ASSESSMENT OF TEACHER BELIEFS AND PERCEPTIONS ABOUT THE EFFECTS OF COMPUTER-BASED TECHNOLOGY ON READING AND LANGUAGE ARTS ACHIEVEMENT

By

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ABSTRACT

Classroom teachers in K-12 are expected to significantly integrate instructional technology into their teaching plans. Notwithstanding a need for technical know-how, what is the effect of one's beliefs and perceptions about the value of technology for improving and enhancing instruction on teacher's motivation and commitment to integrate these resources?

This study sought information about the beliefs and perceptions of four, middle school language arts teachers regarding their previous experiences with an instructional technology program, including how it affected their instructional roles and their student's reading achievement.

Teachers interviewed indicated that the technology afforded independence for student learning and the repetition needed by slower learners. The program should stay "external to in-class routines and activities" and that they could teach effectively without it, "if needed"; but students are " interested in technology". Girls appeared to be as comfortable as the boys with the technology and there was no evidence of gender bias in the graphics, icons and speech features. There was considerable variation in technology training among these teachers; and "having the time" for additional training was noted as a barrier to continual development and implementation of technology.

Key words: Teacher Perceptions/Beliefs, Technology Integration, Learning Technologies, Instructional Technology.

INTRODUCTION

Cope and Ward (2002) have identified and outlined some of the basic issues and concerns that need to be addressed by teachers to successfully use and integrate computer-based learning and related instructional software. They note that teacher beliefs, perceptions and expectations are assumed to be important factors and that their student's perceptions and expectations of learning with technology will be influenced accordingly. That is, teacher's perceptions and attitudes, whether these are optimistic or guarded about the value of learning with technical tools, will ultimately feedback to influence their student's motivation as well as their own interest and motivation for seriously using technology to teach and to enhance student achievement. This will be increasingly important if or when technical instruction becomes the primary mode for curriculum delivery in K-12 contexts.

Duhaney & Zemel (2000) describe the ever-widening use of instructional technology in educational settings and its innovative implications, enabling teachers and students to teach and learn in different levels of immersion. These innovations have the potential to enhance learning and to herald in a new wave of teacher and even student accountability. Guerrero(2005) notes that this trend has continued as new technology has emerged and school districts more than ever have continued to acquire and implement more and better tools as important resources for teacher instructional planning and delivery. Thus the expectations, and perhaps even pressures, on teachers to learn the related skills and competencies to integrate these resources are likewise increasing.

Enormous amounts of money have been and continue to be spent on technical resources and the pressures are

growing on school districts and teachers to show achievement results via technology integration and engagement, particularly in the teeth of NCLB. Likewise, such funding has included a great variety of professional development activities to increase teacher competencies. However, Schrum, Giley and Miller (2008) indicate, in a recent review, that such preparation has not been all that successful. They note further that teachers who successfully use computers display certain underlying attitudes, dispositions and beliefs that promote the use of technology to benefit learning and their teaching. In other words they believe in what they are doing and expect it to benefit their teaching and their student's learning. But it goes beyond just acquiring and possessing knowledge about computers and related technologies. There is a context of knowledge and know-how, perception, self-efficacy and curiosity combining to support successful technology integration.

Similarly, Rogers (2007) remarks that even though there has been considerable access given in schools to high-quality technological resources over the past several years, the use of these has not necessarily increased, particularly for teachers in elementary and middle schools. Why aren't such teachers adopting the use of these resources? The author describes several such "barriers", one of which is the "lack of time", which likely translates into the time that is needed to "practice" and to learn the related technical skills, and the time needed to implement such resources into instructional plans and activities. Another "time" barrier is that it takes time away from preparing students for standardized tests or related skill sets in reading and mathematics. Perhaps, the most relevant reason noted is the "attitude" of the teacher and the predispositions held that either promote or demote the motivation for integration of technology. Newer technology resources are more "technical" which complicates their integration by requiring stepped-up knowledge and know-how. The "know how" will unlikely ever be static and teachers who use these resources effectively will make a commitment to not only learn, but to stay abreast with the demands that newer technology will bring.

Kuzmicic (2006) likewise explains that attitudes, efficacies and confidence levels combine to influence teacher motivation for using and integrating technology. Those who are more experienced with technology and have the associated comfort levels "find the time" to implement and to enhance their skills and know how. The author further points out that technology is more "authentically integrated" when teachers go beyond traditional models of instruction and "center" the students.

Russell, BeBell, O'Dwyer & O'Connor (2007) surveyed 2850 classroom teachers in 22 school districts in Massachusetts to determine the extent that teachers integrated various kinds of technical resources into their instructional activities. From a factor analysis of 44 survey items of the various uses of technology, six clustered: preparing to use technology, delivery of technology, directing students to use technology; use of technology for special learners, e-mail and grade/record management. To better understand the variables that influenced the use of these resources, one of the authors (Bebell) regressed various descriptors (e.g., grade level taught, years of experience, access to technology, perceived pressures to use technology, pedagogical beliefs about technology) to identify those that combine to best predict each of the six categories of technology use. Four were reported, including email, delivery, preparation and student direction. Across three of these four categories of use, "teacher beliefs about the importance of technology for teaching" was the strongest predictor of the frequency with which technology is used for a given purpose. Beliefs about technology are consistently and strongly related to the use of technology for instructional delivery. Although "confidence" for using technology is an important influence, the authors concluded that it appears to be a lesser effect than the importance of beliefs. In short, changing teacher beliefs and related perceptions about the importance of technology may be just as important as exposing them to technology and the underlying knowhow.

Purpose

The purpose of this study was to seek information about

the beliefs and perceptions of four middle school reading/language arts teachers in the context of their previous experiences with instructional technology and how it affected student learning and their instructional roles. Further, there was an interest in knowing what attitudes and dispositions were held by these teachers that may have influenced their self-confidence, efficacy and motivation for using and integrating technology and how they handled the respective challenges. Moreover, these were examined in regard to their previous training in technology and the kind of professional development activities that led up to their participation.

Background

In a previous study, four middle school teachers were engaged for 24 weeks with an integrated learning software program to teach reading and language arts. Experimental groupings of 6th and 7th graders were given 24 weeks of instruction in reading and language arts with Merit reading and language instructional software in a computer lab setting for 24 weeks, 45 minutes 2 x weekly. Lab instruction was complemented with regular, weekly in-class instruction in three, 90 minute blocks. Control peers were given 5, 90 minute blocks of instruction only in regular classroom settings and no access to the software program. Each teacher taught a control and experimental group. School officials and classroom teachers were exploring ways to improve reading and related literacy and took an opportunity to implement the most recent edition (2005) of the reading and language arts software gratis from Merit. (Securro, Jones, & Cantrell, 2007).

The curriculum associated with Merit is closely aligned with the WV standards and objectives for reading and language skill and sub-skill reading comprehension sets, grade 5-8. It delivers a variety of related lessons and activities, such as main ideas, sequence, inference, actual recall, fact and opinion and vocabulary comprehension and enhancement. These lessons advance to critical thinking skills for mastering specific literacy skills related to core content such as social studies and science. Interactive grammar exercises emphasize more difficult points of English grammar. (O'Byrne, Securro, Jones, & Cadle, 2006).

Overall results on year-end standardized test scores in language arts and reading showed that Merit subjects had significantly greater test scores than did the controls at both grade levels (Securro, Jones, & Cantrell, 2007). But above and beyond the quantitative differences there was an interest in the context of the study and the perceptions and beliefs of the four classroom teachers involved as noted.

Methodology

Follow-up interviews were conducted at the school site with four, reading and language arts middle school teachers whose students previously were the subjects in the reading software investigation described above. Interviews were conducted by two doctoral candidates in Curriculum and Instruction at Marshall University Graduate Center. The interviewers had no involvement in the original study, but were supported on site by the principal, university researcher. Each candidate interviewed two of the four teachers using a closed-response questionnaire with 14 items designed to focus on various aspects about the context and function of the instructional software program as they perceived its influence on student achievement, their instructional roles and the value of technology in general in the process.

Specific areas addressed, e.g., included content alignment of the software with the expected State of WV reading/language content objectives; gender differences; the relationship of lab and in-class instruction; the impact of their beliefs on the value of technology; influence on student achievement and motivation; and the impact of teacher perceptions, attitudes and dispositions including their self-confidence and efficacy for working with technology. A complete copy of the interview questionnaire is found in the Appendix.

Interviews were audio-recorded and interviewers independently reviewed their tapes and summarized a response profile for the items, focusing upon the most relevant and appropriate comments. Tapes were then

exchanged and summaries were made, resulting in a separate summary of the four teachers by each interviewer. These summaries were then reviewed collectively and a final response summary was created. Finally, the faculty researcher, who likewise had listened to all tapes, added relevant observations to the profile.

In addition to the specific questions asked to focus the interviews, two broad questions guided the overall assessment and interpretation by interviewers:

"What seemed to be most important to these teachers in regard to effectively using the software and complementing it with their particular instructional modes, personal abilities and related beliefs about the value of technology to help students successfully achieve the reading and language goals?"

"What specific aspects of the learning context were operative in regard to the teacher's motivation, personal efficacy, confidence and motivation for using and integrating technology into instruction?

Results

A basic but important theme addressed the instructional features of the software and its effects on student achievement, interest and motivation. Replies were very complimentary regarding the graphics, sound effects and presentation screens. The most effective content modules noted were for grammar ("Grammar Fitness"), vocabulary and essay writing ("Essay Punch"). All commented that the content of the software was compatible with current curriculum goals and objectives, and that it reinforced reading and language skill sets being taught in class, especially for several struggling readers. However, all noted that the time allotted for software engagement (in the lab) was too rigidly scheduled and that instructional needs could be more effectively addressed with greater flexibility in the schedule i. e., they may need more or less time in a given session depending upon the purpose and depth of the lesson. Interestingly, many, if not all of the research articles reviewed in the original quantitative study concerning the effects of integrated learning systems delimited a set time and day schedule.

Perceptions of the effects on students varied somewhat but all agreed that the program affords a good level of independence and individual pacing. Instruction can be "concurrently differentiated", which is not feasible (or even possible) with "20 learners sitting in front of you" as a class aggregate. Lower achieving students "like it best" but some did get frustrated with the process that returned them to previous screens when they didn't meet criterion on reading assessments. Although the repetition was especially beneficial for special students, upper level students often got bored. However, they did enjoy the "independence". Also, some viewed it as "computer games" and got caught up in the graphics and other technical effects such that screen progressions building a particular language skill may not have been connected. Others may view it as a respite or a "break" from the classroom. And there are those who simply do not like computers, although these seemed to be a minority.

Another important theme was gender equity and whether the software appeared to favor either sex. All teachers agreed that the program was gender free and that the visual and verbal contexts on screens and related language content were equitable and representative. Both groups appeared to be interested in and motivated to use the program"they looked forward to it".

Were the teachers prepared enough beforehand with the respective technical knowledge and skills needed to comfortably use the program? One of the four teachers indicated that she was very confident about using the program and knew for the most part how to address related technical issues and challenges. She had fairly extensive training and development in technology and "liked to use it". This was not evident for the others who generally commented that they lacked a good bit of skill and had not been involved in much technical training because it "took too much of their time". One relied more so on several of the "tech savvy" students to help others. All commented that the student tracking and monitoring functions were efficient for making instructional decisions, reteaching and reinforcing reading content in weak

areas, and sending achievement reports home to parents. One commented that although tracking was easy to use she didn't use it as often as she could have because she liked "hard copy" documentation and record keeping.

Another theme addressed the teacher's perception about its contextual use, i.e., delivering in class (rather than externally); how it influenced their instruction; and how essential was it for them to teach the related reading content. All but one replied that it needs to stay external to in-class instruction; that they could effectively teach without it if needed to, but "rely on technology because it is interesting to kids"; "easier to use" and it makes the "subject matter more relevant because the content on the screen is usually about topics which kids at this age group are interested in." Generally, all commented that the computer gives the repetition needed for students who are struggling readers. One feature that all commented on was that it gets the student's attention and actively involves them in learning. They can control the pace and can slow down or speed up when needed.

What sorts of dispositions and attitudes about the use and value of technology were evident for these teachers? As noted above, they did not see technology as an "end all" for instruction. It has its place but apparently does not impact their particular roles to a great extent. All but one commented that it needs to be "outside of the classroom" and that there is not enough time in a given class session to use the computer for conducting their presentations and related learning activities. They had to "make sure that the respective reading skills or goals for a given lesson were met". There was a sense among these teachers that computers are expected to be used most likely from school administrators and even by the parents in some cases. All commented that the use of this technology is important for reinforcing the skills or competencies that may show up on year-end standardized tests. Some frustration was expressed about technical problems arising in the middle of an activity and not being able to resolve these and the loss of instructional time. "Losing instructional time" appears to be a consistent theme.

Were the teachers motivated to continue to use technology for instruction and to enhance their personal skills and knowledge? One plans to continue to take courses or related activities and to "self-teach" using materials and resources provided by the school district and other resources that she personally purchases. She regularly attends related conferences locally and statewide. The others plan to participate in the orientation activities for the software provided by the school or the school district. Having the "time" to participate is mentioned time and again! There is not a sense that most of these teachers will make a large investment in time and energy to grow technically.

Summary/Discussion

There was unanimous agreement that language and reading content in the Merit program was consistent with and aligned to state/school curriculum; the content and context on instructional screens were not gender biased; the software was user friendly for students and teachers; and that it had a positive effect on student reading/ language achievement. Moreover, the program should stay external to in class instruction time, suggesting that the teacher should stay "centered" there. Cope and Ward (2002) contend that the successful implementation of learning technologies has a greater likelihood in contexts where teachers perceive and use technology wholly within a student centered approach. The context of the computer lab environment gave students greater independence with and control over their learning, but in the classroom, it appeared to shift back to a teacher centered instructional context. This is an interesting dichotomy: technology place-bound in the lab; and teacher transmission in the classroom.

They believe that they can teach effectively without computers but think that language instruction is better off with it particularly for lower achieving students and most definitely for special youngsters who need the drill and practice. They also think that it can be very boring for higher level students. They do not like the rigidity of the set time schedule, twice weekly for 45 minutes. More or less time may be needed depending upon the instructional circumstance and individual student needs.

One respondent has completed a fair amount of informal and formal training and development in technical instruction. For the others, training and development have been very modest and there are no plans to engage extensively in technical training aside from the various orientation activities provided when new resources are implemented at the school level. It is not clear whether these teachers "believe" that knowing, understanding and integrating technology throughout their instructional activities will make them more effective teachers or whether it is a " professional responsibility", given the various mandates and expectations for teaching "21st century skills". All commented that it "takes time" to learn technology and several became frustrated when the programs failed to work which made them helpless for a period of time. This may be an explanation in part for the lab-class-dichotomy referred to above. When technology is place bound in a lab context, it may not be perceived as their responsibility to know what to do when the system faults.

Student effects varied - most liked it some did not, particularly the "higher" students who were bored at times. It may be that an "algorithm of presentation" across numerous screens creates a dulling effect for faster learners and becomes too predictable-- which can lead to stimulus boredom. However, a redeeming feature is that computers do not get tired of repeating information or frustrated when answering the same questions over and again, which is a plus for slower learners (and for the teacher!). Another positive effect is that students are given independence and individual pacing; they control the "academic accelerator", which is likely to become the instructional mode as technology use progresses. Constructivist computer based instruction may ultimately result in greater individualized instruction enabling students to effect their own learning and to make it meaningful (Parr, 1999).

Differences in achievement scores between males and females in the previous study raised interest about why these occurred. Could there be a "gender bias" in the text, graphics, speech, and narrative instructional content/contexts in certain aspects of the software? Or perhaps, was it just an "artifact" peculiar to the local context in the previous study? Cooper (2006) in an article on the "digital divide" gave evidence to support the supposition that females are at a distinct disadvantage when learning material being delivered by computer-based software. The author described, in part, that the disadvantage is a matter of computer anxiety traced to the socialization of boys and girls and the "resultant stereotyping that the computer is the toy for boys" (Cooper, p. 320). He suggests that the divide is a matter of software programs being designed with features that are more appealing to boys than to girls, including the social contexts of computer learning. However, the teachers interviewed in this study indicated no such outcome was evident by girls; they were not threatened or anxious about engaging in the software system. Moreover, they indicated that the graphics and content on the various content screens gave no evidence of a gender bias. An achievement advantage in reading and literacy may be operative for girls at this level but they felt it was unlikely related to computer programs. It is apparent that the teachers in this study did not give any impressions that favored the boys or that boys are by nature better at working and learning with computers.

Tracking and monitoring functions were positively regarded except for one person who thought these were complicated and difficult to use. Even though the others were more complimentary about these aspects, it does point to the importance of substantial and continuing professional development for personnel who teach in integrated learning systems or with technologies. Clark (2008) indicates that, even when teachers are given technical training and report having acquired some level of skill and knowledge, it doesn't necessarily motivate one to run out of the training session and log on! Only a small to modest portion feels comfortable with various aspects of technical engagement in their teaching contexts. Data from the National Center of Educational Statistics (2000) indicate that less than 1/5 of classroom teachers felt prepared enough to use and to integrate technology into their instructional plans and practices. Wang, Ertmer & Newby (2004) similarly report teachers to be lacking in

confidence and self-efficacy for technology integration. Apparently, educators intuitively know that accumulating knowledge does not necessarily lead to a permanent or substantial change in behavior. An accompanying set of initial transformational skills, content understandings and attitudinal predispositions and feelings need to be interfaced, along with personal confidence and efficacy. It is not clear that these respondents mirrored these needs to a large extent.

The future of computer-based instructional systems and related software for reading and language arts is unpredictable at this point. But for sure, the expectations are that these tools will be used by educators to help students learn and to connect learning to real world contexts. The tools, programs and processes will surely differ significantly from those currently being used. At the same time, developing perceptions and beliefs about technological processes and benefits are continually being shaped, including the personal efficacies and related motivations of teachers. These, as well as the tools and programs that may affect student achievement, are important research considerations, particularly for the "teacher in technology context". It is the classroom teacher who creates a context for learning with related beliefs, perceptions and expectations that will set the stage for the successful implementation and use of technical instruction.

Appendix

Teacher Interview Questions for Effects of Merit Software (MS) Program.

1. Describe several instructional features about the MS program you think were particularly effective for teaching reading and language arts. (can also probe here for aspects that were "ineffective").
2. How well do you think that the MS Program stimulated and /or maintained student interest and motivation?
3. How compatible is the content of the MS program with the WV standards and objectives for reading and language arts and sub-skill reading comprehension sets?
4. What is your opinion about the idea that technology based instruction is critically needed to effectively teach today's students?"
5. How satisfied were you with the operation and management of the MS Program? Was it teacher "friendly" or "unfriendly"?
6. From your experiences, in what ways do you think the use of computer assisted instruction contributes to or enhances student achievement? What about those with learning problems or disabilities?
7. Comment on the degree to which the MS Program has influenced you to move away from traditional instructional delivery in the classroom or to foster new or different ways of teaching?
8. What is your opinion about the idea that the use of the MS Program would be more effective for students and teachers if it were integrated into normal in-class schedules and routines?
9. Describe some of the student's attitudes toward the use of the MS Program that you have observed. Any comments or reactions from parents?
10. What is your feeling about this software being "gender-free"-i.e., the visual and verbal content and context being fairly equitable?
11. What is your reaction to the following statement? "I can teach the necessary content in my classes just as effectively without the use of the MS Program."
12. What are the major barriers that you see in regard to integrating technology into your instructional routines?
13. Describe the level of knowledge and understanding that you have about computers and instructional software programs. Previous formal and informal training? Any plans to do additional development?
14. Any final comments about topics or issues not addressed that you would like to offer?

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