Teacher value beliefs associated with using technology: Addressing professional and student needs

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ABSTRACT

Studies have indicated that when teachers believe technology uses are valuable, they are more likely to incorporate those uses into their practices. This hermeneutical phenomenology study investigated the value beliefs that underlie teachers' uses of technology. To measure value beliefs, teachers' uses (and reasons for those uses) of technology for teaching and learning were examined. Data were collected from eight award-winning teachers through an interview, observation, and electronic portfolio. Findings indicated that teachers used technology to address professional (e.g., creating customized classroom materials, improving classroom management by engaging students) and student needs (e.g., enhancing student comprehension, equipping students with technology skills), all of which related to the underlying value belief of promoting student learning. Based on these findings, professional development activities should emphasize the potential impact of specific technology uses on student learning.

1. Introduction

1.1. Current technology use

Best educational technology practices are typically defined as those that promote student-centered learning (Becker, 1994; Bigatel, 2004; Coppola, 2004; Moersch, 2002). Student-centered learning emphasizes authentic experiences, encourages active learning, and results in the creation of new products (Hickey, Moore, & Pellegrino, 2001; Jonassen, 1996). Jonassen noted that meaningful use comprises using the computer as a ‘mindtool’ which enables students to achieve higher levels of thinking by reducing the cognitive load required to visualize and represent problems (Jonassen, 2003). Student-centered learning is advocated as a means to increase academic performance (Guthrie et al., 2004; Hannafin & Foshay, 2008; Mergendoller, Maxwell, & Bellisimo, 2006), help students develop lifelong learning skills such as self-regulation and problem-solving (Bereiter & Scardamalia, 2006), and increase information and communication technology skills (Kozma, 2003).

Despite this evidence, student-centered technology uses are not prevalent in schools (Barron, Kemker, Harmes, & Kalaydjian, 2003; Russell, Bebel, O'Dwyer, & O'Connor, 2003; U.S. ED, 2003; Zhao & Frank, 2003). In a review of educational technology use and policy in the United States (U.S.), Culp, Honey, and Mandinach (2005) found that although the research community clearly preferred student-centered technology uses that “support inquiry, collaboration, or re-configured relationships among students and teachers” (p. 302), only a small number of teachers actually used technology in this manner (Culp et al., 2005). Instead, teachers tended to use technology to support and improve their existing practices (Culp et al., 2005).

Recent U. S. surveys suggest that although teachers use technology in their classrooms (CDW-G, 2006; Project Tomorrow, 2008), the majority of uses target administrative and communication tasks (e.g., communication with colleagues or parents)(Palak & Walls, 2009) as opposed to instructional tasks. Although teachers report using technology to facilitate student learning, only a third of the respondents to a 2008 National Education Association survey (NEA-AFT) required their students to use computers more than a few times a week.

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Furthermore, reported classroom uses are rarely designed to engage students in the kinds of inquiry-based, problem-solving activities advocated by best practice (Lawless & Pellegrino, 2007; Partnership for 21st Century Skills, 2007). For example, based on the results of the Speak Up 2007 survey (Project Tomorrow, 2008), 51% of the responding teachers (n = 13,027/25,544) reported that their primary uses of technology to “facilitate student learning” comprised (1) asking students to complete homework assignments using the computer (e.g., writing reports, finding information on the Internet) and (2) assigning practice work at the computer (e.g., using drill-and-practice software).

Therefore, technology is not being used to support the kinds of instruction (e.g., student-centered) believed to be most powerful in the U.S. (International Society for Technology in Education [ISTE], 2008; Partnership for 21st Century Learning, 2007). If the most effective uses of technology align with student-centered learning, why are more teachers not implementing such uses? Many barriers, summarized in previous reviews (e.g., Ertmer, 1999; Ertmer & Ottenbreit-Leftwich, 2010; Hew & Brush, 2007), appear to prevent these uses. These barriers include lack of time (Bauer & Kenton, 2005) and resources, school culture (Zhao, Pugh, Sheldon, & Byers, 2002), and teacher abilities (Waight & Abd-El-Khalick, 2007). However, perhaps the largest barrier to student-centered technology integration is teacher beliefs (Ertmer, 2005).

1.2. Teacher beliefs and practices

Teacher beliefs are defined broadly as “tacit, often unconsciously held assumptions about students, classrooms, and the academic material to be taught” (Kagan, 1992, p. 65). Kagan (1992) and Pajares (1992) have indicated that teacher beliefs have more influence on teacher practice than teacher knowledge. According to Clark and Peterson, the professional decisions teachers make on a daily basis are based on their beliefs.

Teacher beliefs play a critical role in general instructional practices (Pajares, 1992; Richardson, 1996) as well as specific technology integration practices (Nyce & Yocom, 1996). Typically, teachers with student-centered beliefs are more likely to integrate technology in student-centered ways (Cope & Ward, 2002). However, there is not always a direct relationship between beliefs and practices. Even though teachers may espouse student-centered technology beliefs, their practices may not necessarily follow those beliefs (Ertmer, Golapkrishnan, & Ross, 2001; Judson, 2006). For example, based on observations of 32 teachers who self-reported student-centered beliefs, Judson concluded “there was no significant correlation between teachers’ reported beliefs about instruction and their actual practice of integrating technology” (p. 590).

Perhaps these inconsistencies are due to the difficulty in measuring teacher beliefs. Pajares (1992) stated that it is the “context-specific nature of beliefs and their connections to other beliefs that make them especially difficult to infer and measure. It is this same feature that often makes them appear more inconsistent than they perhaps are” (p. 319). Because beliefs are typically inferred from what teachers say, intend, or do, it is important to examine all three aspects in order to gain an accurate representation of beliefs (Rokeach, 1968).

Another explanation for the apparent contradictions between beliefs and practice may stem from the existence of conflicting beliefs. Rokeach (1968) proposed that beliefs are ranked in order of importance. When a situation produces two conflicting beliefs, the belief with the higher ranked importance will override the other. For example, a teacher may believe that students should use technology as a tool for learning, but also believe that students need to learn specific technology skills in order to be prepared for the future. The second belief may be ranked higher; thus, the teacher gives her students lots of time to learn how to use specific technology skills or programs. On the surface, this seems inconsistent with her belief about using technology as a tool for student learning. Such practices illuminate the complex interactions among differentially ranked beliefs housed within a single belief system.

Belief systems have been represented as a complex network of attitudes and values (Rokeach, 1968). Beliefs have a tendency to influence practice (Pajares, 1992; Richardson, 1996), especially beliefs attributed to value (Ertmer & Ottenbreit-Leftwich, 2010; Tondeur, Hermans, van Braak, & Valcke, 2008). Value beliefs (or beliefs about the value of something) encompass the perceived importance of particular goals and choices (Anderson & Maninger, 2007). In other words, teachers’ value beliefs with regards to technology are based on whether or not they think technology can help them achieve the instructional goals they perceive to be the most important (Watson, 2006). When a new pedagogical approach or tool is presented, teachers make value judgments about whether that approach or tool is relevant to their goals. The more valuable they judge an approach or tool to be, the more likely they are to use it. This is particularly true of technology (Zhao et al., 2002). When teachers learn how to use technology within their specific content areas and/or grade levels, they can more readily transfer that knowledge to their own classrooms (Hughes, 2005; Snoeyink & Ertmer, 2001/2002). When learning experiences are focused solely on the technology itself, with no specific connections to grade or content areas, teachers are unlikely to incorporate technology into their learning experiences. Hughes (2005) noted “the more content-specific the example, the more likely the teacher will see value and learn it” (p. 295).

Although teachers may possess positive attitudes toward technology, it is unclear which specific value beliefs drive or motivate their uses of technology (Smolkara, 2008). Similar to other innovations, teachers will not spend precious time, energy, and resources learning about a new technology tool and incorporating it into current pedagogical practices if it is not valued (Hughes, 2005; Zhao & Cziko, 2001). Coppola (2004) found that the five teachers she studied would only use technology when they truly believed in its value; technology integration “requires so much work that only a teacher who already sees its value will carry it out... the teacher had to be sold on the idea that computers could be instructionally worthwhile before he or she would dig into the hard work of integrating them with instruction” (p. 108). Snoeyink and Ertmer (2001/2002) found similar results, indicating that when teachers saw value in using technology for specific educational purposes, they were more likely to use technology even when barriers existed. Therefore, it seems reasonable to assume that teachers need to assign value to a specific use of technology before incorporating it into their teaching practices (Zhao & Cziko, 2001).

Teachers’ reasons for using technology in the classroom usually relate to their beliefs that technology can address important teaching and learning needs (Judson, 2006; Ryba & Brown, 2000; Zhao & Frank, 2003). For example, teachers may find that using technology to communicate with parents and prepare for instruction addresses their most immediate needs, while other activities such as student-to-student communication, remediation, and student inquiry are best served through face-to-face activities (Zhao et al., 2002). One method for
increasing technology integration within schools might be to acknowledge and promote uses of technology that align with teachers’ value beliefs. Teachers typically develop practices from real experiences, and “appear to obtain most of their ideas from actual practice, primarily from their own and then from the practice of fellow teachers” (Kagan, 1992, p. 75).

1.3. Defining best educational technology practices

Teachers’ uses of technology are based on their own (or others teachers’) value beliefs; however, these uses may not be considered best practices. In Harris (2005) editorial and review of educational technology research, she stated that pedagogical dogmatism was one of two primary reasons why technology integration efforts have been perceived as failures. The pedagogical dogmatism concept referred to student-centered uses of technology. If teachers do not use technology in student-centered ways, these uses are often classified as lower-level applications of technology (or not the best educational technology practices) (Cuban, Kirkpatrick, & Peck, 2001; Ertmer, 2005; Moersch, 2002). Pedagogical dogmatism was “pervasive and distracting to educators, developers, and researchers...long embraced and largely unrecognized by many in the international educational technology community” (Harris, 2005, p. 117). Although many have suggested technology as a vehicle for educational reform, Harris (2005) provided a second alternative: investigating “pervasive and productive use of educational technologies for purposes of learning and teaching” (p. 119).

Instead of looking to what educational researchers have understood and examined in terms of teachers’ uses, Becker (2000) argued that defining exemplary technology integration should be “based on the actual effects that exposure...has on students’ competencies” (p. 299) or allowing teachers to define what makes technology integration meaningful to them. Harris (2005) suggested a new approach: “one that genuinely respects pedagogical plurality and honors teachers’ academic freedom...broaden[ing] our research and development work to encompass many different digitally supported instructional strategies while trusting our colleagues to consider and choose appropriately among all of them” (p. 121). In other words, trusting teachers to make good pedagogical decisions about how and why to use technology in order to enhance teaching and learning.

Rather than expecting technology to change the nature of teaching and learning, it may be more beneficial to help teachers use technology to enhance the curriculum in ways they see fit. Teachers’ values are rarely included in conversations on best educational technology practices. Furthermore, teachers lack opportunities to provide input into these conversations and the decisions resulting from those conversations. The end result is often professional development that pushes educational reform as opposed to promoting technology use for teaching and learning. As Madison (2005) stated, “…research has consequences: How people are represented is how they are treated” (p. 4). If teachers are continually represented as incapable of effectively integrating technology, this may have an impact on their professional development with regards to technology. Instead, if professional development programs incorporate technology uses that align with teachers’ value beliefs, as well as strategies that align with teachers’ existing instructional approaches in the classroom, the infusion of technology into teaching and learning may be more possible.

1.4. Purpose

In order to increase teachers’ technology uses in the classroom, professional development programs need to align with teachers’ value beliefs. Therefore, this study sought to examine how and why teachers used technology to enhance teaching and learning in order to understand teachers’ value beliefs related to technology use. More specifically, the study examined the teaching and learning goals teachers addressed through classroom technology use. By understanding the goals teachers addressed with technology (value beliefs), professional development and training initiatives could be created to directly support teachers’ needs and be more likely to transfer into the classroom.

2. Method

2.1. Overview

Many studies have shown that teachers’ descriptions of their technology uses often conflict with their practices (Ertmer et al., 2001; Judson, 2006). This may be due, in part, to teachers customizing their answers to align with expected responses (Ertmer et al., 2001; Ertmer, Ottenbreit-Leftwich, & York, 2006; Kopcha & Sullivan, 2007). In this study we examined the practices and value beliefs of eight practitioners recognized for technology integration experience using a hermeneutical phenomenology approach. That is, we abandoned the typical expectations and definitions of technology best practice to view teachers’ practice from their unique, individual perspectives.

Hermeneutical phenomenology interprets described experience of individuals to understand the phenomenon (van Manen, 1990). This approach extends “beyond mere description of core concepts and essences to look for meanings embedded in common life practices. These meanings are not always apparent to the participants but can be gleaned from the narratives produced by them. The focus of a hermeneutic inquiry is on what humans experience rather than what they consciously know” (Lopez & Willis, 2004, p. 728). In a hermeneutical phenomenological approach, the researcher interprets the experiences of others to better understand the phenomenon; in this case, the phenomenon was technology integration practices and the value beliefs that influenced these practices. In other words, this study used the experiences of eight teachers recognized for technology integration to understand how teachers use technology in their classrooms (practices), as well as the reasons underlying their decisions to use technology in those ways (value beliefs targeting specific needs).

2.2. Role of the researcher

Within hermeneutical phenomenology, interpreting the descriptions of individuals’ experiences is critical to understanding the phenomenon. The researcher’s experiences influence his/her interpretations. Thus, it was necessary for the researcher to acknowledge preconceptions and explain how these influenced the study (Lopez & Willis, 2004).
The researcher's lens for the study resulted from her experiences as both a researcher and a practitioner. As a researcher, most literature and studies seemed to criticize the ways teachers used technology. Some focused on critiquing the frequency (e.g., Moersch, 2004) while others concentrated on the manner (typically perceived as being negative) in which technology was used (e.g., Project Tomorrow, 2008; U.S. ED, 2003). The majority of literature suggested that the most effective ways to use technology were, primarily, based on student-centered approaches (Harris, 2005).

As a practitioner who actively participates in teacher-oriented communities and conferences, many of the technology uses teachers seemed to find meaningful did not always align with those advocated by researchers. However, due to the suggestion in the literature that student-centered technology uses were the most effective, many of the professional development (e.g., Matzen & Edmunds, 2007) and teacher education programs (e.g., Grove, Strudler, & Odell, 2004) were focused on changing teachers' pedagogies and technology uses to reflect a student-centered approach. By failing to obtain teachers' input on the use of technology in the classroom, professional development and training programs may not align with teachers' value beliefs, thus decreasing the likelihood that those uses will transfer to the teachers' practices.

In addition to these experiences, the researcher adopted Harris (2005) argument focusing on how teachers use technology for the purposes of learning and teaching without an agenda for educational reform. In this approach, the researcher supported the notion that teachers are capable of considering and selecting appropriate ways to use technology to enhance teaching and learning. In other words, teachers should contribute to the discussion of what technology uses are valuable for teaching and learning; value should not be solely attributed to only a constructivist pedagogical approach.

2.3. Research design

To construct an understanding for each teacher, a two-phase multiple case study research design was utilized (Stake, 2006). The data for each teacher was first analyzed as one case study (phase 1) before comparing the results to the other teachers in the cross–case comparisons (phase 2). Stake (2006) declared, “Qualitative case study was developed to study the experience of real cases operating in real situations” (p. 3). In this instance, a case study research design provided the means for understanding each individual teacher within a “real” environment. The hermeneutical phenomenology approach (van Manen, 1990) provided the interpretative lens to describe the experiences of the teachers, while the multiple case study research design (Stake, 2006) facilitated the construction of contextualized experiences and systemic analysis procedures.

After collecting, organizing, and analyzing the individual cases, phase two focused on examining the similarities and differences across all eight cases to determine whether any value beliefs transcended individual participants (Stake, 2006). The resulting value beliefs would present general trends that existed outside their bounded systems. Teachers' value beliefs might be considered when designing effective technology professional development opportunities that teachers would transfer to their K-12 classrooms. Stake (2006) recommended using four to ten cases for a multiple case study design to provide enough information on the unique interaction between the case and its system without providing overwhelming amounts of distinctive qualities, thereby limiting comparisons.

2.4. Context and participants

Convenient purposeful sampling procedures were used to identify practitioners recognized for technology integration experience (Creswell, 2000). The eight teachers were selected from a list of recipients of an award program for one U.S. state (Michigan Consortium for Outstanding Achievements in Teaching with Technology: MCOATT) that recognized teachers who evidenced outstanding achievements teaching with technology. As a pre-service recipient of this award, the researcher was familiar with the requirements as well as the organization leaders.

To receive the award, teachers identified themselves as seasoned technology users and developed electronic portfolios that addressed the U.S. National Educational Technology Standards for teachers (NETS-T) with narratives and supporting technology integration artifacts. The NETS-T standards were created by teachers and researchers through a collaborative process, collectively agreeing on the standards teachers should strive for when using technology in the classroom. Portfolios were judged by peers and university professors; winners were recognized for achieving the standards at an advanced level (to view the rubric, visit http://www.coatt.org/rubric) (McManus, Charles, Rubio, Hoffman, & Lenze, 2002). Of the 31 MCOATT recipients, eight female teachers volunteered for the study (see Table 1).

<table>
<thead>
<tr>
<th>Code name</th>
<th>Year award received</th>
<th>Job when award received</th>
<th>Current grade level/subject taught</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adeline</td>
<td>2001</td>
<td>6th–8th Grade computer teacher</td>
<td>6th–8th Grade computer teacher</td>
</tr>
<tr>
<td>Carly</td>
<td>2003</td>
<td>2nd Grade teacher</td>
<td>3rd Grade teacher</td>
</tr>
<tr>
<td>Maude</td>
<td>2005</td>
<td>9th–12th Grade Mathematics teacher</td>
<td>9th – 12th Grade Mathematics teacher</td>
</tr>
<tr>
<td>Jenn</td>
<td>2005</td>
<td>Elementary media specialist</td>
<td>Elementary media specialist</td>
</tr>
<tr>
<td>Erin</td>
<td>2003</td>
<td>3rd–5th Grade teacher</td>
<td>3rd–5th Grade teacher</td>
</tr>
<tr>
<td>Lexy</td>
<td>2002</td>
<td>Elementary media specialist</td>
<td>K-12 technology director</td>
</tr>
<tr>
<td>Sharon</td>
<td>2002</td>
<td>6th Grade teacher</td>
<td>Elementary media specialist</td>
</tr>
<tr>
<td>Pollyanna</td>
<td>2004</td>
<td>6th–8th Computer teacher</td>
<td>6th–8th Computer teacher</td>
</tr>
</tbody>
</table>

* Data was collected in Spring 2006.
2.5. Procedures and data collection

The case study research design included rich cases that provided a variety of data sources (van Manen, 1990; Stake, 2006). A case study for each teacher in this study was constructed from three data sources: interview, observation, and electronic teaching portfolio. Email addresses for the teachers were found either on the electronic portfolio website or the school’s website. All 31 recipients were emailed an invitation to participate in the study, and eight agreed. Most who declined to participate did so due to time or current job constraints. The participants’ principals were contacted to approve the research, and interview/observation times were coordinated via email.

Before visiting each teacher to conduct an interview and observation, each teacher’s electronic MCOATT portfolio was reviewed. The portfolio provided information on each teacher’s practices (with evidence of artifacts) and espoused beliefs (through descriptive narratives and reflections). Each portfolio consisted of five required elements: (a) an introduction of herself as a teacher, (b) an overview of her classroom, (c) a narrative explaining how she met Michigan’s seven technology standards (the first six standards are the NETS-T standards) and links to artifacts as supporting evidence, (d) exhibits organized in a list and linked to artifacts discussed in the narrative, and (e) a reflection on her integration of technology (COATT, 2006). The review of the portfolio prompted additional questions for the interview.

An observation and interview were conducted with each teacher during a one-day site visit. Site visits were all conducted within a two-week period. Teachers were asked to prepare a “20–30 min lesson where you are teaching your students using technology in an exemplary way,” as well as to set aside time for a 20–30 min interview. The observations were designed to examine technology integration practices and lasted between 27 and 90 min. Observations were videotaped for later analysis and were documented by the primary researcher using field notes. Field notes included general descriptive observations of the lesson (e.g., “teacher touches screen to help student with a software feature”), as well as reflective notes documenting the researcher’s feelings or interpretations of the event (e.g., “the teacher refrained from taking the mouse from the student to patiently guide them without taking control”).

The interview was the primary data source used to investigate teachers’ values related to technology. Given that values and beliefs are internal to teachers, the best way to explicate them was through the interviews. The interviews lasted between 24 and 117 min and were digitally recorded. Through the use of a semi-structured interview guide, each teacher discussed her technology uses. The interview guide was flexible; additional questions were added to investigate emerging themes from the portfolios, observations, and interviews with other participants (e.g., preparing students for 21st century) (van Manen, 1990). Questions such as “On a typical day, how do you use technology in your classroom?” and “Why do you use technology?” were included in the interview guide.

2.6. Data analysis

Following the site visit, the portfolio narrative and examples, observation field notes, and transcribed interviews were organized into separate case records for each teacher. A case record organizes the edited data in chronological or topical format; this method makes data analysis more manageable (Miles & Huberman, 1984). Keeping electronic case records enabled an efficient process for searching for themes, establishing relationships and connections, and building flexible conceptual models. This organization and capability assisted in the process of analyzing each case study and developing cross-case themes (Miles & Huberman).

The data analysis for this study consisted of two phases: (phase 1) the development of individual case studies (within-case analysis) and (phase 2) the comparison of multiple cases (cross-case analysis), resulting in a description of the value beliefs that underlie teachers’ professional and instructional uses of technology. The goal of the individual case analysis (phase 1) was to understand how and why each teacher used technology within her specific context. Phase 1 began by reviewing each of the individual eight case records. All of the data in the case record were read through several times in one sitting, as recommended by Stake (2006).

Instead of using subjective descriptions, hermeneutical phenomenology uses interpretations of individuals’ descriptions to understand their experiences (van Manen, 1990). As previously described, the orienting framework for these interpretations was influenced by the researcher’s experiences. Instead of using the terms teacher-centered and student-centered, due to the negative associations with those two phrases, we used the terms “professional” and “student” needs to refer to teachers’ different uses of technology. Using technology for professional needs refers to technology used primarily by the teacher to improve her ability to achieve the professional goals of teaching. In contrast, using technology for student needs focused on technology used by the students or teacher to directly improve student learning or involvement. Using the constant comparative analysis method (Merriam, 1998), data were reviewed from all three sources and initial content codes were identified for each category. For example, Maude discussed how technology facilitated student engagement:

Most importantly the students worked great together. They were discussing ideas and examples, (required), they were checking notes and debating definitions. This was a teachers’ dream! I stood there and saw them learning. I was so pleased with this activity that I repeated it again second semester with a new group of students. The results were just as exciting. (portfolio, standards section)

This statement was initially coded as technology enhanced student collaboration. After the initial codes were established, these codes were revisited to combine or expand them. This code eventually was included under technology engaging students. Once the coding system was established, properties or definitions were created for each code. For example, Maude used the technology to help her students become more excited to learn. This was coded as engaging students. This same approach was used to code the data from all three sources for Maude. Each teacher had her own set of codes. Once the data were classified as addressing professional or student needs, a final case study report was created for each teacher and included (1) a descriptive narrative of professional needs and student needs, (2) quoted excerpts providing support for each research finding, and (3) tables presenting demographic and procedural information.

After the within-case analyses were completed, the eight case reports were analyzed using cross-case analysis. All cases were compared to find codes, categories, and patterns that transcended individual cases (Stake, 2006). Similar to the within-case analysis procedures, all the teachers’ uses that addressed professional needs were reviewed first, followed by a review of those that addressed student needs. During each review, recurring codes and themes were noted. After the initial review for each construct, a meta-matrix of the codes for all
participants was created (Miles & Huberman, 1984) and a constant comparative method was used to identify codes that could be combined (Strauss & Corbin, 1990). For example, the following statement from Adeline was initially coded as student motivation (“I have found that the students are very eager to learn and apply skills learned beyond my own classroom.”), while an initial code of authentic was used for the following statement by Maude (“They had a real purpose for doing it because when you learn technology in isolation you may learn those skills, but you don’t remember them. If you’re doing it and you’re applying it to a project, then you’re keeping the information.”). These two codes were eventually combined to form a code called using technology for students’ needs – transfer technology to future. This constant comparative method yielded a list of codes related to using technology for professional and student needs, accompanied by specific code properties for each (see Table 2) (Merriam, 1998). The results presented in this paper are developed from the findings in the cross-case analysis (phase 2).

3. Results

Teachers’ value beliefs can be inferred from what they say, intend, and do (Rokeach, 1968). To investigate value beliefs, an interview, portfolio, and observation were collected from each teacher. Based on interpretations, teachers’ value beliefs were evident in how they used technology to address both professional and student needs. The results section presents how these two themes were manifested across the eight participants. The paper concludes with recommendations for creating professional development experiences that align with these value beliefs.

3.1. Using technology to address professional needs

In this study, all eight teachers used technology as a way to improve themselves as professionals. Teachers’ value beliefs addressed several professional needs: facilitating classroom operations and organization, creating customized classroom materials, and engaging in professional development. Each of these needs is described below with a description of how/why technology was used as a way to help teachers address these needs.

3.1.1. Facilitating classroom operations and organization

Technology was used by all teachers to facilitate a variety of classroom operations and organization. For example, five teachers described how the use of grading programs facilitated management of student records. Pollyanna stated, “I use Making the Grade, a grading program for keeping student records. I am able to readily produce professional looking reports for students and parents” (portfolio, narrative section). Sharon also mentioned using technology to track student progress: “It is pertinent to keep careful and confidential records of student progress. To ensure that I am able to document student learning, I have used a spreadsheet to calculate total points available, total point obtained, and averages for all students” (portfolio, narrative section).

All teachers also described technology as a way to provide information to parents. One of the common methods for communicating with parents was through the use of newsletters. Lexy described how she used computer-generated newsletters, almost from the beginning of her career: “I immediately found ways to use it in the classroom and I started using [the computer] to do newsletters for parents… I had a really good response from parents when my newsletter was typed as opposed to handwritten … they read it more” (interview, lines 22–25). In her portfolio, Lexy also described using newsletters “to show the parents what we were doing … using the newsletter to keep kindergarten parents up-to-date on our kindergarten activities.”

Erin also described the value of technology for developing newsletters: “We use Microsoft Publisher for our class newsletter, which is sent home once a week and includes a paragraph typed by students of the week” (portfolio, narrative section). Other teachers reported using additional technologies to keep parents up-to-date such as emailing (n = 7) and classroom websites (n = 5). Maude explained: “I have created a web site where students, parents, and the community can learn about the activities taking place in my classes. I use email regularly to communicate with parents” (portfolio, narrative section).

Regardless of whether the teachers used technology to increase the efficiency of communication or just to provide various options for communication, technology was perceived as a valuable asset to improve communication between parents and teachers. Jenn described her interpretation of why using technology improved parent communication:

<table>
<thead>
<tr>
<th>Code</th>
<th>Descriptions and key words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional needs</td>
<td>Technology is used primarily by the teacher to improve their abilities to achieve professional goals of teaching. Technology is used to enhance communication and organization between parents/students outside of the classroom. Newsletters, websites, emails, phone calls, gradebooks, communicate with parents or students.</td>
</tr>
<tr>
<td>Creating customized classroom materials</td>
<td>Technology is used to create customized materials for their specific classrooms/students. Key words: worksheets, tests, personalize, individualize, customize, modify, create.</td>
</tr>
<tr>
<td>Engaging in professional development</td>
<td>Technology is used by teachers to gather new ideas/information/lessons/resources for class. Technology is also used by teachers to collaborate with other teachers or administrators. Key words: professional development, listservs, online courses, collaborate, lessons, search.</td>
</tr>
<tr>
<td>Student needs</td>
<td>Technology is used by the students or teacher to directly improve student learning or involvement</td>
</tr>
<tr>
<td>Engaging and motivating students</td>
<td>Technology is used to engage and motivate students to become interested in the content and learning, as well as increase the quality of student work. Key words: enhance, engage, motivate, interest, excited.</td>
</tr>
<tr>
<td>Improving student comprehension and promote higher-level thinking</td>
<td>Technology is used to help students visualize abstract concepts or encourage higher-order thinking skills. Key words: visualize, higher-order thinking skills, complex, manipulate, observe, illustrate.</td>
</tr>
<tr>
<td>Facilitate technology skill development that could transfer to future applications.</td>
<td>Technology is used to teach students technology skills that can be applied to their current learning needs or to their future jobs. Key words: 21st century skills, college, workplace, successful, skills.</td>
</tr>
</tbody>
</table>
Technology enhances communication with parents. Use of email, telephones with individual voice mailboxes, and conference calls has increased the ability to contact and communicate with other people. For example, if I have a concern about a student, I am able to write a clear, concise email to a parent. As long as the receiving party regularly checks his or her email, I will not have to worry about leaving repeated phone messages that may be misinterpreted. (portfolio, narrative section)

Other teachers noted that technology enhanced parental involvement. Lexy described using technology to produce open house slide-shows and videos, whereas Erin and Carly used their websites to share student work examples.

### 3.1.3. Engaging in professional development

Teachers in this study used technology to address a second professional need: the creation of customized classroom materials. All teachers used technology to assist in the creation of classroom materials and lesson plans. For example, Erin described how technology enhanced her overall productivity as a classroom teacher: “From a classroom management standpoint, computers have made my life much easier … Technology is making our lives more efficient, that is of course when it is working properly” (Erin, portfolio, narrative section).

Maude also used a variety of technology resources to improve her productivity:

> Technology has increased my productivity in many ways. The use of Power point, MS word, Excel, and grading programs have provided me with easy access and updates to my lessons and materials created. Web sites for book companies and computerized test banks allow me to more quickly and neatly create assessments and projects. (Portfolio, narrative section)

All eight teachers also reported using websites to create customized teaching materials. Erin mentioned how she used tools available on websites to develop customized teaching materials: “I refer often to several websites to help me develop tests, puzzles and maps. One way I’ve used puzzles is to create a crossword puzzle activity which assessed student understanding of measuring concepts we covered in a math lesson” (Portfolio, narrative section). Lexy saw technology as a way to create more customized teaching materials: “I could do my own worksheets, my own test, modifying them to fit my students as opposed to using all the pre-printed material. I just found that I could make myself a better teacher because I could take a test and modify them for my own students.” (Interview, lines 24–28). Pollyanna also described using websites to assist with the development of classroom materials: “I create online quizzes using a web site from AlTec called QuizStar. Students love the immediate feedback they receive on their quiz scores. QuizStar also gives me a very complete statistical analysis of quiz results, which allows me to immediately address remediation issues” (Portfolio, narrative section). Many of the teachers (n = 6) used customized rubrics to evaluate student learning. For example, Jenn described why she used rubrics: “To ensure that I effectively and consistently evaluate the students’ learning process and final products, I created a rubric using the Rubistar web site” (Portfolio, exhibits page).

The ability to customize instructional materials and target specific learning seemed to be a value all these teachers shared. Teachers used a variety of technology tools to quickly create customizable teaching materials.

### 3.1.3. Engaging in professional development

All teachers shared a value belief that technology could be used to address their professional development needs. This was achieved through learning opportunities, collaboration, or researching new ideas for classroom use. In her interview, Pollyanna described using the Internet to search for new ideas and resources: “I go to the Web and I look for resources and I can come up with hundreds of resources by the time that I am ready to really start developing what I do with the kids” (Interview, lines 29–31). Maude also described using technology to “search and acquire information for lessons,” as well as “gathering technology resources” (Portfolio, narrative section). Erin described using technologies to keep current on content information and relevant resources:

> It is easy to access web sites to gain information on subject matter—to better prepare for teaching my students. I am also able to search for web sites that allow the students to research or engage in games which practice skills that we’ve learned…I refer often to various websites when searching for lesson plan ideas and activities. (Portfolio, narrative section)

In addition to using general search functions, teachers (n = 5) also mentioned the use of online exchanges such as listservs and participation in online communities. Pollyanna described using listservs to keep herself updated on new ideas: “…I learn about new technologies, new methodologies, and amazing resources. Edtech deals with a broad spectrum of issues relating to educational technology, while Techstaff focuses on professional development issues with regards to technology integration” (Portfolio, narrative section). In her interview, Adeline described how she “get[s] a lot of ideas online and sharing is very helpful if I can talk to other teachers” (Interview, lines 204–205). By utilizing online forums, newsletters, listservs, and online courses, Adeline could “get ideas from people halfway across the world and blend them, modify them or use them to come up with a lesson of [her] own” (Interview, lines 245–246).

Teachers (n = 4) also referenced email as an effective method for communicating and collaborating with colleagues and administrators. Lexy described using technology to communicate with her colleagues and principal: “I use email to communicate with the other teachers. I use email to share information, communicate ideas, projects, and web sites with staff. My principal and I use email to share information and ideas, as well as brainstorming better ways to communicate with staff” (Portfolio, narrative section). In Pollyanna’s portfolio, she described how technology enhanced communication with her colleagues: “Communication with my colleagues has been greatly enhanced through technology. Email is a great way to pass along information, send notification of a meeting, or share resources” (Portfolio, narrative section). Regardless of the specific tool, the underlying theme is the same: Teachers valued technology because it helped them improve their practices.

### 3.2. Using technology to address student needs

In general, the teachers in this study were motivated to use technology in their classrooms due to a strong value belief associated with helping students learn and preparing them for their futures. More specifically, teachers used technology as a tool to engage and motivate
students, improve student comprehension and promote higher-level thinking, as well as a means to facilitate technology skill development that could transfer to future applications.

3.2.1. Engaging and motivating students

All of the teachers in this study repeatedly mentioned how technology enhanced student motivation and engagement. When teachers used technology, it seemed easier to engage students in learning activities because they were motivated to participate. In addition, teachers suggested that student motivation improved student work quality (n = 6). In her portfolio, Jenn described this phenomenon with one example:

Students are really motivated by technology. When asking one parent for permission to use her child’s product in my portfolio, she became very enthusiastic. She identified that this child never does his best work. I identified to her that his performance in the technology lab is amazing and the products he produces are beautiful. It is exciting to know that technology has helped one student become a more successful learner. (portfolio, reflection section)

All teachers also discussed motivation within the context of improved student engagement. Maude described how students who were typically uninterested in content and learning in general became motivated by technology: “students who showed little interest or motivation to learn, worked as active interested participants during the course of technology lessons” (portfolio, narrative section). Furthermore, in her interview, Maude drew on an example from the observed lesson that illustrated how technology enhanced student motivation:

Some of the students that you saw working in the computer lab today don’t work in the classroom. They’ll just sit there and refuse to do anything. But when I take them to the computer lab, they work on the assignment … For example, the one young lady sitting kitty-corner from you was doing the assignment today. She will not do an assignment in class, but she will on the computer. (Interview, lines 139–146)

By using technology, teachers believed that students became more engaged in the learning process. For example, Adeline commented that technology had the ability to increase the engagement of her students: “Raising the level of interest of my students through the use of technology leads them to learn more about a topic, without even realizing they are doing so” (portfolio, narrative section). Adeline described how her students’ excitement motivated her to use more technology: “I think what really sparked my [technology integration] development was the level of interest from the students. Anytime that you could bring a computer or any form of technology … it seems to raise the interest level of the child so they’re more in tune to learning” (Interview, lines 63–71). Erin also indicated that technology facilitated enhanced learning because it motivated students to become more actively involved: “Technology increases student interest, involves students that may not otherwise be actively involved” (portfolio, narrative section). In general, teachers share a value belief that technology improved student motivation and engagement.

3.2.2. Improving student comprehension and promoting higher-level thinking

All eight teachers shared a value belief that technology could be used as a means for improving student comprehension of complex content. For instance, teachers described turning to technology as a powerful means to represent concepts visually, thereby increasing student comprehension. During her observed lesson, Carly reviewed information on the sun, moon, earth, and orbits using a PowerPoint presentation with animations and videos. In her interview, she explained how technology enhanced student comprehension of the material through visual representations: “I can't explain orbit to my kids like that video can show it. There's the planet and the sun and the moon and the earth, and they're going around even if you stand up with a ball it's not the same as seeing that” (interview, lines 168–170). Carly believed that this use of technology was critical to her students’ comprehension.

Maude described how technology improved her students’ understanding by using statistics software to see how changing quantities affected a graphical representation of a complex concept. Later on, Maude described her purpose for using technology in this context:

Technology needs to enhance what’s being taught. I taught them yesterday what [the central limit theorem] was and it was relatively meaningless to them… They understood all the pieces but without visualizing it or working with it, it doesn’t come together to make sense for them … The technology allows us to show them how it works. It allows [students] to work interactively to practice it in their own way, in their own time, at their own pace. (Interview, lines 56–64)

In her portfolio, Maude described a similar activity where her students used technology to achieve higher-order thinking skills:

In the case of Algebra I, the students were encouraged to use higher-order thinking skills, synthesizing and evaluating, by having to discover a method for categorizing each function family. In the Function Family and Sketching Derivatives lessons the students could observe changes in the graph and make their own conclusions; thus encouraging higher-order thinking skills. (Portfolio, reflection section)

While technology in this example was not solely responsible for students utilizing higher-order thinking skills, by utilizing the graphing features of a technology program (Geometer Sketchpad) students could manipulate the graph to further their understanding. Sharon described specifically, in her portfolio, why technology helps target higher-order thinking skills:

Technology creates learning situations in which students use the unique capabilities of instructional technology to learn in ways they could not achieve without the use of technology. All of the projects described in this module illustrate this criteria. Photographs of the students engaged in the process of the project along with the final products will give evidence of this. None of these projects can be accomplished at such a higher level of understanding without the use of technology. (Portfolio, reflection section)

Six teachers described how technology enabled the facilitation of more complex learning experiences that were previously difficult or impossible to achieve by providing access to more resources and current information (e.g., the Internet), as well as new learning experiences
(e.g., virtual field trips). Lexy described using technology because of its impact on her students and their learning. For example, in a first grade Native American unit, she contacted a museum in Ohio and planned a videoconference field trip for the first grade students. Through this experience, students were able to gain a deeper understanding of the content by visually seeing clothing and tools, as well as hearing the drums and instruments played by Native Americans. In addition, Lexy designed the experience so students could ask and answer questions about the content (portfolio, narrative section). In her interview, she expanded on the purpose and impact of virtual field trips by using a recent example:

We did a videoconference with the Indianapolis zoo where they have a whole rain forest exhibit. Since [the rainforest] is part of our standards we should study that particular concept by being able to go to a zoo that has an exhibit and talking to the zoologist and some of those things that you don’t get to do when you actually go to the zoo. You get to talk to the expert who knows about it and zoom in on all the animals and see feedings and some of those things that you don’t always get to do. Being able to talk [to the experts] is cool for the kids too and so we are trying to give kids those experiences, as many experiences as they can have. (Interview, lines 296–304)

Lexy’s purpose for using technology was to provide students with learning experiences that enhanced comprehension by utilizing resources outside the classroom. All of these teachers valued the importance of increasing student comprehension and higher-order thinking skills.

3.2.3. Facilitating technology skill development and transfer to future applications

All teachers in this study also valued technology use because it helped students master relevant skills that they could apply throughout their lives. It is important to note that although the computer teachers repeatedly emphasized this theme, the other teachers also stressed the importance of this value belief. In her interview, Adeline communicated this as one of her responsibilities: “I know what these kids need to know leaving me; what’s needed at the high school level to succeed, what’s needed to get out into the workplace and start college – and that’s technology” (Interview, lines 91–93). As a middle school computer teacher, Adeline described how she focused on a wide variety of skills as part of her role as a computer teacher. Within her portfolio, she described focusing on “research and Internet skills, word processing skills...to improve creative writing techniques and communication skills” (Portfolio, narrative section). These latter skills, sometimes referred to as 21st century skills, were identified by governmental reports and standards as being important to the future success of students’ (Kleiman, 2004; Metiri, 2006).

Jenn also discussed the importance of students using technology as a tool for their future. She provided the example of her younger students who used technology as a learning tool in addition to entertainment: With the younger kids, they have a lot more skills than some of the older kids because the older kids had this mentality that the computers are just for fun. Our sixth-graders didn’t have this computer lab so their vision of technology is different because it’s only what they’ve done on their computers at home and they view it as a toy. Whereas the kids that are K, 1, and 2, they view as a tool to do work and as a tool to have fun. The younger kids are going to be able to do more by time they are in sixth grade just because they have this dual understanding of technology and the use of technology. (Interview, lines 210–218)

Erin also described technology as a valuable tool for students. She wanted to see students “using technology as a way to accomplish the task; it’s something that can make learning easier for the kids” (interview). Erin discussed her purpose for using technology during the observed lesson:

I could have done that lesson on paper. We could’ve drawn circles and done the little mapping activity on paper, but they’re picking up a lot of skills by using Inspiration like the word processing. They are learning a lot of specific technology skills by doing the project...I see it as a way to teach the content in an easier way for the teacher and kids because they’re learning the technology specific skills. (interview, lines 220–228)

Adeline also supported this notion that technology can make learning easier for students: “I want the kids to know that [computers] have a usefulness and they are a good tool to make learning easier, expand their horizons, and be fun for them and right now at the middle school level, they’re learning how to use technology, to help better their education” (Interview, lines 85–87). Adeline describes a value that was shared by all the other teachers in this study; that is they valued the use of technology to prepare students for future situations and life.

All teachers shared a value belief regarding the importance of meeting the curriculum standards. In their observed lessons, all teachers taught or used technology to meet curricular goals. For example, Jenn taught first grade students how to change font style, size, and color to create headings. She planned for first graders to transfer this knowledge to the upcoming frog book report. The technology skills were taught within a context so students could directly apply new technology skills while meeting specific content goals. As the media specialist, this seemed to fall within Jenn’s role of equipping students with the ability to use technology in their everyday lives:

For my vision, it’s the state standards and the new NETS have changed things a little bit. My vision, I guess would be that the kids would have this view, a broad sense of technology that it’s more than just the Internet; I want them to use it for productivity, research, integrate it into their real lives, understand the social and ethics of using things like the Internet and computers, and to be able to manage what they’re doing. (Interview, lines 179–185)

In general, these teachers shared a value belief regarding the importance of using technology within the context of other content standards because this enabled students to learn technology skills within authentic environments. In turn, their students could transfer these technology skills to similar applications in their futures. For example, Pollyanna mentioned that how technology can be used as a tool for learning:

Technology integration needs to involve students working on the computer using the different technology tools to communicate their learning. It’s always essential that kids are learning content. I want them to learn content through the use of technology, because I want them to understand that technology is a tool that they can use for their learning. They learn it because it’s relevant to them and the
technology is what really makes it touch their lives. I think you really have to give [students] the tools that are in the real world. (Interview, lines 52–59)

Lexy also described how students should use technology as a productivity tool to assist in their learning process, emphasizing student choice. In her interview, she described the importance of providing technology as an option for students to express themselves and their knowledge:

I would like to see teachers give [technology] as an option always and I don’t think we do that. I think that teachers give lots of choices for students, but it’s not one. I see it in my own children’s education. I have a fourth-grader, a seventh-grader, and a tenth-grader. … And when they come home, they do all kinds of things [on the computer], but yet at school they hardly get to touch a computer. They’ll have a project where they’re building a poster board, and I would say ‘we could do that in PowerPoint’ and they laugh at me, but that’s not a choice. You want to give them those choices, so that when they enter whatever world they enter, and they have to do a presentation that should be one of the options. … I’d like to see more teachers embrace that as an option for kids in whatever they’re doing because it certainly can fit all across the curriculum. (Interview, lines 206–233)

Lexy indicated that technology use by adults in our society was far more prevalent than the introduction students were currently receiving in school. For students to be prepared for future roles and jobs, it would require more experiences that enable them to practice and prepare for such environments. She also placed a heavy emphasis on providing a choice for students in the classroom, allowing them to decide how to best represent their understanding of the content knowledge, which may be more representative of how students would be using technology in their futures.

4. Discussion

Teacher beliefs tend to influence teachers’ general instructional practices (Pajares, 1992; Richardson, 1996) as well as their specific technology integration practices (Ertmer & Ottenbreit-Leftwich, 2010; Tondeur et al., 2008). Value beliefs comprise the perceived importance of particular goals and choices (Anderson & Maninger, 2007). In other words, teachers’ value beliefs related to technology are based on how they think technology can help them achieve the instructional goals they perceive to be most important (Watson, 2006). As teachers are more likely to incorporate technology uses into their practices that align with these value beliefs (Zhao et al., 2002), professional development programs are likely to be more effective if they demonstrate technology uses that align with teachers’ value beliefs. This study examined how and why teachers used technology to enhance teaching and learning in order to understand teachers’ value beliefs with regards to technology use.

As noted earlier, most teachers’ practices tend to incorporate ideas based on teachers’ own experiences or those of their colleagues (Kagan, 1992; Richardson, 1996). This may be due, in part, to the fact that teachers are more confident that those ideas could work in a real classroom. Often times, suggested uses lack practicality; teachers cannot see how these ideas transfer to the classroom (Smolin & Lawless, 2007). By studying colleagues recognized for technology uses (such as the teachers in this study), professional development programs designed around these value beliefs may be more applicable to other teachers who have not yet embraced technology.

Within this study, teachers were asked to describe how they used technology, as well as why they used technology in those ways. With a hermeneutical phenomenology approach, the researcher interpreted the individual descriptions of experience in order to construct an understanding of the phenomenon (van Manen, 1990). Based on the researcher’s interpretations of participants’ descriptions, the value beliefs that influenced teachers’ decisions to use technology were motivated by a desire to improve as a professional, ultimately impacting student learning.

4.1. Value beliefs associated with professional needs

Teachers’ uses of technology that addressed professional needs seemed to be prompted by value beliefs associated with ways to improve teacher efficiency or effectiveness. Teachers valued using technology to address the following professional needs: facilitating classroom operations and organization, creating customized classroom materials, and engaging in professional development. In this study, teachers seemed to seek methods to address these professional needs.

All teachers used technology to assist in the facilitation of classroom operations (such as online grading programs and communication with parents). Teachers noted that these uses of technology enhanced parental and student involvement. For example, Erin and Carly used their websites to share student work examples. Previous studies have indicated the importance of parental involvement on student learning (Feuerstein, 2000). In this study, teachers shared a value belief that technology use could increase parental involvement. Using technology to increase levels of parent communication also has been found to increase student learning (Junji, Shin, Snow, & Nivens-Wilb, 2007; Rogers & Wright, 2007). In addition, with the recent No Child Left Behind (NCLB) requirements in the United States, tracking student performance has become more critical than ever (Schoen & Fusarelli, 2008). Therefore, using technology to track student performance and communicate with parents may be based on teachers’ value beliefs that technology could be used to improve classroom operations and organization. Technology professional development experiences could develop teachers’ abilities to communicate with parents and facilitate other classroom operations.

All teachers used technology to create customized classroom materials. Teachers explained their reasons for this particular technology use; customized materials allowed teachers to provide more tailored instruction that focused on the pertinent content. For example, Lexy described that her curriculum materials did not address specific knowledge she wanted to cover; by creating customized materials, she could target the specific knowledge. Other studies have shown the importance of being able to create customized materials and how this impacts student learning (Thomas & Milligan, 2004). Such tools make developing teaching materials and individualized instruction more feasible, regardless of the teacher’s approach (Guzmán, Conejo, & García-Hervás, 2005; Thomas & Milligan, 2004). Since teachers are more likely to use technology that directly meets their needs (Judson, 2006), using tools that allow them to customize materials and instruction.
may encourage them to use technology in other capacities. Other studies have shown that teachers are more likely to use technology that supports their specific needs (Ryba & Brown, 2000; Yang & Huang, 2008). One study of five English teachers showed these teachers attributed their integration to discovering subject-specific applications of technology (Hughes, 2005). Other researchers have suggested that when technology is introduced in situated contexts it facilitates teacher development and success in the acquisition of technology integration knowledge (Koehler, Mishra, & Yahya, 2007). Therefore, by allowing teachers to use technology to customize materials, they may be more likely to use technology in their classrooms. Technology professional development experiences should support teachers in creating customized materials for their classrooms.

The final way these teachers used technology to address professional need was by engaging in professional development. Regardless of the specific tool, the underlying theme is the same: Teachers shared a value belief that technology could help them improve their practices. Online professional development has become a popular choice for teacher training (Dede, 2006) due to the flexibility and individual appeal. Another study reported one of the key reasons teachers used technology was to enhance lessons with online resources (Ruthven, Hennessy, & Deaney, 2005). Through this form of self-study, teachers can target individual professional growth goals (Levin & Wadmany, 2008; Sahin & Thompson, 2007). By targeting individual professional growth goals and engaging in professional development, the teachers were striving to improve their professional practices and address specific professional needs through the use of technology. Hopefully, engaging in more personally relevant and timely professional development, it would improve their practice as a teacher.

4.2. Value beliefs associated with student needs

In addition to professional needs, teachers used technology to address student needs. In this study, teachers used technology to engage and motivate students, enhance student comprehension and higher-order thinking, as well as to equip students with technology skills for future use.

Regardless of whether teachers used technology to address professional or student needs, the core underlying value for using technology was to benefit students. For example, Carly described how her use of video increased student comprehension of a complex topic. All teachers used technology to help students achieve learning that was otherwise difficult or impossible. Other studies have discussed how technology improves student comprehension and higher-order thinking skills (Kozma, 2003; Lei & Zhao, 2007). These results align with other research findings in which technology was found to contribute to higher-order thinking skills and activities. For example, in a study of 174 technology integration teacher case studies, Kozma (2003) found that technology enabled students to achieve higher-order thinking skills (e.g., problem-solving abilities) through research projects, data analysis, problem-solving activities, and self-assessment of their work. Jonassen’s work with “mindtools” also supports this idea, indicating that “computer-based tools and learning environments have been adapted or developed to function as intellectual partners with the learner in order to engage and facilitate critical thinking and higher-order learning” (1996, p. 9). During technology professional development, it is crucial to point out how this technology use could enable students to achieve higher-order thinking skills. For example, with Accelerated Reader, the professional development experience might elaborate and provide evidence of how this technology supports student comprehension and higher-order thinking skills.

Teachers in this study also seemed to convey value beliefs that technology could be used to engage and motivate students. Motivation has been mentioned by teachers in other studies as a reason for using technology, often stating that students invest more effort or time in technology-rich learning experiences (Ruthven, Hennessy, & Brindley, 2004). Expert technology-using teachers have previously expressed beliefs that technology increases students’ motivation to learn (Bigatel, 2004; Ruthven et al., 2004, 2005). Hadley and Sheingold (1993) found similar results: “These teachers are inspired by their students’ accomplishments with and enthusiasm about the technology” (p. 298). Other teachers have acknowledged that the increase in their students’ motivation when using technology resulted in a decrease in behavior problems, higher quality work (Tiene & Luft, 2001), and improvements in self-regulation abilities and academic achievement (Ruthven et al., 2004, 2005). Although a recent U.S. study by the Metiri (2006) group suggested that results are still inconclusive as to whether technology increases levels of student motivation, teachers consistently mention a difference in student motivation when using technology (e.g., Angers & Machmets, 2005). Together, these results suggest that technology professional development could include technology uses that specifically motivate and engage students. The professional development experience should introduce the use with a rationale to increase student motivation and engagement.

All teachers in this study also used technology to address a third student need: facilitating technology skills development. In one example, Adeline discussed how teaching students technology skills was necessary for preparing them for their future lives. Recently, discussions have focused on preparing students for the global economy by equipping them with 21st century skills, such as information and communication technology skills and problem-solving abilities (Dede, 2007). These teachers shared value beliefs that these skills were necessary for students to succeed. Levin and Wadmany (2005) found similar results: teachers perceive technology as a method for implementing “authentic or life-based experiences” (p. 296), which facilitated student transfer to future applications. Recent attention has been devoted to discussing the new skills required for graduates, focusing on 21st century literacy skills (Dede, 2007). Kleinman (2004) indicated that technology in K-12 schools can “expand opportunities for students, broaden the information they have available, better connect them with real-world issues and activities, provide them with opportunities for creativity, extend how they communicate and collaborate, and in general, better prepare them for the lives they will lead in the technology-rich 21st century” (p. 248). Therefore, technology professional development that focuses on preparing students for their futures lives might increase the teacher’s use of technology in their classrooms.

Overall, it seemed that the eight teachers in this study use technology to address students needs. Coppola (2004) indicated a similar teacher perception based on her in-depth investigation of experienced technology-using teachers. Her conclusion was that teachers used technology in ways that was “doing what’s best for kids” (p. 136). Like Coppola’s teachers, the teachers in this study used technology for specific purposes and believed in its ability to benefit students. In other studies, exemplary technology-using teachers have previously identified their commitment to student learning as one of the most critical factors for integrating technology (Coppola, 2004; Ertmer et al., 2006; Pierson, 2001; Sandholtz, Ringstaff, & Dwyer, 1997). Pierson further described this commitment to using technology due to the impact
it has on students: “unless a teacher views technology use as an integral part of the learning process, it will remain a peripheral ancillary to his or her teaching” (p. 427). Although this finding is not unexpected, it reminds us of the importance of understanding and addressing the goals that align with teachers' value beliefs.

4.3. Implications of value beliefs

Teachers' reasons for using technology in the classroom typically align with their value beliefs, including how technology enables them to meet both professional and student needs, as described in this study (Judson, 2006; Ryba & Brown, 2000). Therefore, professional development should be designed to explicitly target teachers' value beliefs, focusing on the values addressed in this study. These value beliefs could be targeted by incorporating a “translation activity” into professional development programs.

Translation activities should highlight how students might benefit from specific uses of technology. For example, a common topic for professional development is presenting new grading software. The translation activity may show teachers how recording students' grades electronically can increase the efficiency of analyzing student weaknesses. The teacher is then able to quickly address the individual weaknesses of students (Haertel, Means, & Penuel, 2007). In another example, a professional development opportunity might focus on using a graphing mathematics program. Students can use this program to quickly represent data in various graph formats and examine the data. This improves the efficiency for students, as well as allows them to manipulate data for a better understanding (Haertel et al.). By demonstrating the potential impact technology could have on students, teachers may more readily be convinced to incorporate it into their classrooms.

Many have described exemplary technology uses as those that emphasize student-centered practices (e.g., Bigatell, 2004). However, teachers do not typically use technology in this way (Russell, Bebell, O'Dwyer, & Kathleen, 2003). Some have suggested teachers have difficulties implementing student-centered practices because they are unable to transfer these practices to their classrooms (Churchill, 2006).

Even though teachers may find value in a particular technology use, they are unlikely to implement it if they cannot see how it would work in their classrooms. This may explain, in part, why teachers “borrow” ideas from other teachers; these uses from other teachers have been proven to work in the classroom (Kagan, 1992). Therefore, in addition to a translation activity, an “application activity” should also be incorporated. The application activity would explicitly show teachers how this idea would work in an actual classroom. Zhao and Cziko (2001) found that in addition to valuing a technology idea, teachers must believe the idea will work within their current abilities and environments. Therefore, technology ideas should be introduced in situated contexts in order for teachers to successfully transfer this knowledge to the classroom (Koehler et al., 2007). Other studies have indicated the importance of providing examples of how technology can be used within a teacher’s specific context (Hughes, 2005).

4.4. Limitations and suggestions for future research

There are several limitations associated with this study. First, two data sources focused on teacher's self-reports and perceptions. Therefore, when discussing professional needs and student needs, these definitions were inferred based on the perceptions of these eight award-winning teachers. Future research studies should incorporate more data sources to accurately measure value beliefs, or perhaps develop a measurement tool to better assess teacher value beliefs.

Other limitations include those commonly associated with case studies. Although the sample was small, a large sample was not feasible. Given that the sample was limited to MCOATT recipients, the resulting implications may only apply specifically to this population. A majority of recipients have evolved to become computer teachers, media specialists, or technology coordinators, which may also limit generalizable implications. In addition, all participants were female which may limit generalizability. Future studies should attempt to incorporate a wider range of teachers with varying backgrounds (subjects areas, gender, socioeconomic status, grade levels), as well as teachers from other countries. The sample was obtained and studied in the United States, which may limit its generalizability. Although there was representation of different content areas and focus, it would be beneficial to study more traditional classroom teachers as opposed to those with an emphasis on computers.

In addition, based on limited funds, time, and participant access, only one site visit was coordinated for each teacher. This may not have been enough time to gain an accurate portrayal of their technology integration. Future research may include longitudinal data over the course of a year or several years to better document teachers’ value beliefs. However, through the use of additional data sources, in-depth descriptions of the phenomena were presented (Merriam, 1998).

5. Conclusions

This study was designed to investigate the value beliefs that underlie teachers' uses of technology. Teachers in this study used technology to address both professional and student needs that aligned with their value beliefs, which was to ultimately benefit their students. This is a broader definition than what currently exists in the literature, expanding beyond the typical recommended practices associated with student-centered learning (e.g., Becker, 2000). Or perhaps we need to try to understand best practice within the context in which teachers work. The findings suggest some important implications for teacher professional development: the focus for any new technology use should target a specific purpose that aligns with teachers’ value beliefs associated with teaching and learning in their own classrooms (Hughes, 2005). Future research should investigate general teacher practices and the value beliefs that influence these practices. Since teachers tend to develop practices (Kagan, 1992; Richardson, 1996) based on their value beliefs, broadening our definitions of technology integration to more accurately represent practicing teachers’ value beliefs can lead to technology professional development that will transfer to the classroom.

We also need to consider how to move these teachers toward student-centered practices once their competence and confidence increase with these initial uses. While we congratulate these teachers for using technology to motivate their students, we believe this is just the first step. Hopefully, by beginning with technology professional development that aligns with their current value beliefs, we may be able to build their pedagogical approaches (and beliefs) to include more student-centered practices.
## Appendix. Description of observed lessons

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<th>Participant</th>
<th>Content</th>
<th>Technology environment</th>
<th>Summary</th>
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<tr>
<td>Adeline</td>
<td>6th Grade computer class</td>
<td>Computer lab Part 1&lt;br&gt;One desktop per student&lt;br&gt;Teacher computer&lt;br&gt;<strong>LCD projector</strong>&lt;br&gt;<strong>Time liner</strong>&lt;br&gt;Part 2&lt;br&gt;One desktop per student&lt;br&gt;<strong>Time liner</strong></td>
<td>Adeline introduced <strong>Timeliner</strong> software using her teacher computer and LCD projector. Students followed her as they created a mock timeline together, introducing key concepts of the software. Students then used the remainder of the time to construct a timeline of their own life. This was an assignment for another class.</td>
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<td>Carly</td>
<td>3rd Grade classroom</td>
<td>Part 1&lt;br&gt;<strong>Smart Board</strong>&lt;br&gt;<strong>PowerPoint</strong>&lt;br&gt;<strong>United Streaming</strong>&lt;br&gt;Part 2&lt;br&gt;Document Camera</td>
<td>Carly used the <strong>SmartBoard</strong> and a self-created PowerPoint presentation on orbits. The presentation included videos from United Streaming showing orbits. Cindy had students read along and fill-in blanks of the presentation. Then, students individually constructed an earth/moon/sun orbit from construction paper and wrote three sentences about orbits. Several students shared their three sentences with the class via the document camera.</td>
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<td>Jenn</td>
<td>1st Grade media class headings &amp; sub-headings</td>
<td>Part 1&lt;br&gt;Media center&lt;br&gt;<strong>Smart Board</strong>&lt;br&gt;<strong>Microsoft Word</strong>&lt;br&gt;Part 2&lt;br&gt;Computer lab&lt;br&gt;One desktop per student&lt;br&gt;Teacher computer&lt;br&gt;<strong>LCD projector</strong></td>
<td>Jenn introduced headings and sub-headings by using the context of students’ upcoming reports on frogs. In the Media Center, began with a review on headings and sub-headings, engaging students in discussions and asking review questions. Using a basic text file in Microsoft Word on a SmartBoard, students came up to the SmartBoard and changed the font size and style. After this demonstration, students moved to the computer lab and used Microsoft Word to type their names 3–5 times, changing the font based on the functions they talked about (size and style).</td>
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<td>Erin</td>
<td>3rd Grade classroom classifying literature genres</td>
<td>Computer lab Part 1&lt;br&gt;Teacher computer&lt;br&gt;<strong>LCD projector</strong>&lt;br&gt;<strong>Inspiration</strong>&lt;br&gt;Part 2&lt;br&gt;One desktop per student&lt;br&gt;<strong>Inspiration</strong></td>
<td>Prior to this lesson, Erin had already reviewed the main learning concepts and introduced the activity. In the computer lab, she reintroduced the activity and demonstrated the Inspiration by asking for help and direction from the students. After the demonstration, her students started creating their own Inspiration concept maps. Students had already written down the information they needed on a worksheet and used Inspiration to create a visual representation of their work.</td>
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<td>Lexy</td>
<td>3rd Grade enrichment activity 60 students</td>
<td>K-12 technology building Part 1&lt;br&gt;Teacher computer&lt;br&gt;<strong>LCD projector</strong>&lt;br&gt;<strong>Power Point</strong>&lt;br&gt;Part 2&lt;br&gt;Computer stations (small groups)&lt;br&gt;<strong>Kidspiration</strong>&lt;br&gt;Part 3&lt;br&gt;<strong>10 Alpha Smarts</strong>&lt;br&gt;<strong>Blog</strong></td>
<td>This activity was meant to prepare third grade students to write a compare/contrast argument in preparation for the annual (MEAP) standardized tests. At the beginning of the lesson Lexy engaged the students in a whole group instructional setting using a self-created Jeopardy PowerPoint to review recently learned content (culture, economy, and land of the Midwest and Southeast regions). After the game, students progressed through five different stations to develop a compare/contrast argument essay. Students used computers at two stations. At station two, they entered information about each region into a Kidspiration Venn diagram template. They also used technology in the fifth and final station, typing out their paragraph on an alpha smart and posting it to the center’s blog.</td>
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<td>Sharon</td>
<td>Kindergarten Media Class Butterfly Cycles</td>
<td>Media center Part 1&lt;br&gt;Teacher computer&lt;br&gt;<strong>LCD projector</strong>&lt;br&gt;Online videos&lt;br&gt;Part 2&lt;br&gt;One desktop per student&lt;br&gt;<strong>Online internet butterfly lifecycle game</strong>: KidPix</td>
<td>Sharon began by reading a book on the butterfly lifecycle to introduce the topic. She followed this with several online videos of caterpillars eating and spinning into their chrysalises, as well as videos of butterflies emerging from their chrysalises. Next, she demonstrated how to use an Internet browser and modeled their next individualized activity of completing a drill-and-practice Internet game where students arranged the butterfly lifecycle in order. After the demonstration, the students completed this activity with minimal help from the teacher and when finished, they drew pictures of butterflies using KidPix.</td>
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## Appendix (continued)

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<th>Participant</th>
<th>Content</th>
<th>Technology environment</th>
<th>Summary</th>
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<tr>
<td>Pollyanna</td>
<td>6th Grade computer class orphan trains</td>
<td>Computer Lab</td>
<td>Pollyanna used a self-created PowerPoint on Orphan Trains. She used her teacher computer and LCD projector to guide her lecture. Students followed along on their own computers with a student version of the PowerPoint presentation (which did not include links and sounds). After this presentation, students completed a worksheet on Orphan Trains using the Web Quest website Pollyanna had created that linked to various content sites.</td>
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<td>Maude</td>
<td>9th Grade math class central limit theorem</td>
<td>Computer lab</td>
<td>Maude had introduced the Central Limit Theorem concept to students the previous day. Using the teacher computer and LCD projector, she demonstrated an online simulation of the Central Limit Theorem. Students followed along on their own computers, experimenting with different means in order to visually see how numbers impacted the sample. After the demonstration, students individually experimented for 5 min. Next, students used a math program (Fathom) to create histograms and answer questions from their textbook. Maude briefly demonstrated how to use the software with this activity and then had students individually complete the activity.</td>
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## References


