

Using Drawings and Interviews to Diagram Entering Preservice Teachers' Preconceived Beliefs about Technology Integration

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Abstract: There is concern that colleges of education are not adequately preparing teachers to use technology in their classrooms. Programs find it hard to properly train preservice teachers for a variety of reasons, both structural and pedagogical. One reason is that students bring their prior beliefs about teaching with them into their preservice programs. In the past we lacked sufficient tools to uncover these entering beliefs. This study employs drawings and interviews to uncover preservice secondary teachers' prior beliefs and knowledge about the use of technology in teaching. These methods offer a counterpoint to quantitative approaches often used to study preservice teacher beliefs regarding technology. Our analysis of the data from preservice teacher interviews resulted in a diagram that illuminates incoming teachers' orientation toward their future technology-infused teaching. This study provides methodological guidance for examining and improving teachers' learning about technology integration.

Although there are numerous studies that focus on preservice teachers' beliefs concerning technology integration in the classroom (Becker, 2000; Wang, 2002; Albion 2001), there are few studies that focus on the prior beliefs that preservice teachers hold as they enter their teacher training programs. If we want to develop more effective methods for training teachers to use and integrate technology in their future classrooms, then we need to address this gap in our knowledge. Utilizing methods that Thomas & Pedersen (2003) and Haney, Russell & Bebell (2004) used in developing and collecting drawings, we asked preservice teachers to create an artifact (a classroom drawing) and participate in an interview (based on their drawing) in order to uncover their beliefs about technology integration and determine where their beliefs originate. We were then able to transform this data into an analytical diagram that allows for rapid identification of beliefs across groups of preservice teachers. In this paper, we focus on how the diagramming of each preservice teachers' prior beliefs helps to highlight his or her current position in relation to technology integration in their future classroom. In doing so, we will demonstrate how the combination of image and interview can be used to interpret a preservice teacher's preconceived beliefs concerning technology. Ultimately we hope this research will contribute to practices used to investigate preservice teachers' preconceived experiences and beliefs about technology integration in the classroom.

Theoretical Framework

A large gap exists between today's technology and teachers' ability to integrate technology into their everyday classrooms (Becker, 2000; Cuban, Kirkpatrick, & Peck 2001; Albion, 2001). There is concern among researchers that preservice education is not preparing educators to integrate technology into their classrooms (Doering, Hughes, & Huffman, 2003; Albion, 2001). Albion (2001) asserts that less than 25% of graduating teachers think they are adequately prepared to integrate computers into their classroom instruction. Why aren't teacher preparation programs able to sufficiently prepare teachers to integrate technology? Although there are numerous reasons why teachers are unprepared, one reason, which is often overlooked, is that teachers bring their prior beliefs about teaching with them into their teacher training programs. Because teacher candidates enter their teaching programs with years of schooling experience, often these prior experiences cloud what they are learning in their teacher training. It is well documented prior beliefs play a large role not only in how teachers teach in the classroom, but also in how they learn from their preservice courses (Pajares, 1992; Richardson, 1994; Britzman, 1991; Knowles, 1992; Holt-Reynolds, 1992). Even so, Richardson (1994) concludes that the experiences they have in the program and the way the teachers reflect on those experiences may alter their prior beliefs. In order to modify prior beliefs, it is helpful to know what they are and where they originate. There is consensus that preservice teachers' beliefs stem from a variety of personal experiences, often related to their own schooling (Bruner, 1996; Clandinin & Connelly, 1991; Holt-Reynolds, 1992; Kennedy, 1997; Rath, 2001). If personal experiences are where beliefs originate, then what exactly are these experiences and why do they play such a strong role in shaping what kind of teacher a person becomes? We take a qualitative approach to uncovering preservice teachers' prior experiences.

Thomas and Pedersen (2003) found, “unexplored entering beliefs may be responsible for the perpetuation of antiquated and ineffectual teaching practices” (p. 328). Some (Thomas & Pederson, 2003; Richardson, 1994) argue that teachers pick and choose what they will learn according to their beliefs. Goodman (1988) claimed that higher education classes might be more likely to reinforce teachers’ prior beliefs and experiences. Hence, if we do not know entering preservice teachers’ prior experience with technology, their teacher education courses may not effectively address their entering beliefs. This, in turn, could affect how they respond to different ideas in their preservice technology education.

It was important to select a methodological approach that would allow teachers’ prior beliefs and experiences to emerge. Vygotsky (1978) pointed out that drawings can be a vital way for children to create stories and demonstrate a particular way of knowing. According to Kendrick & McKay (2002), drawings are more than simply pictures on a page; they can denote the beliefs and experiences of a person’s culture and possibly their future actions. Haney et al. (2004) explain that drawings in educational research have largely been overlooked as a data tool, as they can provide rich qualitative data when collected and analyzed. There have been only a limited number of educational studies that have analyzed drawings by their participants to uncover beliefs and experiences about a particular issue, and for the small number of studies that have used drawings, few have examined preservice teachers’ beliefs (Thomas & Peterson 2003, Piscitelli & Andreson 2001, Kendrick & McKay 2002).

In this study, entering preservice teachers were asked to draw their ideal future classroom (including any technology they might utilize). These drawings reflect entering teachers’ prior beliefs and experiences in regard to integrating technology tools into their future classroom. Individual interviews conducted about the drawings highlighted the teachers’ own thoughts regarding classroom instruction and the role that technology might play. The interviews result in a diagram, which depicts each preservice teacher’s entering orientation in relation to technology.

Methods

Setting

The data for this study was collected in summer 2004 from 45 beginning preservice secondary teachers enrolled in a graduate level technology education course at a mid-western research university. These preservice teachers were part of a 2004-2005 secondary post-baccalaureate certification program. Like many such programs, the students received their undergraduate degrees in areas other than education. The 45 preservice teachers’ specializations included social studies, mathematics, science, English, physical education, and foreign languages.

The Data Collection and Analyses

We began the study on the first day of the preservice teachers’ technology education class. The objective of the data collection was to allow preservice teachers to reflect upon their past experiences with technology. We asked all 45 of the preservice teachers to complete a qualitative instrument with three parts, resulting in three separate artifacts. At the beginning of the instrument each student was asked, “*what term best describes your level of experience with technology?*” They were given choices of “*none*,” “*very little*,” “*some*,” or “*a great deal*”. In the first part of the instrument, the students developed a list of technology that they would like to have in their ideal classroom. The second part of the instrument asked them to draw a picture of their ideal classroom, including all of the items from their technology list. Finally, each student wrote a vignette describing his or her past technology experiences.

For the initial data analysis, we grouped the participants along two dimensions. The first was by subject area, and the second was by their stated level of technology experience. We used inductive content analysis to analyze the qualitative instruments along both dimensions. From the findings and subject grouping, we selected a purposive sample (Weiss, 1994) of 11 preservice teachers to participate in extended interviews probing prior technology experiences and how they relate to the artifacts developed (focusing mostly on their drawings). The selected sample was designed to highlight variation by: subject content area, self-identified comfort with technology, and age. The selected sample ranged in age from 22 years to 47 years. There were 6 females and 5 males. The preservice teachers’ content areas included: 3 social studies, 2 science, 2 mathematics, and 4 English. Of the 11 preservice teachers, 4 of them claimed to have “*a great deal*” of comfort and experience with using technology, 4 of them claimed to have “*some*” comfort and experience with using technology, and 3 of them

claimed to have “very little” comfort and experience with using technology. Below are two drawings from the sample (See Figure 1).

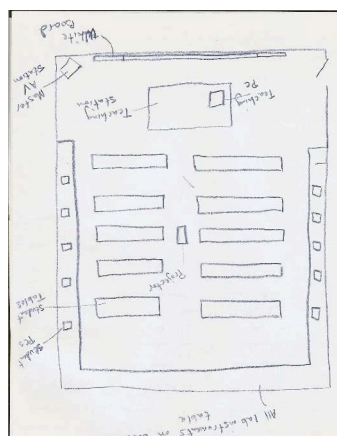
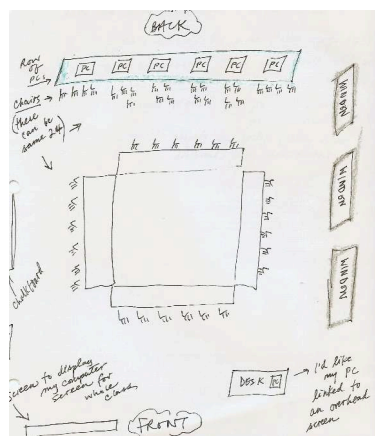


Figure 1: Drawing from preservice teacher #1



Drawing from preservice teacher #23

By using the drawings as the focus for the interview we were able to elicit each preservice teacher’s preconceived beliefs concerning technology in the classroom. This was done by asking the preservice teacher to give the interviewer a tour of his or her drawing; explaining why they selected particular items for their classroom.

In order to analyze their interviews, the research question became *How do preservice teachers self-identify their orientation in relation to technology?* All 11 interviews were transcribed and then analyzed using inductive content analysis (Strauss & Corbin, 1998), looking for categories of technology orientation. Technology orientation was defined as: *how a preservice teacher self-identifies with digital technology in their past, present, and future classroom instruction.* The interviews were emically coded and categories emerged from the data that pertained to the 11 preservice teachers’ orientations to technology. Thus, we discovered that these preservice teachers did not have just one orientation to technology but rather, five dimensions of orientation emerged in the data. The dimensions were:

1. Beliefs about integrating digital technology into classroom instruction,
2. Interest in integrating digital technology into classroom instruction,
3. Comfort with using digital technology resources,
4. Prior experiences with using and/or observing technology,
5. Interest in learning more about technology resources.

We will elaborate on each orientation dimension. The first dimension concerns the preservice teacher’s beliefs about integrating digital technology into general classroom instruction. This category includes any comment the preservice teacher made concerning their general beliefs about if and how technology should be integrated into the k-12 classroom. It does not include their interest in integrating, just their beliefs about integrating. Below is an example from the interviews of a “belief” comment:

Interview #23:

- 1 Just because I feel like kids can learn a lot and get really,
- 2 you know,
- 3 get ahead if they know even basic things like typing and searching,
- 4 there is so much stuff you can find so easily,
- 5 if you just know how to look for it.

The second dimension concerns the preservice teacher’s interest in integrating digital technology into their future classroom instruction. This dimension focuses on the preservice teacher’s own interest in integrating technology in their future classroom (not just a general belief that technology is or is not useful in k-12 teaching and learning). Below are a few examples from the interviews of “interest” comments:

Interview #1:

- 1 I do think that more and more I probably will be using technology in my classroom.
- 2 I feel that especially in the math and science side of things schools are realizing more how helpful they can be,
- 3 so because of that I think that I will be using it quit a bit
- 4 and that districts will start to have math and science teachers use technology a lot more,
- 5 maybe more then in other subject areas,
- 6 but because of the subject area I think that I will be using it.

The third dimension is the preservice teacher's comfort with using digital technology resources. The comments in this dimension refer to the preservice teacher's ease of use with technology tools, and their perception of the how skillful they are in using them. Below are a few examples from the interviews of "comfort" comments:

Interview #22:

- 1 I think I said very little because I feel like I do not know how to operate it.
- 2 I might know about it,
- 3 I might have seen it,
- 4 I might have even watched somebody else use it.
- 5 But a lot of times,
- 6 like the VCR for example, I can put a tape in, but don't ask me to set the
- 7 clock or anything.
- 8 I did not want to say none
- 9 because at the same time I have done simple things.
- 10 The computer for me for a long time was a glorified word processor.
- 11 That's all.
- 12 So I do have some experience,
- 13 but I feel comfortable calling it very little.

The fourth dimension is the preservice teacher's prior experiences with using and/or observing technology. This is an incredibly important category because it focuses on any experiences (active or passive) that the preservice teachers had before entering their teacher-training program. Below are a few examples from the interviews of "prior" comments:

Interview #8:

- 1 And then through my seminars in my undergrad I had to do PowerPoint
- 2 presentations.
- 3 And so I did two nine-minute and one twenty-five minute PowerPoint
- 4 presentations.
- 5 And so just learning how to create those
- 6 and then you know
- 7 the different quick tricks I guess
- 8 about giving PowerPoint presentations
- 9 and how many slides to have
- 10 and how much information to have on them.

The last dimension is the preservice teacher's interest in learning more about technology resources. This dimension focuses on the future. We look for comments where the preservice teacher shows interest or lack of interest in learning more about technology resources and new technology skills. Below are a few examples from the interviews of "learning more" comments:

Interview #1:

- 1 I'd like to learn,
- 2 I've actually started to learn a lot of it on my own,
- 3 but this is just really for my own personal I guess,
- 4 but just some more stuff with the um film industry and stuff.
- 5 Just video editing,
- 6 I had some close friends that are in the industry and stuff,

7 I've been learning things gradually
 8 but because of time constraints,
 9 I have not really been able to get into it that much
 10 and its one area of technology I'd like to learn more just because it is one of my more weaker sides.

Findings

Once the interviews were coded and the dimensions of orientation were identified, we utilized some ideas from the Jones & McEwen's (2000) conceptual model of *Multiple Dimensions of Identity*, to construct a diagram of preservice teachers' multiple dimensions of orientation to technology. Each of the 11 interviews were coded according to the five dimensions of orientation, and those dimensions were plotted into a diagram to represent how each preservice teacher self-identifies their orientation to technology (see Figure 2). The center of the diagram represents neutral beliefs/experiences. The right side represents beliefs/experiences that are positive in relationship to technology. The left side represents beliefs/experiences that are negative in relationship to technology. The three zones (neutral, some emotion, strong emotion) represent how weakly or strongly the belief/experience was conveyed in the interview. Each colored line represents one of the five dimensions that emerged in the data. Each tiny hollow circle represents a comment that this preservice teacher made during their interview that pertains to their beliefs, experiences, or knowledge about technology.

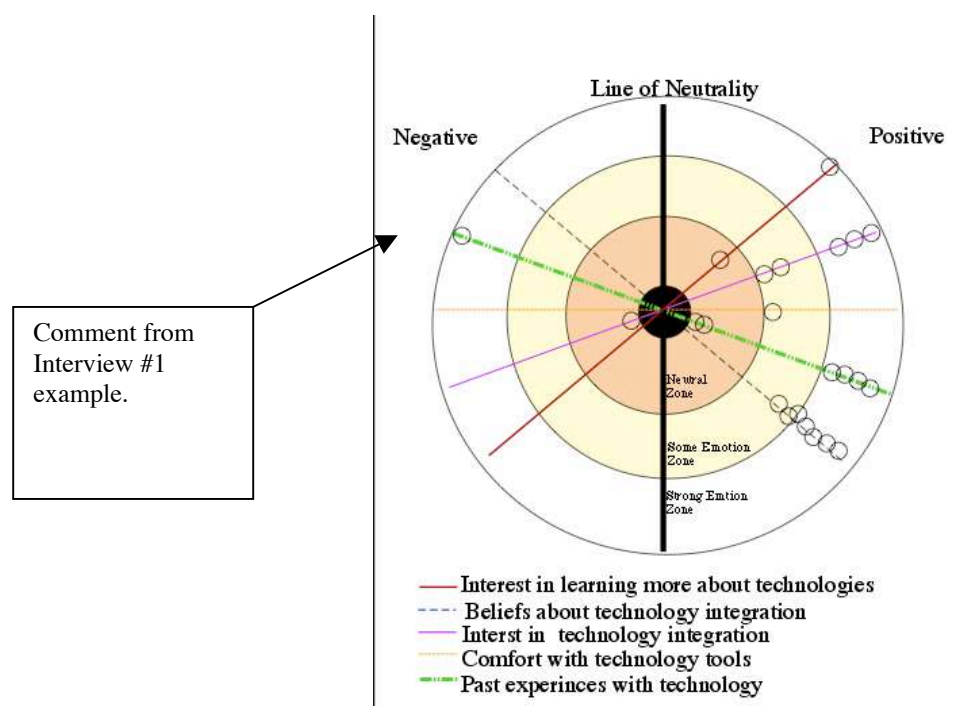


Figure 2: A preservice teacher's self-identified orientation to technology.

Each preservice teacher's interview was plotted into a diagram, which ultimately represented that preservice teacher's orientation to technology prior to beginning his or her preservice education. Each tiny circle on a line in the diagram represents a comment that was made in that particular preservice teacher's interview pertaining to one of the five dimensions. Figure A is an example of one preservice teacher's interview. We will demonstrate how each circle in the diagram represents a comment. For example in Figure 2 this particular preservice teacher had one very strong emotional negative comment about a past experience with technology, here is that particular comment:

Interview #1

1 I realized how difficult technology could be
 2 um I think
 3 that is when I really learned that I had struggles with technology
 4 of course being on computers all through life,

- 5 just how many different things could go wrong for random reasons
- 6 that you can't always know,
- 7 and um and so
- 8 that is kinda what I think on the negative side of technology.

This particular comment was plotted on the dashed line at the far left (negative, strong emotion) of Figure 2. Diagramming the interviews is useful because, by looking each diagram, we can determine each preservice teacher's general orientation to technology. For example the preservice teacher in Figure 2, has a positive outlook on technology, positive past experiences, and positive beliefs about how he or she might integrate technology into his or her future classroom.

Discussion

Compared to quantitative studies, our diagrams give us a unique perspective on preservice teachers' entering beliefs and experiences with technology. Developing the diagrams is an emic process, where the beliefs and experiences emerged in the interview, rather than the etic process of many surveys. Thus, the diagrams are a representation of the strength of the preservice beliefs and stories from their interviews. Although it is time consuming to develop the diagrams, we do not believe that it is necessary to diagram every preservice teachers' orientation. Rather, if we can develop a range or spectrum of technology orientations diagrams that preservice teachers hold, we could develop various methods in teacher training courses to address the range of orientations. Also, we could analyze the range of orientations by secondary subject area, and look for any similarities that may emerge amongst entering preservice teachers of certain subject specialties. For example if we knew that most entering math teachers had a certain apprehension over integrating technology, we could begin to develop methods to address this apprehension in their teacher training courses. Consequently, it is important to conduct further research in order to develop a spectrum of orientations. Through this spectrum, it is essential to create preservice activities that will directly confront their beliefs, not just once, but throughout their preservice coursework in hopes of changing certain preconceived beliefs.

Conclusion

Thomas & Pederson (2003) argued that unexplored entering beliefs could be responsible for the continuation of ineffectual teaching practices with technology. Our study may be a plausible beginning to developing methods to understand and confront entering beliefs about technology integration. Although the diagrams do not tell us exactly what their prior experiences are, they do give us a visual model of how each preservice teacher currently views technology integration in the classroom and the strength of those views. At this point, it is important to continue to uncover different diagrams of orientation for secondary students in various content areas. This is the first step in a longer process, which is to ultimately improve preservice technology education, by better addressing the entering beliefs and experiences concerning technology integration that the preservice teacher's hold. Consequently, this study may also be significant to other areas of education besides technology education, where researchers are searching for methods to gather preconceived beliefs.

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