best predictor of teachers' perceptions of their ability to use technology in preparation of instructional materials, drill and practice, word processing, and use of the Internet. The lower the educational level of the teacher, the higher the perceived ability of the teacher to use technology, indicating that veteran teachers need more staff development and training than newly hired teachers. The second best predictor of teachers' perception of their ability to use technology was gender. Males tended to perceive themselves as having higher ability in technology use compared to females. Appendices include the survey questionnaire and date tables. (TD)

PREDICTING TEACHER PERCEIVED TECHNOLOGY USE: NEEDS ASSESSMENT MODEL FOR SMALL RURAL SCHOOLS

Jerry G. Mathews

Abstract

This needs assessment study was conducted for small rural schools in southeastern Idaho. The needs assessment was intended to determine the best predictors of teacher technology use in the classroom. A 40 item survey was completed by approximately 3500 teachers in 55 school districts. The survey addressed three general areas. Part I defined the population using 10 demographic variables. Parts II and III of the survey assessed teachers' perceptions of their ability to use technology and their actual use of technology in the classroom. The results of the study were valuable to school district administrators to determine current technology levels of use by teachers; current technology resources; future staff development and technology planning needs. The data indicated that education level, gender, number of students taught, and existing technology resources in the classrooms were important predictors of technology use among teachers.

PREDICTING TEACHER PERCEIVED TECHNOLOGY USE: NEEDS ASSESSMENT MODEL FOR SMALL RURAL SCHOOLS

Introduction

Across the nation, the need for technology planning has become an integral part of restructured school programs (Plotnick, 1995). The lack of funding and readily available resources is a critical factor in implementing any program in the nation's small rural schools, and, especially in technology. Small and rural school administrators must assure that technology implementation is carefully planned to maximize current resources and future funding.

Possibly the most critical element for successful planning and implementation of any major initiative, particularly technology, is a needs assessment in the early planning stages. Specific technological approaches are necessary to meet special needs. A major emphasis in technology planning should be on the teacher/instructor, and to effectively deploy teachers may require a reorganization of the school and redefinition of the teacher's role. The basic question is: What competencies do teachers/instructors need to use technology effectively with their learners? A large portion of the educational technology literature is about the design, development, and evaluation of instructional materials. There is an apparent lack of carefully initiated needs assessment in schools/districts prior to implementing technology

plans specifically related to how teachers are using technology effectively and efficiently.

Technology Planning in Idaho

In Idaho, with its majority of schools in remote, rural areas, the need for technology planning, teacher training and staff development was a critical issue. Rural schools in Idaho began moving rapidly into the world of technology with the provision of ten million dollars in block grants by the Idaho Legislature in 1995. Prior to 1995, each school district was responsible for funding technology from other sources. The legislature plans to continue to appropriate ten million dollars annually or bi-annually for implementation of technology in Idaho schools.

Superintendents in fifty-five school districts in Southeast Idaho, which includes 36 districts in two partnerships with Idaho State University College of Education, requested assistance with technology planning to make the most efficient use of the technology funds. The Office of Professional Development for Schools (OPDS) in the College of Education at Idaho State University assists the 55 school districts in its service area on a regular basis; therefore, OPDS assumed the responsibility for conducting a needs assessment to determine the level of knowledge and use of technology by classroom teachers. The first, and possibly the most critical, step in the process was to assess current technology available in the districts and the way teachers were using the technology.

The Teacher Technology Survey Questionnaire (TTSQ) (See Appendix A) was developed to assist school district superintendents and other school administrators to assess current technology resources and practices in addition to future technology planning, staff development and training needs. Specific items in the TTSQ were used to: (a) determine selected demographic variables that described the population of teachers in each district, (b) determine specific uses of technology by classroom teachers in each district, and (c) based upon the selected demographic variables, determine the best predictors of teachers' ability to use technology and their actual use of technology in the classroom.

A Preview of the Needs Assessment Results

The outcomes of the assessment provided valuable information for the school district administrators to determine current technology resources and practices. In addition, the data was useful for developing future planning, training, and staff development related to district technology goals. The overall pattern of the data indicated approximately one-third to one-half of the teachers never actually used technology for any instructional purposes. The TTSQ asked teachers to rate themselves in computer literacy as either novice, intermediate, or advanced. Overall, teachers rated themselves as novices in computer literacy. Thus, it appears that, in Southeastern Idaho school districts, training and staff development are needed to enhance the teachers' actual use of technology and ability to use

technology. The data indicated that the education level of the teacher was the best predictor of the teachers' actual use of technology in three of the items surveyed: (a) preparation of instructional material, (b) attendance reporting, and (c) word processing.

Small rural school administrators often have few applicants to choose from when hiring new faculty. In many cases, the applicants are new teacher education graduates looking for their first teaching positions. According to the needs assessment data, recently hired teachers with Bachelor's degrees may be better trained in technology and have higher computer literacy than the veteran teachers. New teacher graduates who are hired would require less training and staff development in the use of technology in the classroom.

The number of computers in the classroom was the overall second best predictor of teachers' actual use of technology. The higher the number of computers in the classroom, the more frequently teachers used technology. This data indicated that the funds spent for hardware paid off in dividends of technology use by teachers.

Technology Planning

Dr. Larry S. Anderson (1997), director and founder of the National Center for Technology Planning (NCTP) at Mississippi State University, has noted that less than 30% of America's schools possess a written technology plan that is integrated across the curriculum. A technology plan is defined as a "written

document that represents the very best thinking accumulated in a particular environment (school building, district, state, etc.) for the purpose of studying technology infusion, then recommending direction for the future" (p. 2). The NCTP has the mission of assisting schools throughout the United States in technology planning efforts. Anderson stressed the importance of using strategic planning to help insure the success of a technology plan. The necessary components of technology planning, as noted by Anderson, are: (a) initiating structure - developing a technology planning team consisting of school personnel and other stake holders, (b) vision building - formulation of belief and mission statements of the technology plan through consensus, (c) development of goals and objectives, (d) formulation of an action plan, (e) implementation of the plan, and (f) on-going evaluation.

Without effective needs assessment prior to implementation of technology, its effective and efficient use in achieving the expected outcomes is unlikely (Flank & Livesey, 1993). In fact, improvement in academic achievement by using educational technology in many of the nation's schools has been dismal over the past decade. The failures have been attributed to such factors as: (a) limited knowledge of teachers about technology (Larner & Timberlake, 1995), (b) a lack of technical support (Shick, 1996), (c) a lack of time to learn about technology (Quality Education Data, 1995), (d) technology plans based on numbers of machines and not learning outcomes (See, 1997), and (e) a lack of training and staff development. The National Educational Goals Report (1995)

stated that only half of all teachers reported any professional development opportunities available to them in the areas of technology. Provisions for technology training and staff development must be included in technology planning. However, according to a technology study by Mann and Shafer (1997), teachers reported spending three times as much of their own time learning technology as they spent in district-sponsored training time. Hence, after the initial training phase, extra time commitment is required by teachers to master technology skills.

The Needs Assessment Component of Technology Planning

Perhaps the most crucial area of focus for the use of educational technology is student achievement. In addition, teacher initiated use of technology is potentially the most important element in the efforts to achieve success in outcome-based technology plans. In a three year technology and achievement study by Mann and Shafer (1997), it was determined that in "schools that had more instructional technology and teacher training . . . we found a strong relationship between increased technology and higher scores . . . ." (p. 22). Seventy-five percent of the school districts in the study had Internet connections. Seventy-five percent of the teachers were using computer-related technology. Unfortunately, many of the nation's schools fail to show such achievement in outcomes of technology implementation. Comprehensive needs assessment as a component of technology planning may be the answer to solving that problem.

Methods

Population and Instrumentation

The population in this study consisted of 5862 teachers in 55 Southeastern Idaho school districts. These 55 school districts contain mostly small, rural schools in farming or mountain communities. The total student population in grades K-12 was 107,442. The number of minority students was 14,032. The percentage of white students was 87%, Hispanics 9%, Native Americans 3%, and African Americans 1%. Data for the study were obtained from a 40-item Teacher Technology Survey Questionnaire (TTSQ)(See Appendix A). The surveys were mailed to the schools in 55 school districts. Detailed instructions were provided to the school building principals for administering the surveys to teachers. Self addressed stamped envelopes were provided to mail the surveys back to the Office of Professional Development for Schools for analysis. Approximately 3500 useable surveys were analyzed for a return rate of 60%.

The first part of the TTSQ consisted of 10 questions relating to demographic variables, most of which served as predictor variables in multiple linear regression analysis. Seven items selected from Part II of the survey were the dependent variables used to determine classroom teachers' perceptions of their actual use of technology. The same set of items, indicated in Part III of the survey, was used to determine teachers' perceptions of their ability to use technology.

For each of the items indicating actual use of technology, the scale was (a) never, (b) rarely, (c) frequently, and (d) always. For each of the items indicating ability to use technology, the scale was as follows: (a) novice, (b) intermediate, and (c) advanced.

The demographic data and questions for the TTSQ were developed based on needs requested by school district superintendents and from consultation with experts in the educational technology field. A pilot study was conducted to determine the internal consistency of instrument. The reliability coefficient for the TTSQ was .91.

Research Questions

Research Question 1. What is the descriptive profile of teachers based on the perceptions of their actual use of technology and their ability to use technology?

Research Question 2. What are the best predictors of teachers' perceptions of their actual use of technology related to (a) preparing instructional materials for classroom use, (b) grade recording and calculation, (c) attendance, (d) tutorials to explain concepts/methods, (e) drill and practice, (f) word processing, and (g) the Internet?

Research Question 3. What are the best predictors of teachers' perceptions of their ability to use technology related to (a) preparing instructional materials for classroom use, (b) grade recording and calculation, (c) attendance, (d) tutorials to

explain concepts/methods, (e) drill and practice, (f) word processing, and (g) the Internet?

The independent (predictor) variables for research questions 2 and 3 were as follows: (a) gender, (b) educational level of the respondent, (c) total years of teaching experience, (d) grade level presently teaching, (e) number of subject preparations presently teaching, (f) number of students taught per day, and (g) the number of computers in the teacher's classroom.

Results

Percentages of Teachers' Responses

This section is a summary of the perception percentages of teachers who responded to the scale items in Part II and Part III of the TTSQ. Included are the results of the analysis for research question 1 regarding teachers' perceptions of their actual use of technology (see Table 1) and teachers's perceptions of their ability to use technology (see Table 2). In addition to the analysis of results for all 55 school districts combined reported in this manuscript, reports were prepared and sent to each individual school district regarding specific district data.

Teachers' Perceptions of Their Actual Use of Technology. This section contains the calculations of the percentages of teachers' responses to their actual use of technology, Part II of the TTSQ.

Table 1

Percentage of Teachers' Perceptions of Their Actual Use of Technology

Item	Percent			
	Never	Rarely	Frequently	Always
Preparation of instructional materials	28.8	37.6	25.6	8.0
Grade recording and calculation	28.1	23.4	24.0	22.5
Attendance	54.7	11.5	8.5	25.3
Tutorials	43.0	30.5	22.1	4.4
Drill and practice	39.3	27.8	26.4	6.5
Word Processing	27.9	22.7	30.9	18.5
Internet	79.1	12.6	5.6	2.7

Teachers' Perceptions of Their Ability to Use Technology

Table 2 is a summary of the percentage of teachers who responded to the items in Part III of the TTSQ. This section includes the results of the analysis for research question 1 regarding teachers' ability to use technology.

Table 2

Percentage of Teachers' Perceptions of Their Ability to Use Technology

Item	Percent		
	Novice	Intermediate	Advanced
Preparation of instructional materials	59.2	28.2	12.6
Grade recording and calculation	42.8	37.3	19.9
Attendance	55.6	26.9	17.5
Tutorials	58.4	32.2	9.4
Drill and practice	50.4	36.7	12.9
Word Processing	41.1	37.3	21.6
Internet	77.4	17.8	4.8

Predictors of Teachers's Perception of Their Actual Use Technology

In this study, separate multiple regression analyses were conducted using the teachers' perception variables as separate dependent variables. These dependent variables, contained in Part II of the TTSQ, were as follows: (a) preparing instructional materials for classroom use, (b) grade recording and calculation, (c) attendance, (d) tutorials to explain concepts/methods, (e) drill and practice, (f) word processing, and (g) the Internet.

Multiple linear regression analysis was performed to determine which independent variables (predictor variables) accounted for a statistically significant amount of the variation in teachers' perception of their actual use technology (dependent variables). Table 3 is a matrix representing rank order of the independent variables that are the best predictors of teachers' perceptions of their actual use of technology (dependent variables). The regression analysis estimates the coefficients of a linear equation involving the independent variables that best predict the value of the dependent variable. Multiple regression determines the relative importance of each independent variable on the teacher perception items used in the analysis. One way to determine or assess the relative importance of independent variables in the regression equation is to consider the increase in the R^2 value when a variable is entered into the regression equation that already contains the other independent variables (Pedhauzer, 1982). The R^2 increase can be calculated by subtracting

the previous R^2 reported at each step from the R^2 in subsequent steps. The equation used in this analysis was

$$R^2_{change} = R^2 - R^2_{(i)}$$

where $R^2_{(i)}$ is the R^2 value when all independent variables except the ith variable were in the equation. The predictor variables included in the matrix are: (a) gender, (b) educational level of the respondent, (c) total years of teaching experience, (d) grade level presently teaching, (e) number of subject preparations presently teaching, (f) number of students taught per day, and (g) the number of computers in the teacher's classroom. In Table 3, the rank of one (1) represents the predictor variable that is most important in accounting for variation in the dependent variable. Appendix B, Table 4 through Table 17, contains detailed results of the regression analysis of the independent variables that predict teachers' actual use of technology.

Table 3

Ranking of Predictors of Teachers' Perception of Their Actual Use of Technology

Rank Ind. Var.	Q11[a]	Q12[a]	Q13[a]	Q15[a]	Q16[a]	Q18[a]	
1	Education Level (-)	Number Students Taught	Education Level	Number Computers in Classroom	Number Students Taught (-)	Education Level (-)	Nu Cc ir Cl
2	Number Computers in Classroom	Number Computers in Classroom	Number Computers in Classroom	Grade Level (-)	Grade Level (-)	Grade Level	Nu St Ta
3	Years Experience	Education Level	Number Students Taught	Number Subjects Taught	Number Subjects Taught	Years Experience	Gr Le
4	St. Tau.	Gender (-)	Gender (-)		Gender	Gender	
5	Gender (-)				Years Experience		
6					Number Computers in Classroom		

Note. [a] Dependent variables: (Q11) preparing instructional materials for classroom use, (Q12) grade recording and calculation, (Q13) attendance, (Q15) tutorials to explain concepts/methods, (Q16) drill and practice, (Q18) word processing, and (Q21) the Internet.
[b] Negative sign (-) represents a negative correlation between the predictor variable and the dependent variable.

Predictors of Teachers's Perception of Their Ability To Use Technology

Multiple linear regression analysis was performed to determine which independent variables (predictor variables) accounted for a statistically significant amount of the variation in teachers' perception of their ability to use technology (dependent variables). Table 18 is a matrix representing rank order of the independent variables that are the best predictors of teachers' perceptions of their ability to use technology (dependent variables). The rank of one (1) represents the predictor variable that is most important in accounting for variation in the dependent variable. Appendix C, Table 19 through Table 32 contains detailed results of the regression analysis of the independent and dependent variables that predict teachers' ability to use technology.

Table 18

Ranking of Predictors of Teachers' Perception of Their Ability to Use Technology

Rank Ind. Var.	Q26[a]	Q27[a]	Q28[a]	Q30[a]	Q31[a]	Q33[a]	
1	Education Level (-)	Gender (-)	Number Computers in Classroom	Number Computers in Classroom	Education Level (-)	Education Level (-)	Edu Lev
2	Grade Level	Number Students Taught	Gender (-)	Gender (-)	Number Computers in Classroom	Gender (-)	Gen (-)
3	Number Computers in Classroom	Number Computers in Classroom	Number Students Taught	Grade Level (-)	Grade Level (-)	Grade Level	Num Com in Cla
4	Years Experience	Education Level (-)	Grade Level		Number Students Taught (-)		
5	No. Sub. (-)	Grade Level	Years Experience (-)		Gender (-)		
6	Gender (-)						

Note. [a] Dependent variables: (Q26)preparing instructional materials for classroom use, (Q27) grade recording and calculation, (Q28) attendance, (Q30) tutorials to explain concepts/methods, (Q31) drill and practice, (Q33) word processing, and (Q36) the Internet.
[b] Negative sign (-)represents a negative correlation between the predictor variable and the dependent variable.

Discussion

Research Question 1. How do teachers perceive their actual use of technology and their ability to use technology? The overall pattern of the data indicated approximately one-third to one-half of the teachers never **actually used technology** for any instructional purposes (See Table 1). The lack of use of technology for tutorials and drill and practice may be explained by the lack of adequate numbers of computers in the classrooms. The average number of computers in the classroom was three for all school districts. More than 70% of the teachers never used the Internet in the classroom. Internet use is a topic that needs more indepth study in southeastern Idaho schools. For schools that do not have Internet available, it may be a resource to consider in expanding technology capability in the overall plan.

The overall pattern of the data regarding the teachers' **ability to use technology** indicated that more than one-half perceived themselves as novices in the use of technology in all of the items in Part III of the survey (See Table 2). In addition, the survey asked teachers to rate themselves in computer literacy as either novice, intermediate, or advanced. Overall, teachers rated themselves as novices in computer literacy. Thus, it appears that, in Southeastern Idaho school districts, training and staff development are needed to enhance the teachers' skills in their actual use of technology and ability to use technology.

Research Question 2. What are the best predictors of teachers' perceptions of their actual use of technology related to (a) preparing instructional materials for classroom use, (b) grade recording and calculation, (c) attendance, (d) tutorials to explain concepts/methods, (e) drill and practice, (f) word processing, and (g) the Internet? The overall pattern of the data indicated that the **education level** of the teacher was the best predictor of the teachers' actual use of technology in preparation of instructional material, attendance reporting, and word processing (See Table 3). Overall, more frequent use of technology was indicated by teachers with a Bachelor's degree (lower education level). Approximately one-third of the teachers reported their teaching experience as less than one year while one-third reported their teaching experience as more than 10 years. Eighty percent of the teachers reported a Bachelor's degree as their education level. Thus, recently hired teachers with Bachelor's degrees may be better trained in technology and have higher computer literacy than the veteran teachers.

The number of computers in the classroom was the overall second best predictor of teachers' actual use of technology. The higher the number of computers in the classroom, the more frequently teachers used technology. This data indicates that the funds spent for hardware pay off in dividends of technology use by teachers.

Research Question 3. What are the best predictors of teachers' perceptions of their ability to use technology related to (a) preparing instructional materials for classroom use, (b) grade recording and calculation, (c) attendance, (d) tutorials to explain concepts/methods, (e) drill and practice, (f) word processing, and (g) the Internet? As we expected, the predominant predictor of the teacher's **ability to use technology** was the education level of the teacher (See Table 4). Overall, the data indicated that education level was the best predictor of teachers' perceptions of their ability to use technology in four of the dependent variables: (a) preparation of instructional materials, (b) drill and practice, (c) word processing, and (d) use of the Internet. Again, the lower the education level of the teacher, the higher the perceived ability of the teacher to use technology. This indicates that veteran teachers need more staff development and training than the newly hired teachers.

The second best predictor of the teachers' perception of their ability to use technology was gender. It was indicated as either the first or second best predictor in six of the seven items selected as dependent variables. In this study, males tended to perceive themselves as having high ability in the use of technology compared to females.

Our conclusion is that this model can be used by administrators to assess technology needs for their teachers. The data tends to indicate that there is a need for staff development

and training based on the responses of teachers to the items in the TTSQ. It is especially important to note for small rural schools that hiring recent graduates of teacher education programs may assure administrators that school districts will have teachers who have the ability to use technology in the classrooms. Also, administrators can compare the demographic characteristics of teachers in their school districts to the findings regarding teacher demographic variables in this study and make decisions about the greatest need in planning for technology.

The results of needs assessment models such as this study are valuable to school district administrators who are presenting proposals to school boards and other funding agencies. Data based decisions can then be made to procure funds to implement effective technology planning.

Following the conclusion of the needs assessment conducted by OPDS at Idaho State University, a two-day workshop was developed in the fall of the next school year to provide staff development and training for over 1000 teachers and administrators. The results of the teacher technology needs assessment was useful in planning topics for the training sessions.

References

Anderson, L. S. (1997). Technology planning: A recipe for success. [On-line]. Available: http://www.nctp.com/

Flank, S. G. & Livesey, L. (1993). Computers in education: A survey of computer technology in Westchester/Putnam schools. Westchester Education Coalition, White Plains, NY. (Eric Document Reproduction Service No. ED 360 954)

Larner, D. K. & Timberlake, L. M. (1995). Teachers with limited computer knowledge: Variables affecting use and hints to increase use. Report No. 143. (ERIC Document Reproduction Service No. ED 384 595)

Mann, D. & Shafer, E. A. (1997). Technology and achievement. The American School Board Journal, 48, 22-23.

The National Education Goals Report. (1995). Washington, DC: U.S. Government Printing Office.

Pedhauzur, E. J. (1982). Multiple regression in behavioral research (2nd ed.). Fort Worth, TX: Holt, Rinehart, and Winston, Inc.

Plotnick E. (1995). Trends in educational technology 1995. (ERIC Document Reproduction Service No. EDO-IR-96-08)

Quality Education Data. (1995). Technology trends in U.S. public schools. [On-line]. Available: http://www.edshow.com/QED/

See, J. (1997). Developing effective technology plans. Minnesota Department of Education. [On-line]. Available: http://www.nctp.com/

Shick, R. W. (1996). Implementation of technology in the classroom. Master's practicum paper, Nova Southeastern University, FL. (ERIC Document Reproduction Service No. ED 394 516)

APPENDIX A

Teacher Technology Survey Questionnaire

Office of Professional Development For Schools
College of Education
Idaho State University
Teacher Technology Survey Questionnaire

School district superintendents in Regions 4, 5, and 6 have requested that the Office of Professional Development For Schools gather information regarding teachers' use of technology and staff development needs for school districts. Your help, as a teacher, is critical to the success of this survey.

This survey packet contains the following: (a) a 40 item Technology Survey Questionnaire (FRONT AND BACK) and (b) a Scantron answer form. Please take a few minutes to respond to the items listed on the Survey Questionnaire. Then, return the entire survey packet to your building administrator for mailing to ISU. Thank you in advance for your assistance.

Identification Number Directions: In the largest rectangle at the top of the Scantron answer form, fill in the **three-digit region number code for your school district** in the top three rows of "bubbles". Then write in the corresponding numbers in the top three open spaces to the right. Use the three-digit number **district code** provided by your principal.

PART I. Directions: Respond to each of the following by filling in the bubbles under the appropriate letter on the Scantron answer form corresponding to the item number. Please use a number 2 softlead pencil and carefully fill in only one bubble for each item. Do not put any stray marks on the Scantron form as the scanner will read only marks within the bubbles.

1. (a) male (b) female

2. Ethnic background of respondent:
   (a) Native American
   (b) Asian/Pacific Islander
   (c) African American
   (d) Hispanic
   (e) White

3. Educational level of respondent:
   (a) 4 year college degree
   (b) Master's Degree
   (c) Educational Specialist Degree
   (d) Doctoral Degree
   (e) Other

4. Total years of teaching experience:
   (a) Less than one year
   (b) 1-3 years
   (c) 4-5 years
   (d) 6-10 years
   (e) More than 10 years

5. Grade level presently teaching:
   (a) K-3
   (b) 4-6
   (c) 7-8
   (d) 9-12
   (e) Other

6. Number subject preparations taught:
   (a) 1
   (b) 2
   (c) 3
   (d) 4 or more

7. Number of students taught per day:
   (a) less than 30
   (b) 30-59
   (c) 60-89
   (d) 90-119
   (e) 120 or more

8. Number of computers in your classroom:
   (a) 0
   (b) 1-3
   (c) 4-6
   (d) More than 6

9. Your computer literacy self rating:
   (a) Novice
   (b) Intermediate
   (c) Advanced

10. Instructional minutes in computer lab per week:
    (a) 0
    (b) 0-30
    (c) 31-60
    (d) More than 60

PART II. Directions: Respond to the following numbered items by filling in the bubbles under the appropriate letter on the Scantron answer form corresponding to the item number. Use only one response indicating your actual use of technology for each item from the following:

	(a) Never	(b)Rarely	(c) Frequently		(d) Always
11.	Preparation of instructional materials	(a)	(b)	(c)	(d)
12.	Grade recording and calculation	(a)	(b)	(c)	(d)
13.	Attendance	(a)	(b)	(c)	(d)
14.	Graphics and drawing	(a)	(b)	(c)	(d)
15.	Tutorials to explain concepts/methods	(a)	(b)	(c)	(d)
16.	Drill and practice	(a)	(b)	(c)	(d)
17.	Discovery learning/problem solving	(a)	(b)	(c)	(d)
18.	Word processing	(a)	(b)	(c)	(d)
19.	Simulations	(a)	(b)	(c)	(d)
20.	Database searching and research	(a)	(b)	(c)	(d)
21.	Internet	(a)	(b)	(c)	(d)
22.	CD-ROM for multimedia	(a)	(b)	(c)	(d)
23.	Modem for telecommunications	(a)	(b)	(c)	(d)
24.	Distance learning	(a)	(b)	(c)	(d)
25.	Large screen monitor	(a)	(b)	(c)	(d)

PART III. Directions: Respond to the following numbered items by filling in the bubbles under the appropriate letter on the Scantron answer form corresponding to the item number. Use only one response indicating your ability to use technology for each item from the following:

	(a) Novice	(b) Intermediate		(c) Advanced
26.	Preparation of instructional materials	(a)	(b)	(c)
27.	Grade recording and calculation	(a)	(b)	(c)
28.	Attendance	(a)	(b)	(c)
29.	Graphics and drawing	(a)	(b)	(c)
30.	Tutorials to explain concepts/methods	(a)	(b)	(c)
31.	Drill and practice	(a)	(b)	(c)
32.	Discovery learning/problem solving	(a)	(b)	(c)
33.	Word processing	(a)	(b)	(c)
34.	Simulations	(a)	(b)	(c)
35.	Database searching and research	(a)	(b)	(c)
36.	Internet	(a)	(b)	(c)
37.	CD-ROM for multimedia	(a)	(b)	(c)
38.	Modem for telecommunications	(a)	(b)	(c)
39.	Distance learning	(a)	(b)	(c)
40.	Large screen monitor	(a)	(b)	(c)

APPENDIX B

Regression Analyses Tables of Teachers' Actual Use Technology

Predictors of Teachers' Perceptions of Their **Actual Use of Technology**

Preparation of Instructional Materials as the Dependent Variable.

Table 4

Stepwise Multiple Regression of R^2 and R^2_{change} for Predictors of Teachers' Perceptions of Their Actual Use of Technology in Preparation of Instructional Materials

Predictor Variable and Step	R^2	R^2 change
1. Education level	.192	.192
2. Number of computers in class .	.202	.010
3. Years experience	.208	.006
4. Students taught per day	.212	.003
5. Gender	.213	.001

After the first step of the multiple regression analysis, the R^2 value was .192. This indicated that 19.2% of the variation in Teachers' perceptions of their actual use of technology in preparation of instructional materials was attributed to by variations in the education level of the teachers responding to that item. After the second step of the regression procedure, the R^2 value increased to .202. This indicated that the number of computers in the classroom accounted for a change in the R^2 value of .010, or 1.0% of the variation in Teachers' perceptions of their actual use of technology in preparation of instructional materials was accounted for by variations in the number of computers in the classroom. Table 4 summarizes this regression analysis.

The measure of the relative importance of the indicator variables within the regression equation is signified by the Beta coefficients and the direction of the relationships are signified by the t-values. Negative t-values indicate that the value of the dependent variable decreases as the value of the predictor variable increases. The result of the analysis indicated that 46.1% of the total variation in dependent variable was explained by five of the indicators, $F(5,3410) = 184.3$, $p = .000$: (a) education level, (b) years of teaching experience, (c) gender, (d) number of computers in the classroom, and (e) number of students taught per day. These values are also presented in Table 5. All subsequent regression summary tables reflect this procedure.

Table 5

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Actual Use of Technology in Preparation of Instructional Materials

Variables in the Equation

Variable	Beta	t	prob.
Education level	-.197	-17.976	.000*
Years teaching experience	.066	5.682	.000*
Gender	-.060	-2.000	.046*
Number computer in class	.085	6.963	.000*
Students taught per day	.034	3.389	.001*

*$F(5,3410) = 184.293$, $p = .000$

*$p < .05$

Grade recording and calculation as the dependent variable.

Table 6

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Actual Use of Technology in Grade Recording and Calculation

Predictor Variable and Step	R^2	R^2 change
1. Students taught per day	.022	.022
2. Number of computers in class .	.038	.016
3. Education level	.043	.005
4. Gender	.045	.001

Table 7

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Actual Use of Technology in Grade Recording and Calculation

Variables in the Equation			
Variable	Beta	t	prob.
Education level	-.075	-3.900	.000*
Gender	-.043	-2.500	.013*
Number computers in class	.146	7.733	.000*
Students taught per day	.202	10.486	.000*

*$F(5,3408) = 40.074$, $p = .000$

*$p < .05$

The result of the analysis indicated that 21.2% of the total variation in the dependent variable was explained by four of the predictor variables, $F(5,3408) = 40.074$, $p = .000$.

Attendance as the dependent variable.

Table 8

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Actual Use of Technology in Attendance

Predictor Variable and Step	R^2	R^2 change
1. Education level	.059	.059
2. Number of computers in class .	.084	.025
3. Students taught per day	.105	.021
4. Gender	.113	.008

Table 9

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Perceptions of Their Actual Use of Technology in Attendance

Variable	Variables in the Equation Beta	t	prob.
Education level	.147	.7.890	.000*
Gender	-.091	-5.461	.000*
Number computers in class	.193	10.586	.000*
Students taught per day	.144	12.458	.000*

*$F(4,3406) = 108.177$, $p = .000$

*$p < .05$

The result of the analysis indicated that 33.6% of the total variation in the dependent variable was explained by four of the predictor variables, $F(4,3406) = 108.177$, $p = .000$.

Tutorials as the dependent variable.

Table 10

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Actual Use of Technology in Tutorials

Predictor Variable and Step	R^2	R^2 change
1. Number of computers in class .	.017	.017
2. Grade level	.024	.006
3. Number subject preparations . .	.025	.001

Table 11

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Perceptions of Their Actual Use of Technology in Tutorials

Variable	Variables in the Equation Beta	t	prob.
Grade level	-.064	-3.424	.001*
Number computers in class	.128	7.205	.000*
Number subject preparations . . .	.039	2.057	.040*

*$F(4,3406) = 108.177$, $p = .000$

*$p < .05$

The result of the analysis indicated that 15.7% of the total variation in the dependent variable was explained by three of the predictor variables, $F(4,3406) = 108.177$, $p = .000$.

Drill and practice as the dependent variable.

Table 12

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Actual Use of Technology in Drill and Practice

Predictor Variable and Step	R^2	R^2 change
1. Number of students taught . . .	.046	.046
2. Grade level	.053	.007
3. Number subject preparations . .	.056	.003
4. Gender	.058	.002
5. Years experience	.060	.001
6. Number of computers in class .	.061	.002

Table 13

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Perceptions of Their Actual Use of Technology in Drill and Practice

Variables in the Equation			
Variable	Beta	t	prob.
Years experience	.056	2.924	.004*
Gender	.052	2.992	.003*
Grade level	-.081	-4.038	.000*
Number computers in class	.045	2.392	.017*
Number students taught.	-.113	-5.049	.000*
Number subject preparations . . .	.051	2.339	.019*

*$F(6,3409) = 36.924$, $p = .000$

*$p < .05$

The result of the analysis indicated that 24.7% of the total variation in the dependent variable was explained by six of the predictor variables, $F(6,3409) = 36.924$, $p = .000$.

Word processing as the dependent variable.

Table 14

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Actual Use of Technology in Word Processing

Predictor Variable and Step	R^2	R^2 change
1. Education level	.108	.108
2. Grade level	.115	.007
3. Years experience	.117	.002
4. Gender	.118	.001

Table 15

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Perceptions of Their Actual Use of Technology in Word Processing

Variables in the Equation			
Variable	Beta	t	prob.
Education level	-.395	-13.597	.000*
Experience	.070	3.082	.002*
Gender	.038	2.328	.020*
Grade level	.010	5.456	.000*

*F(4,3408) = 114.520, p = .000

*p < .05

The result of the analysis indicated that 34.4% of the total variation in the dependent variable was explained by four of the predictor variables, F(4,3408) = 114.520, p = .000.

Internet as the dependent variable.

Table 16

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Actual Use of Technology in Internet

Predictor Variable and Step	R^2	R^2 change
1. Number of computers in class .	.014	.014
2. Number students taught	.024	.011
3. Grade level	.027	.003

Table 17

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Perceptions of Their Actual Use of Technology in Internet

Variables in the Equation			
Variable	Beta	t	prob.
Grade level	.063	2.465	.014*
Number computers in class	.129	5.918	.000*
Number students taught . . .	.070	2.721	.006*

*$F(3,2123) = 19.652$, $p = .000$

*$p < .05$

The result of the analysis indicated that 16.4% of the total variation in the dependent variable was explained by three of the predictor variables, $F(3,2123) = 19.652$, $p = .000$.

APPENDIX C

Regression Analyses Tables of Teachers' Ability to Use Technology

Predictors of Teachers's Perception of Their Ability To Use Technology

Preparation of instructional materials as the dependent variable.

Table 19

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Ability to Use Technology in Preparation of Instructional Materials

Predictor Variable and Step	R^2	R^2 change
1. Education level	.148	.148
2. Grade level	.157	.008
3. Number of computers in class	.161	.005
4. Years experience	.165	.004
5. Number subject preparations	.169	.004
6. Gender	.171	.002

Table 20

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Perceptions of Their Ability to Use Technology in Preparation of Instructional Materials

Variables in the Equation

Variable	Beta	t	prob.
Education level	-.395	-16.382	.000*
Years experience	.104	4.674	.000*
Gender	-.048	-2.946	.003*
Grade level	.074	3.984	.000*
Number computers in class	.088	4.994	.000*
Number subject preparations	-.075	-3.938	.000*

*$F(5,3377) = 38.410$, $p = .000$

*$p < .05$

The result of the analysis indicated that 41.4% of the total variation in the dependent variable was explained by six of the predictor variables, $F(5,3377) = 38.410$, $p = .000$.

Grade recording and calculation as the dependent variable.

Table 21

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Ability to Use Technology in Grade Recording and Calculation

Predictor Variable and Step	R^2	R^2 change
1. Gender	.028	.028
2. Number of students taught . . .	.035	.007
3. Number of computers in class .	.046	.011
4. Education level	.052	.006
5. Grade level	.054	.002

Table 22

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Perceptions of Their Ability to Use Technology in Grade Recording and Calculation

Variables in the Equation			
Variable	Beta	t	prob.
Education level	-.105	-5.221	.000*
Gender	-.121	-6.920	.000*
Grade level	.049	2.377	.018*
Number computers in class	.136	7.201	.000*
Number students taught.	.132	6.311	.000*

*$F(5,3377) = 38.410$, $p = .000$

*$p < .05$

The result of the analysis indicated that 23.2% of the total variation in the dependent variable was explained by five of the predictor variables, $F(5,3377) = 38.410$, $p = .000$.

Attendance as the dependent variable.

Table 23

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Ability to Use Technology in Attendance

Predictor Variable and Step	R^2	R^2 change
1. Number of computers in class	.039	.039
2. Gender	.066	.027
3. Number of students taught	.084	.017
4. Educational level	.090	.006
5. Grade level	.092	.003
6. Years experience	.093	.001
7. Education level	.093	-.006

Table 24

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Perceptions of Their Ability to Use Technology in Attendance

	Variables in the Equation		
Variable	Beta	t	prob.
Years experience	-.073	-3.969	.000*
Gender	-.146	-8.565	.000*
Grade level	.071	3.661	.000*
Number computers in class	.170	9.394	.000*
Number students taught.	.073	3.556	.000*

*$F(5,3380) = 69.367$, $p = .000$

*$p < .05$

The result of the analysis indicated that 30.5% of the total variation in the dependent variable was explained by five of the predictor variables, $F(5,3380) = 69.367$, $p = .000$.

Tutorials as the dependent variable.

Table 25

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Ability to Use Technology in Tutorials

Predictor Variable and Step	R^2	R^2 change
1. Number of computers in class .	.010	.010
2. Gender	.016	.006
3. Grade level	.022	.006

Table 26

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Perceptions of Their Ability to Use Technology in Tutorials

	Variables in the Equation		
Variable	Beta	t	prob.
Gender	-.090	-5.156	.000*
Grade level	-.080	-4.662	.000*
Number computers in class	.192	5.353	.000*

*$F(3,3390) = 25.477$, $p = .000$

*$p < .05$

The result of the analysis indicated that 14.8 of the total variation in the dependent variable was explained by three of the predictor variables, $F(3,3390) = 25.477$, $p = .000$.

Drill and Practice as the dependent variable.

Table 27

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Ability to Use Technology in Drill and Practice

Predictor Variable and Step	R^2	R^2 change
1. Educational level	.018	.018
2. Number of computers in class .	.026	.009
3. Grade level	.031	.005
4. Number of students taught . . .	.032	.001
5. Gender	.033	.002

Table 28

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Perceptions of Their Ability to Use Technology in Drill and Practice

Variables in the Equation			
Variable	Beta	t	prob.
Educational level	-.103	-5.005	.000*
Gender	-.041	-2.334	.020*
Grade level	-.063	-3.046	.002*
Number computers in class	.070	3.632	.000*
Number students taught.	-.051	-2.436	.015*

*$F(5,3386) = 23.400$, $p = .000$

*$p < .05$

The result of the analysis indicated that 18.3% of the total variation in the dependent variable was explained by five of the predictor variables, $F(5,3386) = 23.400$, $p = .000$.

Word Processing as the dependent variable.

Table 29

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Ability to Use Technology in Word Processing

Predictor Variable and Step	R^2	R^2 change
1. Education level	.089	.089
2. Gender	.093	.005
3. Grade level	.095	.002

Table 30

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Perceptions of Their Ability to Use Technology in Word Processing

	Variables in the Equation		
Variable	Beta	t	prob.
Education level	-.318	-17.349	.000*
Gender	-.063	-3.777	.000*
Grade level	.052	2.801	.005*

*$F(3,3387) = 118.454$, $p = .000$

*$p < .05$

The result of the analysis indicated that 30.8% of the total variation in the dependent variable was explained by three of the predictor variables, $F(3,3387) = 118.454$, $p = .000$.

Internet as the dependent variable.

Table 31

Stepwise Multiple Regression of R^2 and R^2 change for Predictors of Teachers' Perceptions of Their Ability to Use Technology in Internet

Predictor Variable and Step	R^2	R^2 change
1. Education level	.027	.027
2. Gender	.045	.017
3. Number computers in class.	.051	.006

Table 32

Stepwise Multiple Regression Analysis for Variables Predicting Teachers' Perceptions of Their Ability to Use Technology in Internet

Variable	Variables in the Equation Beta	t	prob.
Education level	.147	8.502	.000*
Gender	-.118	-6.951	.000*
Number computers in class	.082	4.649	.000*

*$F(3,3388) = 60.527$, $p = .000$

*$p < .05$

The result of the analysis indicated that 22.6% of the total variation in the dependent variable was explained by three of the predictor variables, $F(3,3388) = 60.527$, $p = .000$.

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