

Classroom Technology: Literature, Attitudes and Lessons Learned

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Review Article

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ABSTRACT

Increased teacher accountability for all student populations, prompting administrators and educators to audit and improve instructional practices, was initiated by the No Child Left Behind Act and continues to thrive in today's climate high-stakes testing and the adoption of the Common Core State Standards Initiative and Every Student Succeeds Act. Additionally, standards reforms require the use of technology in public education classrooms, creating a new vision for quality instruction. Research supports that technology integration into curriculum enhances academic performance of all student populations. However, some teachers refuse to utilize available Internet and technology resources. The lack of teacher involvement in technology based instruction is primarily attributed to a lack of training, support, time, and resources. Educators must continue to provide quality instructional delivery for today's twenty-first century learners. Therefore, as new technology continues to emerge, educators must challenge themselves to become technologically proficient in today's digital world.

INTRODUCTION

Classroom environments and instructional strategies have morphed over the last decade. The shift can primarily be attributed to increased teacher accountability and an overabundance of technology resources. A learning environment equipped with interactive resources, videos, and multimedia exemplifies the classroom of the twenty-first century. Educators are expected to emphasize technology-driven instruction, while incorporating hands-on activities and varied learning strategies ^[1]. However, successful implementation of any program requires extensive teacher training, numerous resources, and support from all stakeholders ^[2]. The NCLB (2001) provided explicit expectations for educators and incorporation of technology into classroom instruction was deemed non-negotiable.

Today, those demands continue as technology integration is woven throughout the CCSS. Although a technological focus on classroom instruction remains, many teachers continue to defy directives, leading one to question why resistance persists ^[3]. After an extensive review of the literature, several factors are noted that attribute to teacher reluctance to incorporate technology. This article will provide an overview of current perceptions of technology and some concerns acknowledged by educators.

LITERATURE REVIEW

Providing students with an optimum education is the goal of teachers, administrators, community members, and legislators. Increased accountability, resulting from NCLB (2001) and CCSS (2010) has forced schools to examine current teaching practices. Numerous studies have been conducted to determine the most effective means of lesson presentation. The importance of incorporating technology into classroom instruction is validated throughout the literature ^[4]. Technological advancements afford educators access to an abundance of resources, providing differentiated opportunities for English language learners, "at-risk" students, gifted learners and individuals who receive special education services ^[5]. Schools that are not providing a quality education for all students can be held accountable for violation of NCLB mandates. The majority of classrooms today are equipped with an interactive white board (IWB), in-focus projector, and computer access to facilitate student learning. Recent studies have identified mixed results when investigating the effect of the IWB on

student achievement. Some studies refer to the IWB as a replacement for the overhead projector, allowing for continued teacher-centered instruction^[6]. Other critics do not view the tool as a medium for development of long-term critical thinking skills^[7]. Although the research primarily supports the use of the IWB for achievement of all student groups^[8], the literature consistently emphasizes a need for teacher training and support for effective integration of the IWB and technology-driven instruction^[9]. Additionally, educators must have a positive attitude toward using a new medium for instruction or the resources become another task versus a learning tool. Technology-driven instruction becomes more meaningful for students due to the availability of unlimited resources. Mathematics studies have confirmed that students gain a clearer understanding of difficult concepts when teachers use visual illustrations, multimedia integration, and representations that are impossible without the aid of technology^[10]. When used correctly, the aforementioned resources encourage cooperative learning and allow teachers an opportunity to collect real-time data to assess student learning^[11]. However, a focus on pedagogy in addition to technology is crucial for successful implementation. Teachers are the content experts who are facilitators of the curriculum. Technology simply provides a medium for students to learn that is engaging and relatable for today's learners^[12].

The integration of technology applications into classroom instruction has significantly impacted student assessment results. Several schools reported improved student performance results after implementing various technology resources. Canton City School District in Ohio improved student success on state scores after initiating a two-year program of graphing calculator integration.

Bernabei-Rorrer, a math coach for the school district stated, "We were blown away by the results. Students who used TI's graphing calculators along with the TI- Navigator system achieved at a level three times greater than students who did not"^[13]. In a North Carolina study, student performance increased by 17% for schools that implemented computer-aided instruction^[14]. Students who had access to graphing calculators for algebra instruction had significantly higher test scores than students who were not exposed^[15].

Students who engage in learning through technology often develop a new attitude towards content areas they had previously not enjoyed. According to recent studies^[16], "A growing body of research indicates that information and communication technologies make teachers' lessons more interesting, more enjoyable, and more important to their students". When students are more involved in the learning process, they often develop a new learning viewpoint and sense of achievement. Studies^[17], investigated the effect of web-based instruction on the attitudes of middle school mathematics students. Using qualitative and quantitative analysis, attitude improvements were attributed to the use of technology in the classroom. The research determined the following:

Across multivariate and factor analyses and the transcripts of interview notes, results of the study indicate that with the opportunities of drilling and practicing on the computer and receiving instant scores and adapted feedback, students had gained interests in doing mathematics, and formed a perception that they became smarter in problem-solving^[18].

TEACHER ATTITUDES

Although the importance of using technology in the classroom is undisputed in the literature, many teachers choose not to implement technology resources in the classroom. Research primarily attributes the lack of classroom use to a teacher's sense of being unprepared to model content through computer-aided assistance^[3]. Successful implementation of technology-based lessons requires extensive teacher preparation. Using the Internet, IWB, or interactive activities can be a very demanding task, especially for those who lack expertise with computers. Unfortunately, this presents a multitude of challenges for professionals who are lacking in this area. In previous years, many assumed that if teachers had extensive knowledge of computers and could use them effortlessly, they would be able to teach with technology. However, studies states^[19], "Recently, attention has turned to integrating technology into the curriculum, recognizing that being a competent technology user is different from knowing how to teach effectively with technology". Analysts recognize the need for training to provide teachers with the tools and resources needed to instruct effectively.

The focus on technology-based instruction must shift from what can be accomplished to what will be accomplished. Teachers must first acquire confidence in targeted skills prior to implementing successful classroom instruction. Strategies to improve curriculum delivery require ongoing training and professional development. Studies have emerged raising concern about the lack of teacher preparedness to use technology resources in the classroom. According to research from the National Center for Education Statistics, although 99% of full-time public school teachers had computer and Internet access in their schools, only 39% were integrating technology into their lessons. And when asked about preparation, 33% of public school teachers felt they were well prepared to use computers and the Internet in their teaching, while 66% felt somewhat or not at all prepared to use this technology^[20].

The National Education Technology Plan further recognized that teachers had not received the necessary training

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to successfully implement technology into classroom lessons ^[21]. Therefore, teachers were not prepared to teach with the Internet and did not have the training needed to create lesson plans that integrated technology ^[22].

Several educator concerns are discussed at-length in current studies. Many challenges faced when implementing technology are similar to those faced by teachers on a daily basis. Studies ^[23], referenced the challenges faced by educators when implementing web-based instruction as follows: (a) knowing the subject matter; (b) knowing what students know and can do; (c) keeping track of student work; and (d) developing coherent ideas. Clearly, these are issues that occur to varying degrees in all teaching. Teachers must be trained, whether they are in the classroom or in the technology center ^[24].

Technology resources are often ambiguous, which can be challenging, specifically to inexperienced teachers. Numerous sources often have to be reviewed before finding detailed activities. However, in recent years, an abundance of web sites and resources have been created by teachers, for teachers. Although initially the instructor may spend a substantial amount of time researching, additional topics will be located that can be used in subsequent lessons ^[25].

Students, just as teachers, have different levels of technology proficiency; therefore, students must also be trained on expectations and program applications.

LESSONS GLEANED

The literature provides a basis for creating a plan to address deficiencies in classroom technology implementation. Once a problem is identified, strategies can be designed to facilitate positive change. Planning, preparation, instruction, refinement, and evaluation represent an example of a five-step model to integrate technology into curriculum ^[26]. Each phase is necessary to implement the model and create the desired technology rich environment. The first step is to educate staff members and provide professional development opportunities. Teachers need staff development opportunities, focused on current research and examples of positive outcomes, if accountability for technology usage is going to be established ^[27]. Each stage is unique and specific expectations must be outlined for each aspect ^[28].

New challenges will present themselves because of the time required to effectively implement any technology program, so commitment is needed from all stakeholders ^[29]. Collaboratively, subject teams will benefit by working together to create lesson plans that incorporate hands-on technology activities. Recent studies ^[30] states, "Teaching with the Internet entails the usual tasks of teaching-planning, implementing or interacting, and assessing-along with the less common tasks of identifying and selecting resources and materials, and fitting them into the curriculum".

Teachers are already using lesson plans on a daily basis for instruction. Incorporating technology into existing curriculum requires that teachers plan, implement lessons, and evaluate outcomes to determine their effectiveness ^[31]. Teachers will be more open to instructional change once they recognize that these types of lessons do not require additional planning ^[32].

Administrative support is essential for successful implementation of technology in the classroom ^[19], elaborated on the importance of administrative support in the following: Remember that change takes time, and a realistic Technology Integration Plan should span three to five years. During this time, administrators must be patient, diligent, and attentive. Through strong vision and leadership, the number of educators who can integrate technology effectively into their teaching practices will increase, which will ultimately lead to higher levels of student achievement.

A productive school technology atmosphere focuses on the following:

- Faculty members need access to the basic tools of technology such as computers, software, and networks.
- Faculty must be aware of the existence of these resources and understand the ways in which can be applied to their work.
- Faculty must acquire the skills needed to use technology resources in ways that are relevant to their work.
- Faculty must apply the technology as appropriate.

Technology integration into classroom instruction is often a concern for educators. Analysis of the literature offers some considerations for schools or teachers who are struggling with support issues as follows:

- Gain support of central office personnel and administrators at the campus level.
- Involve students in changes.
- Collaborate and actively participate when possible.

Funding is needed to secure necessary professional development, software, and additional resources, which may be provided at the campus or district level. Administrators can also authorize common collaborative planning periods for

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teachers to develop lessons. Additionally, a clear expectation that all faculty members are expected to use technology resources must be established. If teachers are allowed to participate on a voluntary basis, those who are not confident with technology applications will most likely choose not to participate, which is detrimental to the school environment. Team collaboration creates a learning team environment where teachers do not become overwhelmed and isolated when planning instruction.

CONCLUSION

The studies ^[19], created a sense of urgency in the educational community. The sense of urgency and demand remains steadfast, and in fact, appears to be heightened with today's focus on career and college readiness through the implementation of the CCSS and high-stakes testing.

There is a continued focus on students' abilities regarding critical thinking, problem solving, collaboration, and application of technology-based skills. All learning styles can be targeted using technology and virtual representations when teaching styles are adapted to meet student needs. The literature provides a foundation for classroom change, emphasizing the importance of professional development opportunities and ongoing teacher support ^[22]. Adequate funding for teacher training and resources must also be secured for successful implementation. This article provided a brief overview of technology expectations, current studies supporting increased student achievement, and strategies for assisting teachers who are struggling with technology integration. Creating a technology-rich learning environment produces students who are motivated to learn, which, in turn, increases success rates ^[31,32]. The realization that this is not a "quick-fix" situation allows students, teachers, and administrators an opportunity to continue to progress to a technologically proficient level and transform a traditional classroom into an engaging learning environment. Technology is continuously evolving; therefore, educators must also evolve.

REFERENCES

1. Hartsell T, et al. Effectiveness of professional development in teaching mathematics and technology applications. *J Edu Tech Dev Exch*. 2004;2:53-64.
2. Perritt DC. Including professional practice in professional development while improving middle school teaching in math. *Nat Teac Edu J*. 2010;3:73-76.
3. Bingimlas KA. Barriers to the successful integration of ICT in teaching and learning environments: A Review of the literature. *Eur J Math Sci Tech Edu*. 2009;5:235-245.
4. Bellamy JS and Mativo JM. A different angle for teaching math. *The Technology Teacher*. 2010;69:26-28.
5. Blaschke C. 10 technology funding sources in NCLB. British Educational Communications and Technology Agency. *Harnessing Technology Schools Survey, Analysis and key findings*. 2003;30(10):22.
6. Bush G. Logging on to staff development: Enhancing your teachers' knowledge and use of educational technology through online professional development. *Technological Horizons in Education Journal*. 2005;32(11):14.
7. Common Core State Standards Initiative (CCSS). (2010).
8. Curtis DA, et al. Impact of handheld graphing calculator use. Heller Research Associates. 2005.
9. Cundiff JM, et al. One size does not fit all. *Technological Horizons in Education Journal*. 2005;32(11):26.
10. Dreyfuss JS. Improving low-income and minority students' test performance: Three successful high schools practices. *Dissertation Abstracts International*. 2005;66(05):1702.
11. Allen GD, et al. The impact of web-based assessment and practice on students' mathematics learning attitudes. *The Journal of Computers in Mathematics and Science Teaching*. 2006;25(3):251.
12. Hofer M and Swan KO. Technological pedagogical content knowledge in action: A case study of a middle school digital documentary project. *Journal of Research on Technology in Education*. 2008;41(2):179-200.
13. Kuehn L. So long, constructivism. *Hello smart! Our Schools/Our Selves*. 2010.
14. Lightfoot L. Who's bored by the whiteboard? *Pedagogy*. The Times Educational Supplement, Scotland; 2012.
15. Luterbach KH and Brown C. Education for the 21st century. *Int J App Edu Stud*. 2011;10(2):14-32.
16. Manny E, et al. Using the interactive white board in teaching and learning. An evaluation of the SMART classroom pilot project. *Interdisciplinary Journal of E-Learning & Learning Objects*. 2011;7:249-273.
17. Moore D. Smart boards help to make the classroom interactive. *Capital*. 2008.
18. Moss A, et al. A study of teachers using 21st century tools in a rural South Carolina school district. (Doctoral dissertation). Retrieved from Pro-quest Dissertations & Theses database. 2011.

Research & Reviews: Journal of Educational Studies

19. No Child Left Behind Act. 2001.
20. Nugent L. When technology met accountability. *The Journal*. 2006;33(12):41.
21. Ohio's Canton city school district increases math achievement using Texas Instruments graphing technology. PR Newswire Association. 2006.
22. Oleksiw T. Increasing math test scores with the SMART board interactive white board. 2007.
23. Ash JE. The effects of computer-assisted instruction on middle school Mathematics achievement (Doctoral dissertation, Tennessee State University, 2005). *Dissertation Abstracts International*. 2005;66:2871.
24. Rivero V. Teaching in transition. *American School Board Journal*. 2005;192(9):36-38.
25. Schweder W and Wissick CA. Teaching content with interactive whiteboards. *J Sp Edu Tech*. 2008;23(1):54-58.
26. Schweizer H and Kossow B. WebQuests: Tools for differentiation. *Gifted Child Today*. 2007;30(1):29-35.
27. Smaldino SE. Preparing students with 21st century ICT literacy in math and science education. *J Curr Ins*. 2011;5(1):1-3.
28. Starkman N. The wonders of interactive whiteboards. *The Journal*. 2006;33(10):36-38.
29. Swan M. Reflections. *Mathematics Teaching*. 2007;200:2-3.
30. Wallace RM. A framework for understanding teaching with the Internet. *Ame Edu Res J*. 2004;41(2):447.
31. Wizer DR and McPheson SJ. The administrator's role strategies for fostering staff development. *Learning & Leading with Technology*. 2005;32(5):14-17.
32. Zittle FJ. Enhancing native American mathematics learning: The use of smart board generated virtual manipulatives for conceptual understanding. 2004.