

HIGH SCHOOL SCIENCE TEACHERS' CONFIDENCE WITH CLASSROOM TECHNOLOGY INTEGRATION

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ABSTRACT

Integrating technology in the science classroom can help support many teaching goals. However, research indicates that teachers need confidence in using technology to effectively integrate it into classrooms. The purpose of this study was to describe high school science teachers' confidence with integrating various forms of technology into their classrooms, and how that confidence varies by teaching discipline, gender, age, and teaching experience. This quantitative descriptive study used a four-point Likert scale survey to collect self-reported confidence data from 40 practicing high school science teachers in the Midwest region of the United States. Overall, 100% of the science teachers reported confidence in using the internet, and 90% or more reported confidence with computers, email, and powerpoint. Interestingly, these findings indicate that physics teachers reported lower confidence in using several types of technology compared to teachers of other disciplines. The author also found that males tended to report higher confidence in their use of technology than females did. While this study provides information for professional development opportunities that focus on improving confidence in classroom technology use by addressing skills and motivation for science teachers, we should note that the sample sizes were low and additional investigation is warranted. This research also leads to new questions about whether confidence translates to higher levels of technological use in the classroom.

Keywords: Technology Integration, Self-confidence, Science Teachers.

INTRODUCTION

Fifteen years ago the National Center for Education Statistics (2002) reported that while many teachers used computers or the Internet regularly in their homes, they were not using this same technology in their classrooms to it is fullest pedagogical capacity. More recently, Martin and Carr (2015) found that middle and high school teachers do report frequent use of the internet and powerpoint in their classrooms. However, there are now several new technologies that are becoming more prominently found in both society and schools.

The ever-changing relationship between teachers and technology plays a very important role in the classroom today (National Center for Education Statistics, 2002). As administrators continue to encourage teachers to

implement new technology tools more frequently, teachers's understanding of and confidence in using current technology becomes a concern (Wallace and Witus, 2013).

In today's classrooms, technology is used in many ways, from online textbook modules to iPads. Isman, Yaratana, and Caner (2007) defined four different kinds of technology tools: classical, modern, computer, and laboratory. Classical tools include chalkboards, workbooks, whiteboards, and drawing instruments. Modern tools include the internet, calculators, and video cameras. Computer technologies were described as various software, hardware, computers, and scanners/copiers. Laboratory technologies include bunsen burners, gloves, goggles, pipets, probes, and interface devices (Isman,

Yaratan, and Caner, 2007).

This study focuses on the use of what is known as instructional technologies that fall into Isman, Yaratan, and Caner's (2007) modern tools and computer technologies categories. While instructional technologies might include classical tools, we were specifically interested in new technology for this research. Laboratory technologies are also very different from the modern tool and computer technologies in that they are often not used as a tool for instruction, and they tend to be discipline specific. Instructional technologies are therefore any of the various forms of teaching tools that help engage students in the classroom to aid in learning, teaching, and comprehension (Smaldino, Russell, Heinich and Molenda, 2005). Technology teaching resources include: computers, iPads, projectors, interactive whiteboards, multimedia, software programs, digitally-based communication tools, or other equipment designed to support the classroom (National Center for Education Statistics, 2002; Martin and Carr, 2015). Instructional technology in the classroom requires integration. Technology integration can be defined as the mixture of technology resources and technology-based applications into the daily routines, work, and management of schools (National Center for Education Statistics, 2002).

Martin and Carr (2015) proposed that classroom integration of technology refers to the actual use of several types of technology resources. More broadly, the amount of technology integration in a classroom is based on an individual educator's use of technology to provide students with simple steps and processes for learning activities, as well as the ways in which various types of technology change the learning environment (Hennessy, Ruthven, and Brindley, 2005).

There is evidence to suggest that when teachers are trained in different areas of technology use, their students have greater success on standardized test scores than do students with untrained teachers (Wallace and Witus, 2013). Perry and Steck (2015) also found that lower educational outcomes of students can be at least partially attributed to low self efficacy of their instructors' technology use. Classrooms with technologically confident teachers had

higher student engagement and higher student self efficacy in using technology. Interestingly, this effect was only found with teacher training and technology use. Students who used iPads regularly in the classroom had higher engagement but, overall lower test scores in a science class as compared to students who did not regularly use technology. This suggests that focus on teacher access to, and use of, technology in the classroom is as important as students' use of technology (Perry and Steck, 2015).

1. Theoretical Framework

Confidence and self-efficacy are based on a conceptual framework of social cognitive theory, emphasizing the fact that people exercise some influence over what they do. Social cognitive theory states that teacher self-efficacy may be summarized as individual teachers' beliefs in their own ability to plan, organize, and carry out certain activities that are required to attain given educational goals (Bandura, 2004).

In this study, the author defined teacher self-confidence as an individual's perceived general ability. In addition, self-efficacy is concerned with the idealized capability to achieve specific goals. Therefore, self-efficacy can be seen as situationally appropriate self-confidence. Bandura (2004) connects high self-reported self-confidence to perceived self-efficacy associated with low risk tasks. It is important to recognize that confidence and efficacy do not describe an individual's actual ability, but rather what a person believes they are able to do with their skills (Bandura, 2004). Holdren and Rada (2011) have noted that high teacher self-efficacy and (therefore) confidence of technology use in the classroom led to higher technology use (Holden and Rada, 2011).

In this study, the focus is not on self-efficacy of teachers in their abilities to achieve specific goals in their classrooms regarding technology use. For example, a teacher may be confident in their use of Microsoft PowerPoint, but to be self-efficient, educators must achieve the goals of their lesson plans through the use of PowerPoint. In this present study, high school science teachers were surveyed through self-report style questionnaire using a broad range of questions regarding both confidence and self-efficacy. The findings

presented here focus primarily on the questions asked about confidence.

2. Problem Statement

With the advent of new technologies available for use in the classroom, it is important to repeat past studies that considered how these technologies are being used by teachers. Older studies do not take into account the increased access of technology in schools. In addition, science serves a special case because the tools of science are also dependent upon technology. There are few studies that consider science teacher confidence in using technological tools in the classroom. This research both updates what the author know about teacher confidence using technology, and it provides information about science teachers in particular. Both of these are currently unavailable in the literature.

3. Literature Review

Many educators need increased confidence in technology use in the classroom as well as confidence in their own technology skills (National Center for Education Statistics study, 2002). According to a National Center for Education Statistics study from 15 years ago, only 23% of teachers surveyed felt ready to integrate technology into their classroom. Those teachers who used technology do so mainly to present knowledge rather than to provide hands-on learning opportunities to students. Some teachers were confused on how to use computer programs while others were uncomfortable with investing instructional time to deal with potential equipment failures or slow Internet access.

More recent studies have confirmed the link between teacher comfort with technology and its use in the classroom. In one study, researchers found that self-confidence was a plausible predictor of teachers' success in using technology (Ertmer and Ottenbreit-Leftwich, 2010). If teachers do not believe they can use advanced technologies (iPads, Digital Projectors, YouTube), it is unlikely that they will integrate them into their teaching. Holden and Rada (2011) revealed that how confident a teacher is with their own technology use also plays a role in how effectively it is used in the classroom. Teachers generally lack confidence when implementing new technology into

instruction and they have an overall feeling of unpreparedness in using technology in their classrooms (Moore-Hayes, 2011).

Currently, research is being done to determine if experience impacts teachers' use of classroom technology. Teachers with less experience use more technology than those with eleven years or more of teaching experience, which suggests that younger teachers utilized more technology into their classroom (Isman, Yaratana, and Caner, 2007). Additionally, teachers who had personal experience with computers outside of the classroom were more confident when it came to applying information technology equipment and software in the classroom (Yildirim, 2000). Additional impacts of teacher use of technology in the classroom is teacher gender. Bang and Luft (2013) found that male teachers used powerpoint more frequently than female teachers did. Meanwhile, Almekalhfi and Almeqdadi (2010) found that both male and female teachers were quite confident in teaching with technology, even despite some common technological issues that arise during integration.

Prensky (2001) recognized that creating activities students enjoy and are willing to act upon is a tough task for teachers. Introducing technology mixed lessons may prove to be a good motivator for students of any age. So-called "digital natives," namely the current generation of primary and secondary students, respond well to technology-rich activities because of their comfortability and everyday use of technology (Prensky, 2001). Technology and teacher motivation have positive effects on student motivation (Atkinson, 2000). Because students respond positively to technology and are motivated by technology, teachers should make clear efforts to create activities that involve some form of technology tool. Students will do better in school given the opportunities and tools they are most comfortable with (Atkinson, 2000).

Although we know it is important to integrate technology into classrooms, we also recognize that there may be a lack of teacher confidence for doing so. Studies that have been done on teacher confidence are now outdated, in terms of technological advances (Holden and Rada, 2011; Isman, Yaratana, and Caner, 2007), they include only

experienced teachers or teachers in their first years of teaching (Bang and Luft, 2013), or they include teachers from all disciplines as a whole (Martin and Carr, 2015; Isman, Yaratan, and Caner, 2007). The authors are particularly interested in science teachers because they may actually be more comfortable with the use of technology in classrooms, since science relies heavily on technological tools. Scientific study itself is a technologically relevant field.

4. Purpose of the Study

The purpose of the research was to investigate the confidence of high school science teachers in using various types of technology and to examine whether or not confidence varies among high school teachers by discipline, gender, age, or teaching experience.

5. Research Questions

- How confident are high school science teachers with technology integration of both modern and computer technology tools?
- How, if at all, does confidence in using both modern and computer technology tools vary by discipline, gender, age, or teaching experience?

6. Methods

This descriptive study used a survey to collect data for the computation of basic descriptive statistics expressed as percentages. An online anonymous Qualtrics Survey was used to gather four-point Likert scale data on science teacher confidence with the use of various forms of hardware and software technologies in their classrooms. Participants for this study were full time high school science teachers (Grades 9-12), who had one or more years of teaching experience. The survey was sent to 240 science teachers via a form email. Contact information was retrieved from public high school web pages around the mid-west. A total of 48 teachers (20%) started the survey, and 40 (16%) completed the survey, including 27 females and 13 males. The sample of this study included all 40 of the returned and completed surveys. Of the teachers responding to the survey, 20% taught physics, 30% taught chemistry, 40% taught biology, and 10% taught other science subjects.

7. Instruments

The first part of the survey instrument was a modified version of the Computer Technology Confidence Survey (CTCS) created by Heather Brown (2014). It asked teachers to rank their confidence in using a list of modern technology tools in the classroom, on a scale of 1-4 (Very Confident to Very Unconfident). The main modification made on the CTCS was the technology tools listed. Tools were removed from the original if they were outdated and new tools were added on to reflect the current technology. These changes were made based on guidance from an educational scholar with expertise in classroom technology. Qualitative questions from the survey were removed as well, so only quantitative data was obtained. A Cronbach's alpha was run for the TIS questionnaire and had an adequate reliability, which is generally considered scores above 0.70 (alpha= 0.76).

The second part of the survey was modeled after the Computer Technology Integration Survey (CTIS) and included 24 confidence statements on technology integration in the classroom. This latter part surveyed educators' confidence based on a Likert scale of 1-4 (Very Confident to Very Unconfident) and was partially modeled from Ling Wang's (2004) Technology Integration Survey (TIS). The TIS was validated as per Wang, Ertmer, and Newby (2004). The CTIS itself was not externally validated, but was deemed appropriate for use by the first author and two experts in educational theory and practice. The CTIS survey was intended to be about teacher confidence, but most of the questions revolved around achieving classroom goals. Confidence in terms of goals is more often defined as efficacy. Therefore, the author ended up only using two questions from the CTIS survey, both of which focused on teacher confidence.

8. Data Collection and Analysis

The survey was administered as an online anonymous Qualtrics Survey. From the email list of area high school websites, science teachers were contacted via a form email. This email clarified the research and outlined what would be required of them. Science teachers were provided a link to the Qualtrics Survey and asked to fill it out anonymously. The data were entered and analyzed

through an Excel Software spreadsheet. First the data were sorted by individual and then sorted by group age, gender, teaching experience, and subject. Because a 4-point Likert scale was used on the survey the "very confident" and "confident" responses were combined, as were the "unconfident" and "very unconfident" responses, therefore creating two options: Confident or Not Confident. Percentages were found using Excel for each individual group, depending on the sort, and a non-statistical comparison between groups was made. The total sample size was too small to run a chi-square test. While it would be possible to run a Fisher's test, it would need to be repeated for each individual technology over each group. This would diminish their statistical power such that it would be unreasonable to expect to find practical significance.

9. Results and Discussion

9.1 Research Question 1

Generally, 61% of high school science teacher respondents reported that they felt they had enough preparation to use technology in the classroom. Also, only about 47% of science teachers reported that they use technology more for personal consumption than for use in the classroom. Just under 2/3 (59%) of participants reported that they were comfortable and confident using technology in their teaching.

These numbers are higher than those that were previously reported (National Center for Education Statistics, 2002), which suggested that only about 23% of teachers use technology in their classrooms despite over 90% of them having it available for use. This is a promising increase in possible technology usage in the classroom. However, it should also be noted that these surveys were done with only science teachers, and this population might be more adept at using classroom technology because the field itself relies so heavily on scientific technological tools. The teachers in this study reported confidence with common technologies that are used repeatedly and often, like computers, web browsers, powerpoint, and email. However, the surveyed teachers reported less confidence using more rare or costly technologies, such as iPads and interactive whiteboards.

These results make intuitive sense as more commonly

available tools would logically translate to higher use and confidence. It is not clear, though which comes first, the use or the confidence. Additionally, it should be noted that this was a 4-point Likert scale and there was not an option for teachers to state that they do not have a particular technology available to them. It is possible that if those technologies did not exist at their school, teachers might automatically say that they had very low confidence in using it, even if they used one regularly at home. This seems less likely, however, based on the earlier findings that actually a full 53% of teachers use technology in their classrooms more often than at home.

9.2 Research Question 2

9.2.1 Confidence by Age

As Table 1 reports, there was a diverse mix of confidence per age and technology type. An analysis of each of the different technologies shows where there are confidence gaps among age groups in classroom use. Younger teachers reported the lowest confidence of all age groups in using Web Browsers, Google Apps, Dropbox, Digital Projectors, Videos (DVD), YouTube, Simulations, and PowerPoint in the classroom, but they reported the highest confidence in using social media. The most senior group, ages 45+, reported higher confidence using YouTube, Web Browsers, and Email. These results seem to mimic other studies done on confidence in classrooms, which indicate that younger teachers tend to have lower levels of confidence. The authors were surprised though that the only technology that the youngest teachers had the highest confidence in using was social media. The authors can assume that the youngest teachers in this study would have had the most personal experiences, from an early age, with technology, yet they have the lowest levels of confidence for most of the technologies. This result leads us to question the idea that comfort with technology outside of the classroom will lead to confidence in its use in the classroom.

9.2.2 Experience Level

Table 2 reports teachers with varying levels of experience and their level of confidence using different technologies in the classroom. In sum, more than 85% of all the different teaching experience groups surveyed reported

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Technology Type	Under 25(n=4)	Raw Number	25-36 (n=15)	Raw Number	36-45 (n=6)	Raw Number	45 & more (n=15)	Raw Number
Computer	87%	4	87%	13.5	100%	6	86%	12.9
Email	100%	4	100%	15	100%	6	86%	12.9
Web Browser	100%	4	100%	15	100%	6	80%	12
Google Apps	50%	2	100%	15	100%	6	66%	9.9
Dropbox	50%	2	68%	10.2	83%	4.98	53%	7.95
Ipad	50%	2	50%	7.5	66%	4	46%	9
Social Media	100%	4	68%	10.2	83%	4.98	60%	9
Interactive White	50%	2	50%	7.5	50%	3	46%	6.9
Digital Projector	50%	2	68%	10.2	83%	4.98	60%	9
Video (DVD)	50%	2	87%	13.05	66%	4	86%	12.9
YouTube	50%	2	100%	15	83%	4.98	86%	12.9
Simulations	50%	2	81%	12.5	100%	6	66%	9.9
PowerPoint	50%	2	93%	13.95	100%	6	86%	12.9
Electronica Grades	50%	2	75%	12	66%	4	66%	9.9
Word Processing	100%	4	100%	15	83%	4.98	66%	9.9
Mean	63%	2.52	82%	12.3	84%	5.04	69%	10.35

Table 1. Confidence with Technology usage by Age Range of Respondents

Technology Type	1-3 (n=8)	Raw Number	3-10 (n=13)	Raw Number	10 & more (n=19)	Raw Number
Computer	87%	6.96	92%	11.96	100%	19
Email	100%	8	100%	13	100%	19
Web Browser	87%	6.96	100%	13	100%	19
Google Apps	87%	6.96	100%	13	100%	19
Dropbox	62%	4.96	68%	8.84	76%	14.44
Ipad	50%	4	50%	6.5	53%	10.07
Social Media	75%	6	68%	8.84	75%	14.25
Interactive Whiteboard	50%	4	50%	6.5	68%	12.92
Digital Projector	62%	4.96	68%	8.84	76%	14.44
Video (DVD)	75%	6	87%	11.31	84%	15.96
YouTube	87%	6.96	100%	13	92%	17.48
Simulations	87%	6.96	81%	10.53	76%	14.4
PowerPoint	87%	6.96	93%	12.09	92%	17.48
Electronica Grades	75%	6	75%	9.75	76%	14.44
Word Processing	100%	8	100%	13	100%	19
Mean	78%	6.24	82%	10.66	85%	16.15

Table 2. Confidence with Technology usage by Teaching Experience

confidence using the Computer, Email, Web Browser, GoogleApps, YouTube, PowerPoint, and Word processing. Science teachers with more than ten years teaching experience had the highest confidence using dropbox, digital projectors, and interactive whiteboards, but had low confidence in using simulations. Science teachers with

teaching experiences from one to three years reported the lowest confidence of all other groups in using dropbox, digital projectors, videos (DVD), and powerpoint. Science teachers who had experience teaching from three to ten years reported the highest confidence in using digital projectors, videos (DVD), and powerpoint, but had the

lowest confidence in using social media.

What the author found interesting about this grouping was that it did not directly correspond with the age groupings done previously. While the author would expect to find that the teachers with the least amount of experience would

Technology Type	Female (n=27)	Raw Number	Male (n=13)	Raw Number
Computer	81%	21.87	100%	13
Email	96%	25.92	92%	11.96
Web Browser	85%	22.95	100%	13
Google Apps	81%	44.82	92%	11.96
Dropbox	55%	14.85	84%	10.92
iPad	44%	11.88	69%	8.97
Social Media	62%	16.74	84%	10.92
Interactive Whiteboard	40%	10.8	69%	8.97
Digital Projector	66%	17.82	69%	8.97
Video (DVD)	81%	44.82	84%	10.29
YouTube	96%	25.92	76%	9.88
Simulations	77%	20.97	76%	9.88
PowerPoint	85%	22.95	100%	13
Electronica Grades	66%	17.82	76%	9.88
Word Processing	85%	22.95	84%	10.29
Mean	73%	19.71	84%	10.29

Table 3. Confidence with Technology usage by Gender

Technology Type	Physics (n=8)	Raw Number	Chemistry (n=12)	Raw Number	Biology (n=16)	Raw Number	Other (n=4)	Raw Number
Computer	75%	6	100%	12	87%	13.92	100%	4
Email	75%	6	100%	12	100%	16	100%	4
Web Browser	87%	6.96	100%	12	81%	12.96	100%	4
Google Apps	75%	6	83%	9.96	81%	12.96	100%	4
Dropbox	62%	4.96	75%	9	56%	8.96	75%	3
iPad	25%	2	75%	9	50%	8	50%	2
Social Media	62%	4.96	83%	9.96	68%	10.88	50%	2
Interactive Whiteboard	37%	2.96	66%	7.92	50%	8	50%	2
Digital Projector	37%	2.96	75%	9	75%	12	100%	4
Video (DVD)	50%	4	91%	10.92	91%	14.56	75%	3
YouTube	75%	6	91%	10.92	100%	16	75%	3
Simulations	75%	6	83%	9.96	68%	10.88	100%	4
PowerPoint	87%	6.96	91%	10.92	87%	13.92	100%	4
Electronica Grades	37%	2.69	83%	9.96	68%	10.88	100%	4
Word Processing	50%	4	91%	10.92	91%	14.56	100%	4
Mean	61%	4.88	68%	8.16	77%	12.32	85%	3.4

Table 4. Confidence with Technology usage by Discipline

also have the lowest confidence in using most of the technologies in question, the author found instead that they had the lowest in only four out of the 15 technologies they asked about. Therefore, it seems to be age itself, not necessarily teaching experience, that contributes to lower confidence in using technology in the classroom.

9.2.3 Gender

Table 3 reports that females displayed higher confidence than men in using YouTube, Word Processing, and Email. Males reported higher confidence than females in using all other technologies. This finding was in stark contrast to what was found by Almekalhfi and Almeqdadi, (2010), but supported the findings of Bang and Luft (2013). However, the authors recognize that this data is only self-reported and as mentioned before confidence and self-efficacy do not necessarily indicate actual ability. The author have wondered if this result is because males tend to over-estimate their efficacy, as per the Dunning-Kruger effect, or if malestend to be more self-confident than do females (Kruger and Dunning, 1999).

9.2.4 Discipline

Table 4 reports that physics teachers in this study displayed the lowest percentage of confidence across all disciplines, in using computers, email, google apps, iPads, social

media, interactive whiteboards, digital projectors, video (DVD), electronic grade books, and word processors. Chemistry teachers reported the highest confidence of all groups in using iPads, interactive whiteboards and social media. Biology users were most confident with YouTube.

The fact that physics teachers indicated lower confidence in most of the technologies than the other groups was of interest, especially since the author has a background in physics. It should be noted, however, that there were only four physics teachers included in this survey, too few to draw any strong conclusions about. In fact, statistical analysis could not be done on this data set because their numbers per group were too small to be normalized. However, it would be of interest to see if this trend is still seen in larger survey data, and if so, to try to understand the role discipline might play on confidence in using technology in the classroom.

10. Summary

The science teachers in this survey were confident in using the current most popular technologies, such as computers, web browsers, internet, and email. The results of this research were consistent with research reported by Mueller, Wood, Willoughby, Ross, and Specht (2008), who observed that teachers have reaffirming touch points with computers in the classroom based-environment that build a teacher's confidence in computer technology and in its potential as an instructional tool. However, other results of this study indicate that familiarity of technology outside of the classroom may not necessarily reflect confidence inside the classroom.

Fifteen years ago, as per a National Center for Education Statistics (2002) survey, 23% of teachers felt ready to integrate technology into their classroom. However, 59% of the science teachers surveyed in this study reported they were comfortable using technology in their teaching. While this is a positive upward trend, it may be an artifact of the methodology of the paper. First, the authors looked only at teachers of science, an already technologically heavy field. In addition, the authors recruited participants via email, which in itself self-selects those teachers comfortable using at least that level of technology.

11. Limitations and Future Study

A series of possible limitations or biases could arise because all the data was self-reported, had small total participants, and were split into stratified categories based on various demographic factors. Therefore, males and more experienced teachers may over report confidence compared to females or younger, less experienced teachers. Also, the percentage of males (13.5%) surveyed was smaller than females (67.5%).

The survey used in this paper was problematic in some respects as well. First, it used only a 4 point Likert scale. In addition, the 4-point likert scale used in the surveys is not sensitive enough to allow for interpretations of gradations of teacher confidence. Second, it was not always clear if the survey developers had considered the difference between confidence and efficacy in the wording of questions. Because these were the only surveys found that could be used to gather the data needed to answer the research questions, and because the authors were able to identify confidence and efficacy questions within them, and focus the results only on the appropriate confidence questions, the authors chose to use these as primary data source.

Previous literature has also indicated that the more confident a teacher is the more they will use technology in the classroom. However, the instrument used in this study did not include questions about how often the technologies were used by the teachers in the learning environments, so it was not possible to correlate usage to confidence. Additionally, the survey had no demographic question(s) asked specifically about the schools, by which to determine socio-economic levels, whether it was a private or public institution, or what technologies teachers actually had access to in their classrooms.

There were no interviews or observations to determine how the teachers use these technologies (if at all) in the classroom. In addition, no quantitative statistics could be completed as Chi-square or Fisher's tests because of the small n-size of the study, overall and especially within groups. Because of the way the data was grouped, conducting statistical tests over each of the possible comparisons would have severely limited the strength of the statistical outcomes. Two Fischer's tests were done on

two samples regarding confidence differences in males and females, neither were significant ($p > 0.05$). The small number of participants may skew the data and do not allow us to fully generalize results because of low group representation.

12. Educational Implications

For future research there is a need to design a better quantitative instrument that can cover questions about how often the technologies were used by the teachers in the learning environment, and how usage correlates to confidence. Additionally, the survey needs to recognize and clarify the theoretical differences between confidence and self-efficacy so they are not confused. As well as, more research can and should be done on each of the categories considered here (and others), to determine exactly which teachers are most susceptible to low confidence in technology use so that we can focus on those groups in professional development and teacher training program.

Conclusion

Overall, to achieve the kinds of technology use needed for 21st-century teaching and learning, it is important to help teachers gain confidence with using technology to aid in meaningful learning (Lawless and Pellegrino, 2007). The results of this research suggest a need to continue professional development for teachers when new technologies are introduced into schools, especially for younger teachers. Wozney, Venkatesh, and Abrami (2006) declared the strong influence of both confidence and intended use of technology in the classroom, showing that self-efficacy by itself might not be enough. In addition, teachers need to use technology as an instructional tool. Knowing this, it is essential to examine how teacher confidence affects meaningful use of technology in science classrooms.

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Appendix A: copy of the instrument (Survey)

Demographic Information

- Age: () under 25, () 26-35, () 36-45, () 46 and up.
- Gender: a. Female () b. Male ()
- What science subject do you currently teach in high school?
 Biology Chemistry Physics Other
- How many years of teaching experience do you have?
 1-3 3-10 10 and more
- Do you have Internet at home? YES or NO
- Do you have a computer at home? YES or NO
- Do you feel you have been offered enough technology training either pre- service or in-service?
 YES or NO

Please check the box of your confidence level in using the following for CLASSROOM USE:

Technology Type	1-Very Confident	2- Confident	3- Unconfident	4-Very Unconfident
Computer				
Email				
Web Browser				
Google Apps				
Dropbox				
Ipads				
Social Media				
Interactive White Board				
Digital Projector				
Video (DVD)				
YouTube				
Simulations				
PowerPoint				
Electronic Grade				
Word Processing				

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Using the following scale please answer Section 3

1- Strongly Agree 2- Agree 3-Disagree 4-Strongly Disagree

1. I feel confident that I understand computer capabilities well enough to maximize them in my classroom.
1 2 3 4
2. I feel confident that I have the skills necessary to use the computer for instruction.
1 2 3 4
3. I feel confident that I can successfully teach relevant subject content with appropriate use of technology.
1 2 3 4
4. I feel confident in my ability to evaluate software for teaching and learning.
1 2 3 4
5. I feel confident that I can use correct computer terminology when direction students computer use.
1 2 3 4
6. I feel have difficulty with the computer.
1 2 3 4
7. I feel confident I can effectively monitor project development in my classroom.
1 2 3 4
8. I feel confident I can mentor students in appropriate uses of technology.
1 2 3 4
9. I feel confident about assigning and grading technology-based projects.
1 2 3 4
10. I feel confident that I can consistently use educational technology in effective ways.
1 2 3 4
11. I feel confident that I can provide individual feedback to students during technology use.
1 2 3 4
12. I feel confident I can regularly incorporate technology into my lessons, when appropriate to student learning.
1 2 3 4
13. I feel confident about selecting appropriate technology for instruction based on curriculum standards.
1 2 3 4
14. I feel confident about keeping curricular goals and technology uses in mind when selecting an ideal way to assess student learning.
1 2 3 4
15. I feel confident about using technology resources (such as spreadsheets, electronic portfolios, etc.) to collect and analyze data from student tests and products to improve instructional practices.
1 2 3 4
16. I feel confident I am comfortable using technology in my teaching.
1 2 3 4
17. I feel confident I can be responsive to students' needs during computer use.
1 2 3 4
18. I feel confident that, as time goes by, my ability to address my students' technology needs will continue to improve.
1 2 3 4
19. I feel confident that I can develop creative ways to cope with system constraints and continue to teach effectively with technology.
1 2 3 4
20. I feel confident in my ability to 1234 integrate multiple technologies into my instruction.
1 2 3 4
21. Integrating technology is not pertinent to my curriculum because of the time it takes to create technology-based lessons.
1 2 3 4
22. I am aware of all the resources available to me to help me successfully integrate technology into the classroom.
1 2 3 4

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23. The ease of use and access to technology my classroom.

1 2 3 4

24. I use technology for personal use more than classroom use.

1 2 3 4

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