Principals’ Use of Computer Technology

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Abstract: The Principal’s Computer Technology Survey, a 40-item instrument, was employed to collect data on Georgia principals’ assessment of their (a) role in integrating computer technology into teaching and learning, (b) perceptions about computer technology, (c) acquired expertise for managerial and administrative tasks, (d) need to acquire computer technology expertise and (e) professional development opportunities. Principals’ responded to survey items measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A stratified random sample of principals from Georgia’s elementary schools, middle schools, and high schools participated in the study. Principals’ reported using computer technology to complete administrative and managerial tasks. However, principals’ indicated a widespread need for more professional development opportunities to increase their capabilities and to infuse computer technology into the teaching and learning process. In addition, principals’ reported that computer technology increases student motivation, student time on task, and student achievement.

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INTRODUCTION

Many educational stakeholders in the 1990s thought that computer technology would transform education. Stakeholders thought that teaching and learning would be more effective and therefore increase student achievement. For example, David (1994) stated that “technology holds great potential for revolutionizing education,” while Herman (1994) indicated that “technology provides new instructional options for students that are a means for achieving dramatic transformations in curricula and instructional processes.”

Teachers typically have been the focus of efforts to achieve technology’s promise of increasing students’ achievement through restructuring classrooms. Brooks (1997) indicated that the success or failure of technology in schools actually resided with teachers. Technology-rich classrooms were established for teachers to practice and develop their expertise. Brooks (1997 and Krysa (1998) reported that many districts had professional development training to positively influence teacher use of computer technology. Krysa (1998) added that the integration of computer technology into the classroom has been slow. In addition, Whitehead, Jensen, and Boschee (2003) reported that technology did not generate changes on teachers’ instructional methods or the anticipated increase in student achievement.

The importance of principals to the process was overlooked as teachers continued to receive training for the integration of technology into the classroom. Witten and Richardson (1991) reported that only 21% of principals had any special computer training. Principals certainly are a crucial part of the process in facilitating the integration of computer technology into the teaching and learning process. A report by the Office of Technology Assessment (1995) indicated that if principals themselves are comfortable with technology, then principals will foster the use of technology into their schools. Cooley and Reitz (1997) concluded that the principal, more than any other educator, is the key to teachers’ adoption and use of technology. Furthermore, Hall (1999) indicated that educational leaders must set the example of computer technology usage so that teachers and students can see the benefits of its use.

Hope and Stakenas (1999) suggested three primary roles for principals relative to computer technology use in schools; role model, instructional leader, and visionary.
Principals function as role models when applying computer technology to administrative and managerial tasks. Principals that are knowledgeable about computer technology and demonstrate a commitment to technology can personally assist teachers to acquire technology expertise. As an instructional leader, principals facilitate teachers’ integration of computer technology into the teaching and learning process. Principals’ knowledge of hardware and software applications can contribute to integration of technology into the curriculum. In the visionary role, principals establish a context for technology in the school. The visionary principal understands how technology can assist in restructuring the learning environment and empower teachers and students. Finally, Hope and Stakenas acknowledged that the degree that principals are prepared to fulfill these roles is unclear.

Krysa (1998) indicated that principals were more capable in using computers for administrative purposes than for instructional purposes. Slowinski (2003) and Golden (2004) stated that principals are responsible for leadership in knowing how best to use technology in the teaching and learning process, facilitating its integration into the learning environment, and making it possible for teachers to adopt technology. Furthermore, Golden (2004) indicated that the challenge facing principals is not the recognition of the capabilities of technology, but one of acquiring the expertise to become the leader in integrating technology into the classroom. Principals need to develop a shared vision of technology use with their teachers. Principals that develop the expertise and that shared vision with their teachers can increase the pace for restructuring classrooms and increasing student achievement. However, Flanagan and Jacobsen (2003) stated that many principals are not prepared to assume the role of technology leader in their schools.

Do principals possess the skills necessary to facilitate the integration of computer technology into the teaching and learning process and to use it to accomplish administrative and managerial tasks? Trotter (1997) indicated that nationwide only five percent of school principals could use word-processing, spreadsheets, databases, and presentation software. The Consortium on Chicago School Research at the University of Chicago (2007) reported on the trend of computer technology usage by principals in the Chicago school system from 2001 through 2005. Both elementary and high school principals exhibited an increase in the use of computer technology for administrative record keeping, analyzing performance data, and e-mailing other principals, regional office, teachers, and parents over this time period.

**PURPOSE OF THE STUDY**

The purpose of this study was to examine the principal’s (a) role in integrating computer technology into teaching and learning, (b) perceptions about computer technology, (c) acquired expertise for managerial and administrative tasks, (d) need to acquire computer technology expertise and (e) professional development opportunities. A secondary purpose was to determine if there were differences in principal’s responses by the (a) principal’s educational level, (b) principal’s school configuration (elementary school, middle school, or high school), (c) principal’s gender, (d) principal’s race or ethnicity, or (e) principal’s self-reported computer expertise on the Principal’s Computer Technology Survey.

**METHODOLOGY**

*Population, Sample, and Sampling Procedure*

Principals in the state of Georgia were the target population for the study. A stratified random sample of 400 elementary, middle school, and high school principals was generated using the Georgia Department of Education School Directory. Principals received a cover letter and the Principal’s Computer Technology Survey. The cover letter included information about the research purpose, confidentiality of responses, number of items, average time for completion, and Valdosta State University Institutional Review Board approval. After an initial mailing and follow-up mailing, 175 of 400 returned surveys were complete and usable for analysis resulting in a 44% response rate.

Demographic information collected on the survey included gender, race or ethnicity, educational level, school configuration, and a self-reported rating of computer expertise. The number and percentage of principals responding to the survey by gender were 88 (50%) female principals and 86 (49%) male principals. By race or ethnicity, there were 141 (81%) Caucasian principals, 32 (18%) African American principals, and 2 (1%) American Indian or Alaskan Native principals. The number and percentage of principals reported having a master’s degree were 25 (14%), whereas the number and percentage of principals reporting having an Educational Specialist’s degree and doctorate were 110 (63%) and 45 (23%), respectively. By school configuration, there were 67 (38%) elementary school principals, 50 (29%) middle school principals, 56 (32%) high school principals, and 2 (1%) other (i.e., combination schools) principals. The number and percentage of principals reporting their level of expertise as that of novice was 3 (2%), while 78 (45%) of principals reported being at the intermediate level of
expertise, 85 (49%) of principals reported being at the advanced level of expertise, and 9 (5%) of principals reported being at the expert level of computer technology expertise.

Instrumentation

The Principal's Computer Technology Survey (PCTS) is a 40–item questionnaire constructed on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The instrument is a modified version of a computer technology survey originally developed by Hope and Brockmeier (2002) and modified by Brockmeier, Sermon, and Hope (2005). The authors identified the instrument development process included identification of the specific domains of interest, item building, and content validation for each item. The subscales comprising the PCTS were: (a) curriculum integration, (b) perceptions, (c) acquired expertise, (d) needs assessment, and (e) professional development. Subsequently, Brockmeier and Gibson (2007) examined the psychometric characteristics of the PCTS. An expert panel reviewed the instrument and determined that the instrument was content valid. In addition, the model was measurement invariant for gender and race or ethnicity.

In the present study, a confirmatory factor analysis was conducted to assess model fit. The chi-square test of model fit was $\chi^2 (3) = 1.548, p = .6712$. Additional indices to assess model fit were the CFI value (.99), TLI value (.99), RMSEA (.0), and SRMR value (.019). All indices indicated good model fit. Furthermore, Cronbach's alpha reliability was .91 for the PCTS total scale. The subscale Cronbach's alpha coefficients were .80 for the curriculum integration, .81 for perception, .84 for acquired expertise, .92 for needs assessment, and .90 for professional development. Cronbach's alpha reliability coefficients were good to very good for the PCTS total scale and each of the subscales.

RESULTS

The results section consists of two subsections; item analysis and inferential statistical analyses. First, principals' responses to items within subscales are reported using the median value and the percentage point differential between positive responses and negative responses for each item. Second, the results from the inferential statistical analyses are presented.

Item Analysis

Curriculum Integration. Curriculum integration consists of nine items. Principals strongly agreed (median value of 5) on 2 of 9 curriculum integration items. Principals strongly agreed that they (a) ensure equity access to computer resources (+94) and (b) encourage teachers to use technology to meet learners' individual needs (+94). Principals agreed (median value of 4) on 6 of 9 items. Principals agreed that they (a) provide teachers release time to facilitate their becoming familiar with the capabilities of technology devices (+69), (b) encourage teacher collaboration in using computer technology for teaching and learning (+94), (c) support computer technology integration in teachers' instruction by providing computer technology training experiences(+93), (d) are familiar with many academic software programs that teachers can use to support teaching and learning (+71), (e) recognize that facilitating computer technology integration into the teaching and learning process is one of my important instructional tasks (+64), and (f) allocate a significant amount of time to assist teachers in integrating computer technology into their instruction (+47). Principals neither agreed nor disagreed (median value of 3) that they provide teachers release time for determining the appropriateness of software for integration into the teaching and learning process (+26).

Perceptions. Nine items represent principals' perceptions about computer technology. Principals agreed (median value of 4) with the statements on 8 of 9 items. Most notably, principals indicated agreement that computer technology (a) improves managerial or administrative performance (+95), (b) increases student engagement time on tasks (+93), (c) increases student achievement (+87), (d) increases student motivation (+90), and (e) provides a more efficient way to complete tasks than paper-and-pencil (+79). In addition, principals agreed that (a) they are capable of evaluating computer technology (+95), (b) their expertise contributes to them being viewed as a technology leader in the school (+45), and (c) principals professional development has been a focus of the district to infuse technology into the schools (+35). On the other hand, principals neither agreed nor disagreed (median value of 3) that technology standards can facilitate integration of computer technology into instruction (+30).

Acquired Expertise. Seven items represent principals' acquired expertise. Principals strongly agreed (median value of 5) with 5 of 7 items on the subscale. Principals strongly agreed that they (a) use e-mail to communicate (+98), (b) use word processing to generate letters (+98), (c) use the district’s information management system to retrieve information (+96), (d) use computer technology to develop schedules (+86), and (e) use computer technology to develop presentations (+86). Principals agreed (median value of 4) that they (a) use computer technology to develop budgets (+74) and (b) use computer technology to create databases (+70).
Needs Assessment. Needs assessment consists of eight items. Principals agreed (median value of 4) with all eight items on the subscale indicating a widespread need for professional development. Most prominently, principals indicated needing professional development to (a) use computer technology to collect and analyze data (+77), (b) assess computer technology’s influence on student achievement (+63), (c) assist integrating computer technology into the teaching and learning process (+76), and (d) assist in the facilitation of organizational change (+69). In addition, principals agreed needing professional development to protect students from inappropriate materials (+66) and to apply to their work as a principal (+64). Although principals agreed needing professional development, principals responded less of a need for professional development about (a) legal issues related to software development (+49) and (b) ethical issues related to computer technology (+54).

Professional Development. Professional development consists of seven items. Principals agreed (median value of 4) with 2 of 7 items. Principals agreed that they (a) participated in activities to increase technology leadership capabilities (+44) and (b) received professional development in using applications (+37). Principals neither agreed nor disagreed (median value of 3) that they received training in the school district to (a) create budgets (-5), (b) use the Internet for research purposes (+40), (c) evaluate hardware (+6), (d) evaluate software (+2), and (e) create databases (+19).

Inferential Statistical Analyses

To answer questions about differences in principals’ responses by educational level, school configuration, gender, race or ethnicity, and self-reported computer expertise three ANOVAs and two t tests for independent means were conducted on principals’ total scores (M = 157.06, SD = 15.94) on the instrument. The principals’ total scores on the instrument were symmetric (skewness = -0.31) about the mean, but the scores were peaked (kurtosis = 1.88). Data transformations were attempted, but had no substantive effect on the distribution nor had an effect on the interpretation of the analyses so the results are presented for the untransformed data. Other statistical assumptions for the statistical procedures were met.

An analysis of variance revealed that there was no significant difference on the PCTS total score by the principal’s educational level, F(2,168) = .53, p = .59 or by the principal’s school configuration, F(2,168) = .13, p = .88. In addition, an independent means t test revealed that there was no significant difference on the PCTS total score by gender, t(169) = 1.65, p = .10.

Since the race or ethnicity of the responding principal’s was primarily African American or White, an independent means t test was conducted. The independent means t test revealed that there was a significant difference on the PCTS total score by race or ethnicity, t(169) = 3.39, p = .0009. Overall, African American principals responded more positively (M = 165.45, SD = 15.27, n = 32) than White principals (M = 155.03, SD = 15.53, n = 141) on the Principal’s Computer Technology Survey. Cohen’s d was used as a measure of effect size. Cohen’s d was .67 indicating a medium to large effect size. African American principals reported having more expertise in facilitating teachers’ integration of computer technology into the classroom, more positive perceptions about the use of computer technology, more expertise with employing computer technology, more likely to recognize the need for more computer technology professional development opportunities, and more likely to have received computer technology professional development through the school district than White principals.

An ANOVA was calculated on the PCTS total score by the principal’s self-reported computer technology expertise. A significant F (3, 167) = 7.14, p < .0002 was found. Post hoc comparison tests revealed that the least square mean of the novice classification (M = 137.67, n = 3) was significantly lower than the advanced level (M = 161.10, n = 85) and expert level (M = 166.57, n = 9) of computer technology expertise classifications. The computer technology novice had significantly less agreement with the PCTS items than principals that reported their level of computer technology expertise as advanced or expert. Additional post hoc comparison tests revealed that the least square mean of the intermediate classification (M = 152.23, n = 78) was significantly lower than the advanced level (M = 161.10, n = 85) and expert level (M = 166.57, n = 9) of computer technology expertise classifications. Principals that self-reported being at an intermediate level of computer expertise had significantly less agreement with the PCTS items than principals that reported their level of computer technology expertise as advanced or expert.

CONCLUSION

The principal’s role in integrating computer technology into teaching and learning, perceptions about computer technology, acquired expertise for managerial and administrative tasks, need to acquire computer technology expertise, and professional development opportunities were examined in this study. Regardless of educational level, school configuration, or gender, principals responded similarly to items on the Principal’s Computer Technology Survey. Principals responded somewhat
differently to the survey by race or ethnicity and self-reported computer technology expertise. Overall, African American principals were in greater agreement with items than White principals. In addition, principals that self-reported being at the advanced level or expert level of computer technology expertise were in significantly greater agreement with items than principals that reported being at the novice or intermediate levels of computer technology expertise.

Principals, in this study, strongly agreed in using computer technology to generate e-mail, letters or memos, and presentations; create schedules; and access the district’s information management system. In addition, principals agreed using computer technology to create databases and construct budgets. This is quite a contrast to Trotter’s results in 1997 and the Consortium on Chicago School Research at the University of Chicago’s (2007) results from the Chicago Public Schools trends of computer use from 2001 to 2005. Given the ever increasing presence of technology, it is reasonable that over time the acquired expertise of principals for performing managerial and administrative tasks would increase. Principals agreed receiving professional development from their school district in the use of these applications and that these applications increase their managerial and administrative performance. It is worthwhile to note that principals reported needing professional development for using computer technology to collect and analyze data and to protect students from accessing inappropriate materials. Principals’ capability for modeling the use of computer technology would increase the view of the principal within the school as being the technology leader.

As the instructional leader, principals agreed that facilitating computer technology into the teaching and learning process is one of their most important instructional tasks. On one hand, principals agreed to promoting collaboration among teachers for using computers in the teaching and learning process as well as providing teachers training for integrating technology. In addition, principals strongly agreed to providing equity of access to computer resources and encouraging teachers to use computer technology to meet the needs of learners. On the other hand, principals neither agreed nor disagreed with receiving professional development to learn to evaluate computer hardware and to evaluate computer software for learning. It seems that principals are strengthening their teacher’s capabilities, while not strengthening their own instructional leadership capabilities. While principals agreed that computer technology will increase student motivation, student engagement on tasks, and student achievement, principals agreed needing more professional development opportunities to assess computer technology’s influence on student achievement and to assist the integration of computer technology into the teaching and learning process. Hope and Stakenas (1999), Slowinski (2003), and Golden (2004) indicated that it is the principals responsibility to best know how to integrate technology into the teaching and learning process so that classrooms can be restructured for learning. Without the principals’ instructional leadership, it is highly likely that the restructuring of the learning environment will occur. School districts must provide or continue to provide professional development opportunities directly for principals to increase their capacity as the school’s instructional leader and ultimately for school improvement.

REFERENCES


