Abstract

Development of preservice teachers emphasizes the content and pedagogical knowledge of instruction and an understanding of the decision making processes of teachers. This knowledge develops voice in the educational world they are entering. This research examines preservice teachers’ awareness of their literacy autobiography and the experience of struggling with technology to understand themselves as strategic problem solvers. The study has three components: the writing process to develop a literacy autobiography, developing technologically challenging digital storytelling, and examining connections between the literacy autobiography and technology production on views of themselves as strategic problem solvers. Results of the study indicate that writing literacy autobiographies and designing a digital storytelling supported a sense of teachers as strategic problem solvers.

Intellectual development is a journey requiring effort, it is not an inherent gift one does or does not possess. One chooses whether to embark on the journey and applies one’s intelligence, among other personal qualities, to the journeying (Hill, 2000).

Schools of education are working to prepare preservice teachers to take leadership roles in the intellectual journey toward building better schools. Strategic problem solvers who understand their own decision making processes are needed to proceed with this journey. There are contrasting forces at work in many schools that struggle for control of decision making processes as administrators search for the silver bullet in literacy instruction. The first move is driven by the focus of a cover the material mentality to drive test scores higher (Reeves, 2004). In this approach materials and programs are handed to teachers with all decision making provided about what to do and how to do it. The message is to simply apply the lessons and learning will occur. Of course this does not happen and students continue to struggle to learn to read and teachers are frustrated as one more program comes and goes with immense amounts of time and energy spent. What’s missing in this quick fix approach is the role of teacher as strategic problem solver (Wold, 2003) focused on implementation of instruction’s best practices. The second force is also driven by the need for high achievement, but the focus is on diagnostic teaching that relies on the teacher’s knowledge base and ability to be critically reflective in order to make strategic decisions in instruction (Brookfield, 1995). Lyons and Pinnell (2001) point out teachers as strategic problem solvers see each new step in instruction as a journey of intellectual development better informing their decision making. Both approaches have the goal of students as successful, high achieving readers, writers and thinkers. They are very different, however, and developed around very different philosophies of the teacher’s role.

This study examines preservice teachers’ changing views of themselves as readers, writers and strategic problem solvers as they write their literacy autobiographies and struggle
with the technology product of digital storytelling. With the intent of focusing on the awareness of themselves as teachers who are strategic problem solvers, this research is grounded in inquiry of the role of teacher autobiography in developing self-awareness, the role of strategic thinking and of teacher as problem solver. This study introduces a framework developed by the author to articulate personal levels of learning required to be a strategic problem solver.

Frameworks for Understanding

Literacy Autobiography

The research on preservice teachers’ awareness and exploration of their autobiography as consumers of literacy clearly demonstrates that this is a positive move in analyzing their beliefs (Pinar, 1986). Preservice teachers’ prior experiences affect the way they approach new situations as teachers (Posner, Strike, Hewson, and Gertzog, 1982) and exploring their life experience promotes a deeper understanding of how perception impacts their role in the classroom (Woods, 1987.) Individuals’ self-beliefs about personal capabilities are also critical elements in the decision making processes (Bandura, 1989). What happens, however, when these beliefs stay buried under layers of either positive or negative school experiences? It is the premise of this researcher that mining for those self-beliefs about literacy capabilities and experiences that will impact actions begins with a combination of metacognitive reflection about self and a thorough understanding of one’s individual literacy history. This metacognitive process forms the foundation for strategic thinking and problem solving.

Strategic Thinking

Constance Weaver (1998) explains strategic thinking as the purposeful thinking through of the problem, the data, the skills, and the solutions. She particularly focuses on plans for carrying out the mental processes of reading, but in this study the process is extended beyond the area of literacy. Strategic thinking is a conscious invitation to growth and a time to develop personal control and empowerment (Harst & Leland, 1998). The goal is to prepare reflective teachers who think strategically in order to determine student and even program needs and who use methods and materials effectively to meet those needs (Daniels and Bizar, 2005). However, the ability to take on the role of articulating the focus of such literacy program, the ability to demand that neither materials (basals for example) nor organizational structures (prepackaged programs for example) but teachers be the determiner of needs demands a professional who has not only a strong knowledge base but also a strong understanding of self and strategic problem solving.

The notion of strategic thinking has been explained as awareness of the process of thinking (Dowhower, 1999), as being purposeful and independent (Routman, 2000) and that the learner must not only knowing but know that they know (Butler, 1990). Alexander and Jetton (2000) refer to reading strategies as specialized sets of mental procedures that readers use to facilitate their understanding of text. Using these ideas to explain strategies to preservice teachers, this researcher refers to the strategies used by readers and writers as “invisible mental processes” since they are not immediately visible to teachers new to this notion of mental
procedures. This definition of strategies as invisible mental processes is used here as a foundation piece in understanding the role of developing awareness of problem solving skills.

*Strategic Problem Solving*

The personal history of learning to be a literacy problem solver is lost to time for most teacher candidates. Pre-service teachers possess the automaticity of strategies needed to read and write so recalling their own literacy beginnings does not necessitate their understanding the mental processes involved. Developing awareness of the steps of mental processes and problem solving is then recaptured by tackling a novel, unpredictable, and potentially stressful project (digital storytelling) and achieving a level of success (Schunk, 1984; Sousa, 1995). Strategic thinking is promoted and discussed as candidates develop this complex product with the hope of developing awareness of problem solving.

As a step in understanding this model of connecting strategic thinking and problem solving it is helpful to examine this framework in another common area. Everyone uses strategies to accomplish everyday problem solving tasks such as driving a car. Strategies are also used for specialized tasks such as surgery, defending a client, and teaching students. There are levels or stages of problem solving prowess (see Figure 1) that are determined by understanding of self, knowledge of procedures, and awareness of strategies.

Driving a car is a problem solving act. A novice driver understands the basics of starting the car, the rules of the road, ways to stop the car, and how to avoid collisions. A more experienced driver senses the right behaviors, learns how to be alert to problems, and usually avoids accidents even though the efforts may not be conscious. Most drivers have found themselves daydreaming as they proceed on a well-traveled route to work, yet arrive safely. The highly experienced driver is more strategic and understands the complexities of driving, how to react on icy roads, and multiple ways to correctly and quickly react to critical situations. Whether this driver makes decisions consciously or unconsciously determines the level of strategic problem solving involved. The ultimate might be winning Nascar drivers who know how to drive and problem solve strategically in order to be successful. They know and they know that they know and can be strategic problem solvers.

This understanding and awareness of strategies and self are supported by reflection. This model of strategic problem solver built on the awareness of strategies and self explains how students and teachers become stronger problem solvers. Using this model one can discuss novice teachers’ growth along a continuum of seeing themselves as problem solvers. Novice teachers often have the “rules of the road” when they enter their first classroom. They have a beginning knowledge of classroom organizational structures, some experience with classroom management tools, knowledge of content, processes that have been modeled and experienced, and products they have seen, read about or created themselves. More experienced teachers do good things for students, often because it intuitively feels right. However, the decision making may not be consciously focused. The teacher may be caring, intuitive to student needs, and make good decisions but the response to “why” might be, “It was just the right thing to do.”
Teachers make decisions based on a variety of factors, but they are strategic problem solvers if they are aware of the knowledge, skills, attitudes, background, and issues involved and can articulate them. Conscious awareness allows teacher to analyze actions and to use strategic problem solving with instructional decisions (Lyons, 2003). The quickness and correctness of the response may be based on experience and time, but the process is based on awareness of the role of strategic problem solving. The willingness to articulate those processes and beliefs may be based on personal self efficacy. The ultimate example might be a Master Teacher who can make decisions based on the ongoing assessment of student behaviors and can discuss the why’s of the decisions with others so that they are replicable in a positive way.

Figure 1: Problem Solving Taxonomy

![Problem Solving Taxonomy](image)

Study Design

Overview of Study

In an effort to break away from the apprenticeship of observation model (Lortie, 1975) where past practices are simply repeated to a model of reflection in action (Schon, 1983) Early Childhood Education preservice teachers produce a literacy autobiography in digital storytelling form during their writing methods course. This technology product is new to each of the preservice teachers and serves as an opportunity to experience the struggle of new learning and focus on writing skills. The goal of this exploration is for participants to move toward becoming
strategic thinkers and problem solvers. This would then open the pathway to discussing the role of strategic thinking and problem solving in teaching literacy to young children.

**Participants**

This midsized state university in the Midwest is most often attended by candidates whose parents’ homes are relatively close to campus although approximately 50% live in campus or off campus housing. The study involves one hundred-four pre-service Early Childhood Educational candidates including ninety-five females and nine males. Writing entrance scores on the Praxis I test for this group of students range from average to slightly below average with most scores ranging from 173 (minimum for entrance to the program) to 176. Two students’ scores are below 173 and require specific support requirements and one student score is 180. Reading scores are just slightly higher than writing scores. These teacher candidates are in their final placement and two quarters from graduation. The 4.5 quarter hour course meets once a week for three hours and forty-five minutes. The participants have worked with the researcher during the previous quarter in a reading methods course.

**Methods**

This study took place over three quarter periods from January through December. Candidates who participated in the study were a part of two literacy methods courses. The first set of participants was involved in the Winter and Spring terms consecutively. The second set of participants was involved in the Spring and Fall quarters consecutively. The first quarter course is Reading Methods and Materials. The second quarter course is Writing Methods and Materials. The initial survey of attitudes toward literacy takes place during the beginning of the first quarter and is repeated at the end of the second quarter. Additional information is gathered through in-class reflective journal entries, personal student feedback, WebCT electronic responses, in-class comments and discussions, class exit cards, individual interviews, and end of course final anonymous reflections on the process and the product.

Qualitative data was collected through written responses in and out of class to allow for immediate responses and for those that developed with reflection after class events. These comments were first categorized by positive and negative toward the experiences, toward learning in general, toward learning about the processes of reading and writing, and toward learning about the processes of teaching reading and writing. These were then categorized again by comments that demonstrated awareness of the levels of problem solving (see Figure 1). These findings were used to lead discussions in the post course interview and to design the end of course survey on the experience.

**Study Phases**

The first phase of the study occurs at the beginning of the Reading Methods course as students fill out a survey of their perceptions of themselves as readers and writers. This information is discussed in class and the data is kept for later use. In the Reading Methods course students are introduced to the concept of reading strategies and strategic thinking and problem solving. The idea of teacher as problem solver is discussed.
The second phase of the study occurs during the Writing Methods course and focuses on the writing of a personal literacy autobiography. Students are guided through the writing of literacy autobiographies over the ten-week quarter. The process moves from modeling, revising, storyboard development, and to production of a final copy. In-class minilessons model the craft of writing, using engaging leads, strong endings, title options, voice in writing, and the use of descriptive language. Students each take part in the minilessons and are expected to try their hand at revising their writing. Evidence about student impressions of the processes is gathered through submission of autobiography drafts, individual reflections on WebCT, in class reflections and discussions and class exit cards.

The third phase of the study focuses on the development of the digital storytelling to be presented to the class the last day of the quarter. Digital storytelling is a new technology tool for all students in this study. Product development is supported by a technology faculty member who makes in-class visits to introduces the process, models open source sites for music and visuals, and provides assistance in problem solving the glitches of working on a challenging technology product. Students are encouraged to visit the university technology support system which they are aware of from other coursework. Throughout the quarter several students who are highly interested in technology become sources of support for others. Evidence is gathered on this part of the study through an anonymous survey at the end of the course, through in class discussions, and WebCT written reflections.

The fourth phase of the study includes gathering documentation about candidates’ views of themselves as readers and writers, the impact of understanding their literacy autobiography on their role as teachers and candidates’ views of themselves as strategic thinkers and problems solvers. Data is gathered about this part of the experience through an end of quarter survey, written reflections and post quarter personal interviews.

Findings

Perceptions and Reflections of Literacy Selves

The first part of this study was to document candidates’ perceptions of themselves as readers and writers. As part of understanding themselves as literacy consumers and to better understand their literacy selves, candidates were given the same survey before and after taking the two quarters of literacy classes and working through the autobiography and digital storytelling project. The survey asks if they see themselves as readers and writers. Before the twin quarters 50% saw themselves as readers and writers. However, 40% saw themselves as either non-readers or non-writers and 10% saw themselves as both non-readers and non-writers. At the end of the twin quarters 89% saw themselves as readers and writers. Only 10% saw themselves as either a non-reader or a non-writer and only 1% said they are still a non-reader and a non-writer.

The group as a whole was originally unsure how students learned to read other than sounding out words and learning letter sounds. As candidates wrote about themselves as literacy learners in their literacy autobiographies, however, they dug into memory boxes from home, interviewed parents, siblings, and friends and filled in many of their missing gaps with
information and recalled memories. An often stated comment from candidates was, “I had forgotten all about that until now.” Their recollections led them to discussion about how they learned to read and write, successes and struggles, a great deal of empathy for each other, and a sense that they had learned a lot about how to approach the teaching of reading and writing in learner centered ways and were indeed becoming problem solvers through building their knowledge base.

Candidates’ recollections of the forces that helped shape their skills and attitudes about literacy were varied. Most stated that they did not remember how they learned to read exactly, but with some probing the majority stated that they began to learn to read and write at home with their parents. There were those, however, who came from environments where literacy was not a priority. This was an epiphany for some candidates. One candidate wrote, “I had no idea that Susan (pseudonym) came from a family like that. I thought that only poor and uneducated families did that (put down reading and writing as a waste of time.) She’s so successful. It really opened my eyes to possibility.” School experiences and particular teachers were also mentioned by almost everyone-some were positive and some were negative. These shared experiences also had a profound effect on the group. “I never want to be that teacher who puts a student down or tells someone they ‘can’t do it.’…I’ve seen what a lasting effect that has on people.” This comment and similar ones were made by several candidates after they viewed the digital stories. One candidate expressed what others also said, “What helped me learn is what will help my students learn. This experience has expanded my understanding of the processes of literacy. I will use this information and these tools.” One candidate told how the focus on strategic thinking and the project affected her current work, “I’m finding that I’m reading better now that I’m aware of my own processes. I’ve always had trouble with comprehension. I’m improving. I’ll share this with children.”

Candidates’ anonymous comments were varied but mostly positive regarding this process. At the end of the project they all stated that they felt very proud of their efforts although several said that they planned to continue revising--it wasn’t quite right yet--the sign of a true writer. Janice wrote, “I wish I had learned this process long ago. It has changed my mind about writing and teaching writing.” Another candidate said, “It was powerful to see my ideas develop, grow, change as I went through the process.” A recurring theme was the initial assumed lack of need for the writing process. “Experience has taught me that I don’t need the process of revision and problem solving. I write the night before and get A’s. No one has ever shown me the value of the process before.” One candidate focused on an additional value. “The greatest difference is that the emphasis was on the process not only the product. That makes a huge difference.”

Using Problem Solving Skills to Learn

The second part of the study focused on the impact of developing the technologically challenging digital autobiography on candidates’ understanding of themselves as strategic problem solvers. Candidates’ comments on the technology product have been mixed over the two quarters as the teaching of the technology itself is being refined. Initially a great deal of freedom and lack of organizational structure in the design and delivery proved very frustrating for candidates. That delivery has moved to a more guided scaffolding process with positive results in candidates’ feelings of success. Although no direct connection to strategic thinking and
Defining Literacy Self Images

Problem solving was stated in reflective comments, many candidates referenced themselves as problem solvers and the role of support in their attaining success.

Some candidates loved the challenge and wrote, “It was fun and exciting. I had never done this. Hard, but I did it with some help. I felt very proud.” A candidate from the first group returned to tell me that, “Now that some time has passed I see some possibilities for this. I just couldn’t see making second graders cry over doing this—and believe me I cried. Sometimes you have to walk away to really see things.” Feelings of accomplishment were shared, “I had no idea I could do this, but I did. It helped to have it broken down into parts and pieces and to have so much help. I guess learning to read and write is like that. Is that why you had us do this project? Crafty!” A less enthusiastic candidate wrote, “It was so hard for me to work on this project, feel like I had no idea what I was doing and then not have it work in class. I don’t think I’ll ever use it.” For some there were benefits outside of just this experience. “I’ve learned a new way of presenting information. I’m going to make gifts with this for my mom—she already cried when she saw this one. I hope I can make my students get this excited about learning.” Another recurring comment was the focus on a product with a true purpose that they can see using in their futures as teachers. Several candidates wrote, “There was an authentic purpose. That was important.”

Strategic Thinking and Problem Solving

The third part of the study was to look for candidate connections between the development of their literacy autobiography in the digital storytelling format and the way they see themselves as strategic problem solvers. Candidates overwhelmingly saw clear connections. All but two responses on exit reflections showed some kind of link between the experiences and personal understanding about problem solving in literacy instruction. Connections between problem solving and personal self-efficacy were strongest in the comments about the digital storytelling. Jonothan wrote, “I found I had to really think things through in doing this project—step by step I had to be the problem solver. Each time I worked through something I knew more and felt stronger. Learning anything goes through the same process, doesn’t it?”

Candidates’ comments on the writing process also focused on the process of problem solving and strategic thinking. Candidates constructed prewriting and an initial draft with the assumption (shared much later) that they were finished. Through the in-class minilessons the craft of writing was discussed, modeled, and used with their draft copy. Although the choice was always theirs whether to revise or not, everyone’s autobiography went through major alterations. Many changed totally from beginning to end product. This process accomplished two purposes; candidates experienced a writing process to use in their own classrooms, and they were forced to think strategically and to problem solve with each mini-lesson.

There were numerous comments about the impact of strategic problem solving on the teacher’s role as supporter and nurturer in the classroom setting for all students. One candidate stated, “I understand myself better. I have a better understanding of my own experiences and their impact on me as a learner. Activities and assignments that put us back in the shoes of children learning to read and write are really valuable. We’ve forgotten what it’s like to learn HOW to do this stuff.” The impact on the candidates sense of responsibility seemed to be
highlighted as many commented about the complexity of teaching young children how to read and write. Mary Beth stated, “I’m overwhelmed with the immense task of teaching someone how to read and write. I learned how to read so easily, but now I realize everyone didn’t have my experience and it has affected how they feel about literacy. I don’t want to turn anyone off of reading and writing.”

Comments and connections were positive about the relationship between the experience with this project and their understanding of the role of teachers as literacy guides and strategic problem solvers. Candidates in post course interviews designated their own perception of their personal level of problem solving as a teacher of reading and writing using the Problem Solving Taxonomy shown earlier. A clear majority, 72% interviewed, see themselves as Consciously Unknowing. A majority of the statements focused on the notion that they’ve learned a lot but have a long ways to go and they know it. Another 25% see themselves as between Consciously Unknowing and Consciously Knowing. These candidates feel that they are beginning to problem solve at a simple level in their current field experiences but have not yet developed the confidence to go it alone. A confident 3% stated that they are at the Problem Solving level as they see children’s behaviors and have an understanding of how to begin to intervene for them. These levels are self reporting based on personal perceptions, not on performance so are open to criticism. However, they make a positive statement about the candidates’ belief in themselves, their belief about their abilities to problem solve, and their sense of self-efficacy. Janine said, “My teachers at my placement talk about assessments, about tools for intervention, and about skills and I can join in the conversations in an understanding way. I feel like a true professional. Just beginning I know, but a true professional.”

Educational Importance

Novice teachers’ first years in a classroom often place them in the role of sole decision maker in the design and implementation of the classroom physical and instructional environment. Their decisions are expected to result in positive student achievement. Schools rely on the notion that novice teachers are ready to go from the start or at least ready to go with a minimum amount of support and instruction. These new teachers listen to what the “rules” dictate and then they do what most often their experienced colleagues do—they follow what they feel is personally best (Routman, 1996). Their knowledge base is put into immediate use and they rely on their own experiences as a student, the methods and materials of their mentor, or the knowledge and experiences of their teacher training programs (Zmuda, Kuklis, & Kline, 2004). The teacher’s explicit understanding of strategic problem solving helps to determine the role each of those influences will play in the classroom instructional decisions (Schlechty, 2001).

The goal then should be to nurture the novice teachers’ positive sense of self so their feelings of self-efficacy are strengthened and they can better understand their role as strategic problem solver (Lyon, 2003) so that they “know that they know” and have the self efficacy to explain their beliefs. If candidates understand the impact of strategic thinking on problem solving they have the potential to analyze situations, use deep knowledge to make decisions, and explain their reasoning to others (Gillet, Temple, & Crawford 2004).
The struggle for teachers’ right to be strategic problem solvers relies to a great deal on today’s pre-service teacher candidates—tomorrow’s classroom teachers. It is imperative that these candidates enter the profession understanding their literacy history, how they used problem solving to become readers and writers, and the role their past will play on future literacy instruction. Teachers who believe that learning to read and write “just mysteriously happens” with clever activities will in turn deliver such inadequate programs. The history of practice will prevail. The strategic instruction needed by students who can be problem solvers is lost when new teachers do not understand the complexities of strategic literacy instruction. This study uses the writing process and introduces digital storytelling as a technology tool for pre-service teacher candidate reflection on how they learned to read and write, their vision of themselves as readers and writers, the complexity of the problem solving process, and thus the strategic decisions they will be called upon to make for their students in a best practices literacy program.

Literacy teachers of tomorrow must be strategic problem solvers who not only know but they know that they know. They must have the strong self efficacy to affirm their beliefs and articulate what they know to be best practices in the teaching of literacy. This level of understanding allows teachers to make the critical literacy decisions in the classroom. This researcher believes that reflection on self promotes development of that understanding. Additionally, a strong sense of self as problem solver is needed in order to counterbalance the demands of top down decision makers who are mandating standardized and homogenized literacy instruction. By combining the highly engaging tools of technology with the process of exploration of literacy histories pre-service teacher candidates can build this sense of self and a strong self-efficacy as problem solvers of the future. Writing and technology production to develop self awareness using problem solving and reflective practice is the focus of this paper.
References


