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Teacher Computer Access, Student Computer Access, Years of Teaching Experience, And Professional Development as Predictors of Competency of K-4 Ohio Public School Students on the National Technology Standards

Introduction

During the past four years, the International Society for Technology in Education (ISTE) has worked with educators, business leaders, government agencies and educational stakeholders in "PreK-12 education to develop national standards for the educational uses of technology that will facilitate school improvement in the United States (National Educational Technology Standards, 1998, p.3)." The resulting standards, the National Educational Technology Standards for Students, are part of a larger standards document called the National Educational Technology Standards (NETS).

Beginning in 1994, the Ohio SchoolNet Program worked to place computers in the Ohio Public Schools. An estimated $95 million dollars has been spent to wire all K-12 classrooms for video, voice, and data transmission. In addition, the SchoolNet Plus Initiative had provided at least one interactive computer workstation for every five children enrolled in grades K-4 (National, 1996).

Problem Statement

After four years of implementation of the SchoolNet Program and SchoolNet Plus Initiative, the question still remains as to how competent the students are in the use of technology. Nor has an examination of the characteristics related to the development of these competencies by students been evaluated.

The purpose of this study is to determine if there are relationships among the following characteristics: teacher computer access, student computer access, years of teaching experience and professional development concerning the use of technology. Can these characteristics serve as predictors of student competency in K-4 in Ohio Public Schools as defined by the Technology Foundation Standards for Students as identified in the National

Educational Technology Standards? The information gained serves as a baseline of data concerning Ohio K-4 student's technological competency.

Research Questions

The study seeks to answer the following research questions:

1. Do the combined characteristics of teacher computer access, student computer access, years of teaching experience, and professional development predict student competency on the Technology Foundation Standards for Students as defined in the National Educational Technology Standards (NETS) in grades K-4 in Ohio Public Schools?
2. What perceived barriers remain in place in Ohio Public Schools that inhibits technology competency in students?

The study is limited to the grades kindergarten through fourth grade in public schools in Ohio; therefore generalization beyond that population is limited. Teachers in all content areas were surveyed where possible. The National Educational Technology Standards have only been available since June of 1998. A pilot study was conducted to help identify terminology of concern and care was taken to provide explanations where the terminology was found to suspect.

Definition of Terms

The following definition of terms is an abbreviated list of terms used in the dissertation:

Access –the location of a computer in the school or home in such a manner that the teacher and/or student can use it for educational or personal needs.

Competency – competent, "having requisite or adequate ability or qualities" (Merriman-Webster's Collegiate Dictionary, 1997, 2).

D – represents the metric, independent predictor variable that indicates the number of Professional Development classes a teacher has attended in the area of technology or use of technology in the classroom.

SCA – represents the metric, independent predictor variable, which indicates the Student Computer Access, or the amount of time that a student uses the computer in school during a day. The amount of time will be presented in minutes.

Score – the dependent variable in the study. The value of Score is found by adding the values of the responses to the ten items found on the Technology Foundations for Students checklist located in the NETS document.

TCA – metric, independent predictor variable, represents Teacher Computer Access. This is the amount of time in minutes that a teacher uses the computer (home or school) for schoolwork during a day.

Y – metric, independent predictor variable, represents Years. Years represents the number of years a teacher has been employed in the public school system.

Design

A multiple regression analysis was performed on the data collected in the survey. This method of analysis was chosen because it could assist in determining which independent variable(s) might or might not be most effective in predicting the dependent variable. The dependent variable is Score that reports the teacher's perceptions of their students' technology competency. The independent variables are TCA (teacher computer access), SCA (student computer access), Y (years of teaching experience), and D (number of

professional development course taken in technology). Correlations were examined between the dependent and independent variables and between the independent variables. The literature review did not indicate an importance of individual variables and therefore all variables were entered into the analysis. The data was examined to determine if the assumptions of linearity, normality and homoscedasticity of the residuals and errors were met and if they met the criteria for multiple regression analysis. All assumptions were met. The ENTER method was used to evaluate predictability as there has been no previous research on these factors and the NETS standards. The large number of surveys returned provided sufficient power and cross-validation to the researcher.

Data Collection Methods

During the fall of 1998, a pilot survey was developed and administered to a random sample of schools to aid in the development of an instrument for examining the student competencies concerning the NETS standards. After several revisions and re-piloting, a final survey was developed which contained the NETS standards as well as demographic and classroom implementation questions. The population of this study consists of K-4 teachers in Ohio Public Schools. The sample consists of 108 (total of 612 in the state) public school districts in which K-4 teachers were surveyed concerning their perceptions of the level of competency their students hold when compared to the National Educational Technology Standards.

To obtain the most representative sample for the state, the Ohio Department of Education was contacted and a striated random sample was developed. The striations took into account the socio-economic status of the school district, the designation of rural, urban/suburban or major city, the poverty level of the students in the district and the size of

the school district. The random sample was given an alpha and number identity to help in determining the rate of return during data collection.

Surveys were sent out in early January of 1999. In hopes of improving the return rate, calls were made to each principal and/or superintendent in each school district to obtain permission to be surveyed and to give a short explanation concerning how to administer the survey. Teachers were given an addressed and stamped envelope in which to return their survey along with an informed letter of consent to use the answers from their survey. A return rate of 72% was achieved with the survey. At least a 50% return rate was maintained for each of the schools surveyed.

Results

The analysis of the data supports the SchoolNet Initiative in the placement of technology in the classroom. The data indicates that this placement of computers has provided a "leveling of the field" in the development of technology competencies. No differences were found among the different striations of the sample. The regression equation indicates that student computer access (SCA) is the largest indicator of success on the NETS competencies and also supports the SchoolNet Initiative. In an examination of the competencies, it appears that the low scores on two of the competencies support the lack of professional development training in the integration of technology into the content areas. Two other competencies resulting in low scores referred to questions on the NETS, which require that students use telecommunications and technology resources for problem solving, communication and illustration of ideas. The implementation of these activities in the classroom requires that a teacher have a more complete and detailed understanding of how problem solving and the use of technology can support each other (Forcier, 1997). One

comment summarized the use of technology and the lack of competency on the part of the student when it stated "Technology integration will not be achieved in the schools until we are trained and have the time to practice it in our classrooms."

Conclusions

This study supports the following conclusions: 1) Professional development and time for the development of implementations strategies into the "real" classroom is needed if technology is to be seen as a viable part of the teaching and learning process. 2) Teacher education and professional development should work to help teachers identify the value in using technology as a support for important classroom activities such as interpretation of graphed data, searching databases for research, spreadsheets for data collection and critical thinking skills development through Internet searching (Maddux, 1997). 3) Teacher education has yet to convince teachers that the time spent in learning how to integrate technology into the content areas can increase the achievement of students. 4) Professional development courses must be designed to encourage curriculum integration techniques.

Finally, the comments obtained in the open-ended comment section suggest that continued study is needed on how to structure professional development and time for teachers to practice the implementation of technology into the curriculum.

References

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