How Elementary and Secondary Teachers Use Technology Differently: A National Study of Accomplished Technology-Using Teachers

Abstract

In order for teachers to use technology, it becomes important to establish the link between specific technology applications and the school setting where the technology is being employed. To better understand how technology use among elementary and secondary teachers differs, an online survey was distributed to accomplished technology-using teachers examining teacher technology use. Of 166 teachers who self-selected to participate, secondary teachers reported using technology more for information presentation, administrative/classroom, and supporting activities that facilitate higher-order thinking skills. Phone interviews of thirty teachers were conducted and teacher artifacts were analyzed to validate the findings of the survey results. Comparisons were interpreted for professional development recommendations.

Technology Use

Technology integration, or “…the incorporation of technology resources and technology-based practices into the daily routines, work, and management of schools” (Technology in Schools Taskforce, p. 1) is advocated by experts and policymakers as an essential tool in K-12 education. Research has indicated that although schools are currently equipped with adequate technological resources, teachers are still not utilizing those resources in their classrooms (Project Tomorrow, 2008). Much of the research examining this question suggests that a majority of teachers use technology to support low-level curricular tasks in their classrooms such as drill and practice activities, word processing, educational games, and computer-based tutorials (CDW-G, 2006; O'Dwyer, Russell, & Bebell, 2005; U. S. ED, 2003).

Relevant Teacher Technology Adoption

In order for teachers to use technology, it becomes important to establish the link between specific technology applications and the teachers’ practices (Ertmer & Ottenbreit-Leftwich, 2010). Previous research has shown that computer applications usages differ depending upon grade level (Barron, Kemker, Harmes, and Kalydjian, 2003; Niederhauser & Trish, 2001) and teachers are reluctant to adopt technology that does not align with their sub-culture (Hennessey, Ruthven, & Brindley, 2005; Ertmer & Ottenbreit-Leftwich). In a review of literature on effective professional development for teachers, Hew and Brush (2007) found similar results that technology skills and experiences need to be introduced within an educational context, and should be consistent with specific and authentic needs and problems teachers faced in their professional contexts. In order to create effective professional development that will change teacher practices, we need to investigate the technology uses that are relevant for teachers (Zhao, 2003). If teachers perceive no value tied directly to their content area, they are less likely to use the technology (Hughes, 2005; Judson, 2006).

Elementary versus Secondary Technology Use
The elementary and secondary teacher comparison studies on technology use have presented varying results. In one comparison study, Wozney, Venkatesh, and Abrami (2006) found that elementary and secondary teachers used technology in significantly different ways. Elementary teachers reported using technology more frequently for the following purposes: instructional (e.g., drill-and-practice), recreational (e.g., games); creative (e.g., desktop publishing); expressive (e.g., online journal), and informative (e.g., Internet). Niederhauser and Lindstrom (2006) also found that elementary teachers used drill and practice programs (instructional) software more frequently than secondary teachers. In a review of the federal funding grants for educational technology, the U.S. Department of Education (2003) found significant differences between elementary teachers and secondary teachers. Elementary teachers were more likely to use technology to improve students’ computer skills, for free-time or reward activities, and for practice drills. However, not all comparison studies support these results (Barron, Kemker, Harmes, and Kalydjian, 2003). Barron and colleagues found that elementary teachers used computers for higher order thinking skills such as problem solving, decision making, and communication significantly more than did middle and high school teachers.

Wozney and colleagues also found a significant difference in teachers’ self-reported ‘analytic’ uses of computers (e.g., statistics, charting, graphing, drafting, robotics); secondary teachers reported using technology for analytic purposes more frequently than elementary teachers (Wozney et al.). Other studies indicated secondary teachers were found to use computers more for research (Barron et al., 2003) and for “higher professional use” than elementary teachers (U.S. ED, 2003, p. 10).

**Method**

This study is part of a larger research effort investigating teacher uses of technology and how teachers are prepared to use technology in their classrooms. As it is critical for teachers to find technology uses relevant in order to use them, this study sought to investigate how teachers feel technology should be used in the classroom. By identifying teachers recognized for their technology use, results may be used to recommend high-quality technology uses to other teachers (Judson, 2006). In addition, by investigating the differences between elementary and secondary teachers, specific relevant practices may emerge as being more applicable for these different groups. The research questions for this study were (1) How do secondary accomplished technology-using teachers use technology in their classrooms, and (2) How do elementary accomplished technology-using teachers use technology in their classrooms, and (3) What similarities and differences exist between how secondary and elementary accomplished technology-using teachers use technology in their classrooms?

**Procedure**

With a target population of accomplished technology-using K-12 teachers, requests to complete the online questionnaire were sent to electronic mailing lists for over 60 educational technology organizations including International Society for Technology in Education (ISTE) special interest groups and the U.S. state affiliates of ISTE. ISTE listservs matched the desired sampling frame of having access to accomplished technology K-12 teachers as most teachers participating in the listservs have an interest in technology in education (Hadley & Sheingold, 1993). Teachers self-nominated themselves as accomplished technology-using teachers and
volunteered to fill out the online questionnaire. Elementary teacher participants included in the study were limited to individuals that reported teaching grades PreK-5 in core subjects (math, language arts, social studies, and/or science) or all subjects in self-contained classrooms (n=62). Secondary teachers include those teaching grades 6-12 in science, math, social studies, and/or language arts (n=104). The close-ended question was analyzed using frequency counts and Pearson $\chi^2$ analysis procedures. The open-ended question asked teachers to describe the best ways to use technology for teaching and learning. The responses were coded using the list from the close-ended question. Two researchers reviewed participant responses separately and then came together to review all 101 responses. Inter-rater reliability was 80%. The two researchers evaluated the participant responses where disagreements emerged and resolved each issue (see Table 2).

Follow-up phone interviews with volunteer participants from the questionnaire were conducted in the fall of 2009 and the spring of 2010 to validate self-reported responses and follow-up on themes identified in this study. A maximal variation sample was selected based on the teacher’s grade level, subject area taught, geographic region, and quality of the open-ended response provided in the questionnaire.

Instruments

The questionnaire consisted of 23 closed- and open-ended questions, asking participants to describe how they currently use technology in their classrooms, as well as demographic data. One close-ended question asked teachers to select technology uses they employed during a “typical” week; examples of each use were provided in the question to aid in comprehension (Groves et al., 2004). (see Table 1). These uses were constructed from previous research studies and approved by experts in the field for construct validity. The questionnaire also contained one open-ended question evaluated for this study that asked teachers to describe the best way to use technology for teaching and learning.

Semi-structured in-depth interviews were conducted with ten elementary teachers and twenty secondary teachers from social studies, science, math, or language arts. Two researchers conducted each interview to allow one person to listen and ask questions whereas the other individual took notes. With the permission of the interviewee, conversations were recorded to help ensure the accuracy of data transcription in order to add to the notes. Additionally, interviewees were asked to voluntarily submit various artifacts for data triangulation, including lesson plans, course syllabi, student examples of work, as well as teacher and student websites, wikis, and blogs. Participants were asked to review the accuracy of the field notes as a form of member checking (Lincoln & Guba, 1985). Each transcribed interview was thematically-coded using content analysis procedures by two researchers to ensure inter-rater reliability, as are the teacher artifacts (Strauss & Corbin, 1990).

Limitations

The target population of the study was elementary and secondary accomplished technology-using teachers, and despite the chosen sampling frame, sampling error exists as respondents self-selected to participate (Groves et al., 2004). With membership in the solicited organizations being optional and requiring membership dues, it was unlikely that unmotivated individuals would have membership or taken time to participate. Another limitation of the method of collection was self-reported data collection (Kopcha & Sullivan, 2007). This may
elicit questions of reliability, however, the survey was pilot tested and reviewed by experts to minimize measurement error.

Results and Discussion

Overall Results

Descriptive analysis techniques were used to examine the demographics of the participants. Of the 166 participants, 26 had less than six years of teaching experience. In terms of experience using computers, 136 teachers had more than ten years of experience.

To examine the similarities and differences between how secondary and elementary accomplished technology-using teachers use technology in the classroom, frequencies counts were used to compare and contrast the similarities and differences between the two groups. There were 62 elementary teachers and 104 secondary teachers. From the close-ended questionnaire item (use in a typical week), open-ended questionnaire item (best technology use), and interviews (examples and rationale for technology use), three differences were identified between elementary and secondary teachers: administration/classroom management, information presentation, and facilitating activities that support higher-order thinking skills. This paper describes the results for each data point, then discusses the three differences identified between elementary and secondary teachers.

**Technology use in a typical week: Close-ended questionnaire item.** Elementary and secondary teachers reported using similar applications of technology during a typical week in the close-ended question (see Figure 1). Pearson \( \chi^2 \) analysis was performed to assess whether these observed differences were significant. Two main hypotheses were established, one being that there is a difference between elementary and secondary teacher technology use in various categories (e.g. personal productivity), with the null hypothesis being that there is no difference. The results of the Pearson chi-square tests indicate that there were three specific areas that exhibited statistical significance at the .05 alpha level: administration/classroom management, information presentation, and facilitating activities that support higher-order thinking skills.

![Figure 1. Weekly use of technology: Elementary vs. secondary teachers](image)

**Figure 1.** Weekly use of technology: Elementary vs. secondary teachers
Best ways to use technology: Open-ended questionnaire item. In addition to the close-ended question on the questionnaire, an open-ended question was included on the questionnaire asking teachers to describe the best ways to use technology for teaching and learning. The responses were coded using the list from the previous question with two exceptions due to overlap. First, Facilitating Specific Concepts was embedded into Class Prep as most teachers emphasized lesson planning when discussing using technology to facilitate specific concepts. Second, Learning Style was combined with Special Needs as many teachers mentioned using technology to address learning styles in order to differentiate learning for students with varying needs (See Table 2). Two researchers independently coded all the participant responses with an inter-rater reliability of 80%. The researchers came to consensus on how to code the instances where there were coding differences. The two researchers evaluated the participant responses where disagreements emerged and resolved each issue. Since responses varied in length and detail, the two researchers were able to assign a statement to multiple categories.

![Figure 2. Coded responses of open-ended questionnaire item: Percent of teachers who described this use as one of the best ways to use technology for teaching and learning.](image)

Administrative and classroom management. Fewer elementary teachers (88.7%) self-reported using technology for administrative and classroom management purposes than secondary teachers (99%) on the survey. There were significantly more secondary teachers than elementary teachers that use technology in a typical week for administration and classroom management purposes \(\chi^2(1, N = 166) = 9.034, p = .005\).

In the open-ended questionnaire item, teachers were asked to describe the best ways to use technology in the classroom. While 20% of secondary teachers mentioned using technology for administrative and classroom management purposes as one of the best ways to use technology for teaching and learning, less than four percent of elementary teachers mentioned this use. Secondary teachers mentioned using technology for administrative activities as a best way for technology use: “recording student progress/achievement” (218), “including links for access to online assignments” (154), and “us[ing] Moodle and students have access to assignments and labs in case of absence” (103). Sometimes teachers mentioned the specific tool
used: “Our school uses Edline which we use for chatting, homework hand-ins and interactive assignments, as well as communicating homework assignments and informing students and parents their current grade.” One teacher indicated that technology helps her efficiency: “electronic gradebooks make grading more efficient”. Secondary teachers also mentioned using technology for classroom management purposes such as using one-to-one laptops or programs like DyKnow to facilitate classroom management and student learning.

During the teacher interviews, all secondary teachers mentioned mandated grading and attendance software required by their schools, but only a few elementary teachers had access to electronic resources depending on their school. One elementary teacher noted that, “We don’t have any of grading tools that are online yet, I think it will be coming soon” (Elementary Teacher 2), whereas another stated, “I purchased a subscription to gradebookwizard.com for $30 a year. The district doesn’t pay for it, so I paid for it out of pocket” (Elementary Teacher 9). More secondary teachers typically reported having access to learning management software in addition to the grading and attendance software. This could be because various stakeholders demand it. One secondary science teacher stated that the, “school demanded us to use it [Moodle]” (Secondary Science Teacher 18) where as another secondary language arts teacher mentioned that “parents are demanding access” (Secondary ELA Teacher 4) to learning management systems.

Another preliminary finding during teacher interviews is that although elementary schools may have access to classroom management software, it does not necessarily mean the technology is being used in general or to its full potential. One elementary teacher shared disappointment that though his school provided voice amplification systems for teachers, teachers were not taking advantage of them. “Voice amplification systems are so easy to use and so few people use it, [my cooperating teacher and I] we’re the only two teachers using it. They [the state board] found no one [in the school] was taking advantage of it” (Elementary Teacher 9). Similarly, another teacher reported that though her school provides classroom management software, “It is primarily used for attendance and notes, in order to jot things down. There is a lot more you can do with it, but we haven’t got there yet. The program has had a lot of kinks. Report cards are on it. Interesting – report cards [using the software] have never been done before” (Elementary Teacher 6).

One reason for this could be due to the large difference in administrative demands between levels. Secondary teachers typically have five classes per day with an average of 25 students per class (U.S. ED, 2004); they teach over 100 students per day. This is a much larger quantity than the average self-contained elementary teacher (typically teaches 20 students per day) (U.S. ED). With the advent of No Child Left Behind, student data systems have become a mandate for all states. Most states advocate using technology tools to assist in the collection, management, and utilization of student data systems (Haertel, Means, & Penuel, 2007).

Information presentation. In addition to using technology for administration and classroom management, fewer elementary teachers (87%) self-reported using technology for information presentation purposes than secondary teachers (98%). Based on the Pearson $\chi^2$ test, there were significantly more secondary teachers than elementary teachers that report use technology in a typical week for information presentation purposes ($\chi^2(1, N = 166) = 8.272, p = .006$).

Although there was a significant difference between elementary teachers and secondary teachers use is of technology for information presentation during a typical week, when asked to
describe the best ways to use technology there was not a difference between how many described information presentation as one of the best ways to use technology for teaching and learning in the open ended questionnaire item. While 17% of secondary teachers described uses of technology for information presentation as some of the best, twelve percent of elementary teachers also described uses of technology for information presentation as some of the best uses of technology for teaching and learning. Both elementary and secondary teachers tended to use technology for a wide range of information presentation uses: PowerPoint, Smart boards, projectors, DyKnow, and videos. However, it seemed that secondary teachers focused more heavily on the affordances of technology for information presentation, focusing heavily on using technology to aid in visualization: “Technology helps me especially in chemistry, because I can use virtual labs and online models to help my students see things on the atomic or molecular level.” (366) “Showing visuals found on internet. Google Earth. PowerPoint presentations” (255), “images / pictures and video files help explain, elaborate, and extend what is being presented to students.” (172). This could be due, in part, to the fact that secondary teachers need to take abstract concepts and make them understandable at a simpler level: visualization may help with this complex instructional dilemma.

Interview. Based on both questionnaire items, more secondary teachers tend to use and value technology for information presentation than elementary teachers. In interviews with secondary teachers indicated that presenting information visually adds interest and student engagement. One science teacher indicated “some of the units will start with PowerPoint to prep the kids and have a visual to see pictures of information. This gets them excited. I can show them what they are doing on their computer. They get excited. I want to hook them and get them excited, to show the kids what they are doing. I model. I want to hook them so they are motivated to work” (Secondary Science Teacher 16). A changing mindset of teachers is evident though, as one science teacher indicated that she is trying to move away from information presentation. “When the idea of teaching shifted from ‘sage on the stage’ to ‘guide on the side’, it appealed to me that I was not up there in the center but kids were up there in the center producing their own learning and working in groups. Teacher was moving around the room than teacher presenting the information. That is kind of what changed the way me teaching” (Secondary Science Teacher 17).

For elementary teachers with access to electronic whiteboards and projectors, enthusiasm is evident. Preliminary results from the teacher interviews indicated that teachers described using technology for information presentation due to student engagement. One fifth-grade elementary teacher interviewed stated that the electronic whiteboard “is like an extra arm. If the power went out, I would be crying.” (Elementary Teacher 9). The teacher added that, “the ability to teach with visuals allows for deeper discussion in the classroom” (Elementary Teacher 9). Similarly, another elementary teacher stated she uses her electronic whiteboard because “it’s really interactive and gets students involved. It really gets them [the students] in tuned” (Elementary Teacher 10).

In addition, elementary teachers also used information presentation to teach specific concepts. The teacher explained that she has her students “drag words to allow the students to make prefixes, rather than have the students use notebooks” (Elementary Teacher 10). Another teacher indicated that he limits his use of projecting heavy amounts of text. “I try not to put too many words on the board, but instead I present pictures. For example, the other day, I showed a
triangle so that the students could see that the angles add up to 180. I had a handout and students came up to the [electronic white] board” (Elementary Teacher 9).

One explanation for the heavier secondary teacher use of technology for information presentation could be the demands for the large amount of curriculum coverage placed at the secondary level. Information presentation would be an efficient way for secondary teachers to address large amounts of content. Elementary teachers may employ more discovery or hands-on learning than at the secondary level (Pomeroy, 1993); younger students tend to have shorter attention spans, necessitating less information presentation and more active forms of learning (Ruff & Lawson, 1990). This finding is reinforced by several elementary teachers interviewed. One instructor explained, “I try to not deliver things the same way, to keep the kids on their toes. Otherwise, I find myself talking to myself – they get bored” (Elementary Teacher 1). Another potential reason that elementary teachers may not be taking advantage of the technology available to them may be due to various barriers, such as a lack of knowledge on how to use the software or equipment (Hew & Brush, 2007).

**Facilitating activities that support higher-order thinking skills.** Additionally, fewer elementary teachers (56.5%) than secondary teachers (75%) self-reported using technology to facilitate activities that support higher-order thinking skills. Based on the Pearson $\chi^2$ test, there were significantly more secondary teachers than elementary teachers that use technology in a typical week for facilitating activities that support higher-order thinking skills ($\chi^2(1, N = 166) = 6.149, p = .011$).

Although more secondary teachers self-reported using technology to facilitate activities that support higher order thinking skills during a typical week in the closed-ended question, more elementary teachers (56%) described using technology to achieve higher order thinking skills in the open-ended question as one of the best ways to use technology for teaching and learning. Both elementary and secondary teachers described using technology for student use (e.g., collaboration, hands-on activities, group projects), while elementary teachers seem to mention using technology more for motivating or exciting students. For example, one elementary teacher discussed how she used technology as a motivational tool: “Technology is an incredibly motivating tool for students. I am continually amazed at the quantity of work a student will produce and the quality of their work when technology tools are used for an assignment. I believe technology should be used as frequently as possible in educational settings.” (Respondent 123).

**Interviews.** The discrepancy between elementary and secondary teacher self-reported use of higher-order thinking skills in a typical week from the original survey may be due to teacher perceptions of student abilities given their grade level. During the teacher interviews, one middle school social studies teacher (Secondary Social Studies Teacher 11) indicated the challenge of developing higher order thinking skills in sixth grade students in the area of comparing and contrasting primary document. The teacher noted that the comparing and contrasting primary documents is “not really intense at the sixth grade level” and the teacher wants the students to realize that “you don’t get everything from one place” and that comparing and contrasting documents “begins with step one, research.” The teacher specifically mentions scaffolding her students through this process, whereas other high school teachers interviewed do not focus on the complications of teaching higher-order thinking skills. For example, one high school language arts teacher explained “students plan, film and edit videos as part of class projects, where they need to show synthesis of what they have learned in a project” (Secondary ELA Teacher 15).
The teacher does not mention the need for scaffolding or difficulties in the student project creation process. Likewise, a secondary science teacher interviewed detailed that students in the class “have full control” and work in groups of two to three and “develop project websites” that incorporated technologies such as webcam usage, probes for data collection, digital microscopes, and blogging (Secondary Science Teacher 16). Carrying out such an activity with elementary students can be done, though teachers may face barriers such as time and the need to provide more scaffolding to students (Hew & Brush, 2007).

During elementary teacher interviews, preliminary findings indicate that teachers stress the necessity to structure activities involving technology and the technology skill level of the students. One second-grade teacher stated that technology “activities are very structured, links already created,” as students need to “end up at a site they can read and comprehend.” The teacher mentioned that though some of the second grade students are able to type at the computer, writing is a skill “is still developing at a second grade level” (Elementary Teacher 8).

**Implications, Conclusions, and Future Research**

Although elementary and secondary teachers use technology in similar ways, the areas in which they differ (information presentation, administrative/classroom management, and facilitating activities that support higher-order thinking skills) represent a shift from previous research findings (Franklin, 2007; Goodison, 2002; Tondeur, Hermans, van Braak, & Valcke, 2008). Teacher educators may want to consider focusing on certain technology uses for elementary and secondary teachers that varies in administration/classroom management, information presentation, and facilitating activities that support higher-order thinking skills.

Due to circumstances associated with the sample (small sample size, volunteer, and experts), it is difficult to present conclusions that can be generalized to the typical teacher population. However, the main purpose of this study was to investigate how elementary and secondary accomplished technology-using teachers use implemented technology differently. As teachers are more likely to use technology in ways relevant to their practices and specific levels (e.g., Harris, 2004), this study sought to investigate if there were any differences in how technology is used by different grade levels. The results can be used when designing professional development, in order to target high-quality technology uses that will be relevant to other teachers at those varying levels (Judson, 2006) as technology professional development literature consistently suggests the importance of presenting technology applications that apply to each teacher’s classroom (Hennessey et al., 2005).
References


<table>
<thead>
<tr>
<th>List items</th>
<th>Examples</th>
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<tr>
<td>I generally don’t use technology during a “typical” week</td>
<td>None</td>
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<tr>
<td>Personal productivity</td>
<td>Word processors, spreadsheets</td>
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<td>Information presentation</td>
<td>Powerpoint, digital media</td>
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<td>Administration and classroom management</td>
<td>Gradebooks, attendance, seating charts</td>
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<td>Communication with peers/parents/students</td>
<td>E-mail, online chats, parent newsletters, class websites</td>
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<tr>
<td>Access and use electronic resources</td>
<td>Websites, online databases</td>
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<tr>
<td>Analyze student achievement/performance data</td>
<td>Identify trends, provide remediation to learners</td>
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<td>Facilitate teaching specific concepts</td>
<td>Computer-based courseware, tutorials</td>
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<td>Document personal/professional growth</td>
<td>Electronic teaching portfolios</td>
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<td>Support various student learning styles</td>
<td>Use of media for auditory and visual learners</td>
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<td>Support activities that facilitate higher-order thinking</td>
<td>Collaborative problem-based activities, activities that require analysis and synthesis of information</td>
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<td>Facilitate your support of students with special needs in your classroom</td>
<td>Assistive technology, special software, etc.</td>
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<td>Classroom preparation</td>
<td>Lesson planning, gathering resources</td>
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Table 2. Codes, Definitions, and Examples for Open-Ended Questionnaire Response.

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<thead>
<tr>
<th>Code</th>
<th>Definition</th>
<th>Example</th>
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<tr>
<td>Personal Productivity</td>
<td>Using technology for personal purposes. They specifically mention using it as tool (e.g., web development). They mention the need to build students’ (or teachers) computer literacy, 21st century skills, media literacy, digital citizenship/ethics, technology skills, creating video. Use of wikis, podcasts, Web 2.0, etc. It’s a TOOL for the students’ use.</td>
<td>• “Cell phones, PDA's, social networks are all important tools even in the classroom” [Respondent 21]</td>
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<td></td>
<td></td>
<td>• “Word processors make writing legible and more grammatically correct” [Respondent 62]</td>
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<td></td>
<td></td>
<td>• “Use [technology for teaching and learning] as tools to be more productive (for myself and my students), not just to use them technology's sake. I also feel that high school level instruction should use technology that students will be expected to use in college, workforces, etc. [Respondent 325]</td>
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<tr>
<td>Information Presentation</td>
<td>Using technology to present information. Typically discuss the SmartBoard, projector, PPT. Anything that will help students with visualization, including showing video.</td>
<td>• “Images/pictures and video files help explain, elaborate, and extend what is being presented to students.” [Respondent 172]</td>
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<td></td>
<td></td>
<td>• “I could not work without a projector hooked to my computer. So many lessons, websites, PowerPoints and videos are accessible to the whole group through the use of the projector.” [Respondent 391]</td>
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<tr>
<td>Administration / Classroom Management</td>
<td>Using technology to help them manage their classroom (e.g., gradebook or classroom management system)</td>
<td>• “Electronic gradebooks make grading more efficient” [Respondent 62],</td>
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<td></td>
<td></td>
<td>• “Our school uses Edline which we use for chatting, homework hand-ins and interactive assignments, as well as communicating homework assignments and informing students and parents their current grade” [Respondent 81]</td>
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<td>Communication</td>
<td>Using technology for communication specifically with students and/or parents (e.g., email, phone, websites – but not for supplemental resources, for more of one-</td>
<td>• “Classroom websites...and email are essential to student success and parent communication” [Respondent 48]</td>
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<td><strong>Electronic Resources</strong></td>
<td>Either having the teacher or students access, evaluate, and use electronic resources. Electronic resources include web resources and online information. Searching and accessing information literacy (e.g., researching on the Internet, WebQuests). Evaluate resources to see which ones are appropriate.</td>
<td>• “To provide alternative methods for students to receive information (e.g. class notes and documents available online)” [Respondent 50] • “I use it for research and use online tools.” [Respondent 218] • “Teaching kids to be efficient online researchers and be ethical with resources used for projects.” [Respondent 248]</td>
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<td><strong>Analyze Student Achievement Data</strong></td>
<td>Using technology for data-driven decision making, feedback, and assessment. Specifically looking at student data to help students improve or to improve instruction.</td>
<td>• “Archiving students' technology projects and creating ePortfolios is an excellent way to view student progress over time.” [Respondent 123] • “[Technology should] support the teacher in an effort to assess the needs, skills, and competence levels of the students.” [Respondent 158]</td>
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<tr>
<td><strong>Document Growth</strong></td>
<td>Using technology for professional growth (e.g., collaboration w/other teachers, E-portfolios).</td>
<td>• “Social networking keeps me up to date on trends in education&quot; [Respondent 62] • “Develop a mentoring program with trained 'coaches' to work with staff in best practice situations.” [Respondent 267]</td>
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<tr>
<td><strong>Support Activities that Facilitate Higher-Order Thinking Skills</strong></td>
<td>Using technology to enhance student motivation, student learning, student engagement, student collaboration, student higher-order thinking skills. Responses need to focus on student use of the technology (e.g., hands-on).</td>
<td>• “Technology has allowed me to help students to think critically rather than learning a set of facts to repeat.” [Respondent 153] • “I believe using technology to encourage collaboration is, in my classroom, the best use.” [Respondent 174] • “Technology helps take learning a step farther - its use can be motivating and engaging for students.” [Respondent 331]</td>
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<tr>
<td><strong>Support Students with Special Needs</strong></td>
<td>Using technology to differentiate instruction for students with special needs or varied learning styles. Focus on using technology to individualize instruction.</td>
<td>• “Technology is an excellent way to differentiate in the classroom. It enables students to work on different projects and utilize varying resources while working...&quot;</td>
</tr>
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</table>
| Classroom Preparation | Using technology to facilitate teaching specific concepts, target specific standards, lesson planning, and preparing materials/instruction for their classes. | • “[Technology] can be used to support a lesson, review a lesson, as extra practice on a skill or harder skill building activities.” [Respondent 200]
• “I write my lesson plans and prepare all teaching materials using technology.” [Respondent 218] | • “at speeds that are appropriate for them” [Respondent 42]
• “To integrate multiple modalities for my diverse learners” [Respondent 317] |