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The Role of Epistemological Beliefs in Preservice Teachers' Interpretation of Video Cases of Early-Grade Literacy Instruction

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This study investigated how preservice teachers' beliefs about the nature of knowledge influence how they learn from, and interact with, a case-based hypermedia system designed to highlight exemplary elementary literacy instruction. Specifically, we examined if teacher preparation students' epistemological beliefs influenced what cases they selected, and how it further served as a lens in their reflective writing about their clip selections. The quantitative and qualitative analyses (case studies) focused on two epistemological beliefs—Fixed Ability and Simple Knowledge. The results illustrate that preservice teachers select video cases consistent with their prior epistemological beliefs, and their descriptions of what they find salient about those cases confirm their prior held beliefs. The findings from this study add to the theoretical literature and suggest future directions for research.

"*When the only tool you own is a hammer, every problem begins to resemble a nail.*"
– Abraham Maslow

Teacher educators are confronted with the challenge of creating meaningful learning experiences to help prospective teachers develop into knowledgeable, reflective, skillful, and effective practitioners. This task is difficult

for several reasons. First, preservice teachers need to build up knowledge systems that are fundamental to teaching, including knowledge of student thinking and learning, and knowledge of subject matter (Shulman, 1986, 1987). Second, teaching is dependent upon highly flexible access to organized systems of knowledge (Putnam & Borko, 2000). Third, research suggests that teacher candidates bring their own beliefs and attitudes, which influences what they learn from teacher education programs (Ball, 1988; Bird, 1991; Hollingsworth, 1989; Holt-Reynolds, 1992; Weinstein, 1990). Furthermore, preservice teachers must learn to use their knowledge and make decisions in a complex, ill-structured, dynamic environment (Leinhardt & Greeno, 1986; Spiro, Coulson, Feltovich, & Anderson, 1988).

There are no easy solutions to these challenges. One suggestion has been to use cases as a means of situating knowledge acquisition, organization, and application in the complex, ill-structured contexts afforded by the authentic problems of actual teaching practice. This study investigated how one factor, epistemological beliefs may play a role in how students interact with, and perceive cases in a case-based hypermedia environment. To provide background for the study, we briefly describe the rationale for case-based approaches, and review the literature on teacher beliefs, and epistemological beliefs.

Case-Based Approaches

Cases require teachers to learn theories and analyze scenarios in actual classroom contexts, addressing the need to have preservice teachers analyze the crucial aspects of teaching as well as engage in field experiences in their teacher education programs (Clark, 1988). Shulman (1992) advocated the use of cases as a means to help preservice teachers "think like a teacher," concluding that "from an epistemological perspective, cases may be more congruent with the forms of practical knowledge that undergrid the varieties of practice in teaching" (p. 21).

Among different approaches to case-based instruction, video- and hypermedia-enhanced cases are increasingly finding their way into teacher preparation curriculum. Video may afford a richer and more authentic contextual representation of actual classroom events, whereas the written word might be cued towards the writer's interpretation of classroom events (Koehler, 2002; Richardson & Kile, 1999). Some suggest that using cases in teacher education programs is beneficial to students who have an underdeveloped view of teaching and tend to inappropriately link their prior student experiences in their K-12 education with their beliefs of teaching (Lundeberg,

1999; Richardson & Kile, 1999; Shulman, 1992). In short, video cases might be better suited to help bridge the gap between the theory of teacher education and practice of classroom situations (Koehler, 2002; Lundeberg, 1999; Merseth & Lacey, 1993).

With the addition of hypermedia (i.e., linking), cases can "criss-cross" the conceptual landscape in a nonlinear, but still structured way. Spiro, Feltovich, Jacobson, and Coulson (1992) argued this as the basis for *Cognitive Flexibility Theory*, which is applicable for advanced learning in ill-structured domains such as teaching. Important features of learning in Cognitive Flexibility Theory that are easily supported in hypermedia (and video) cases include the *multiple representations* of cases for illustrating the multi-thematic nature of classroom teaching and *criss-crossing* (or linking) the cases in many directions "to master its complexity and to avoid having the fullness of the domain attenuated" (Spiro et al., 1988, p. 379).

To date, there has been limited research on the effectiveness of video cases and video case-based hypermedia to familiarize prospective teachers with the complex and ambiguous nature of teaching. One such video case-based hypermedia system is Reading Classroom Explorer (RCE). It is based on the Cognitive Flexibility Theory (Spiro et al., 1992), and uses exemplary video cases of teaching. The video cases are criss-crossed in a hypermedia environment, which allows preservice teachers to revisit the same material (i.e., video cases) in multiple ways at various times for different purposes. Hughes, Packard, and Pearson (2000) investigated how RCE might enhance preservice teachers' views of reading instruction, and analyzed whether RCE becomes a part of students' reflections about teaching and learning. The authors examined the extent to which students used RCE as a resource in their learning and analyzed whether RCE became a part of students' reflections about teaching reading instruction. They found that of the fourteen participants who used RCE, five used opportunities for future advantage, seven used RCE only as a part their assignment, and two students did not use RCE even when assigned. Their findings suggest that most preservice teachers used the video cases as an information source like books.

Case Technologies Enhancing Literacy Learning (CTELL) is another case-based multimedia system to expose preservice teachers to exemplary reading instruction. A study by Schrader and colleagues (2003) found that the use of CTELL cases was not statistically significant on the concept mapping task, which asked participants to create concepts maps to represent effective reading instruction. However, the interview data with the students using CTELL cases indicated that the use of CTELL cases created more meaningful classroom discussions and also allowed them to view an issue from multiple perspectives.

While some research exists to support the advantages of case-based video learning with preservice teachers, little is known as to what individual differences such as learning style and beliefs impact learning from video cases. Is learning from video cases likely to be effective for all types of learners? Are certain types of cases more likely to influence different kinds of teachers under particular contexts? In this article, we explore how one such factor, teacher beliefs (specifically epistemological beliefs), may influence how people learn from video cases.

Teacher Beliefs

Research suggests that teacher candidates bring their own beliefs and attitudes that influence what they learn from teacher education programs (Ball, 1988; Bird, 1991; Hollingsworth, 1989; Holt-Reynolds, 1992; Weinstein, 1990). Even though teaching is a complex enterprise with uncertainties and dilemmas, preservice teachers tend to have a more simplistic view of teaching. They fail to see the complexities and ill-structuredness of teaching. Their beliefs systems and lay theories about teaching emanate from their own personal experiences of being students. Having spent a considerable amount of time over the years as students in classrooms, described by Lortie (1975) as "apprenticeship of observation," teacher candidates have formed their own conceptions of what is "good" teaching. Clark (1988) stated that students' preconceptions are "robust, idiosyncratic, sensitive to the particular experiences of the holder, incomplete, familiar, and sufficiently pragmatic to have gotten the teacher or student to where they are today" (p. 7).

Students' beliefs may not be aligned with the goals of teacher education programs and current conceptions of the field. Their beliefs are often incomplete, "for they typically see and hear only the performance side of classroom teaching" (Clark, 1988, p. 7). According to Holt-Reynolds (1992), "there are, however, times when students' lay concepts are not quite contextualizing, illuminating, and helpful so much as they are powerful, potentially misleading, and unproductive as resources for learning the principles we hope to teach" (p. 327). Furthermore, preservice teachers' beliefs have been found to be difficult to change (Ball, 1988, 1989; Holt-Reynolds, McDiarmid, 1990). Ball (1989) examined the role of preservice teachers' beliefs about mathematics in a methods course and how those beliefs influence learning to teach mathematics. She concluded that even though her methods course impacted the thinking of preservice teachers, their beliefs about teaching mathematics as teacher-directed and textbook based remained

largely unchanged. Since their beliefs were strong, when they felt any discomfort with new ideas, "the most logical course of action would be to return to the safety of old assumptions and habits" (Ball, 1989, p. 13).

Epistemological Beliefs

Hofer and Pintrich (1997) defined epistemological beliefs as "how the individuals come to know and, the theories and beliefs they hold about knowing" (p. 1). Schommer (1990) proposed a further refinement of definition of epistemological beliefs, by positing four beliefs about the nature of knowledge and learning: (a) *Fixed ability*—the ability to learn is fixed or static, in contrast to a view of learning as improvable over time and experience; (b) *Quick learning*—learning happens quickly or not at all; (c) *Simple knowledge*—knowledge is made of isolated bits and not of integrated concepts; and (d) *Certain knowledge*—knowledge is never changing, in contrast to a view that knowledge is continually changing over time. Similarly, Schommer described students with a complex set of epistemological beliefs as holding a view that learning does not happen quickly, and that it is made up of integrated concepts rather than isolated bits and pieces. They also hold the belief that ability to learn can be improved over time and with experience, and is continually changing. On the other hand, individuals with a simple set of beliefs believe that knowledge can only be passed down by authority, only seek single answers to complex problems, and avoid problems that might not have a clear-cut solution and are ambiguous in nature.

Epistemological beliefs also have important implications for how teachers react to instruction. For example, Many, Howard, and Hoge (2002) investigated how preservice teachers' epistemological beliefs shaped their experience in the authors' undergraduate course and also in the field. Many and colleagues found that students viewing knowledge as constructed by an active process were more likely to reflect on the course reading and create their own meaning of how that might impact their future teaching. In contrast, prospective teachers with an "exogenic perspective" (i.e., knowledge exists outside of the knower with an external authority) focused primarily on their subjective experience in the field and failed to recognize that strategies from the course can help in their own teaching. These teacher candidates viewed knowledge as being transmitted by the teacher to the students, who are passive learners. The authors further highlighted that preservice teachers' views about the nature of knowledge were critical to whether instructional approaches used in the course were effective. Thus, research

on epistemological beliefs and how preservice teachers view the nature of knowledge and learning is of vital importance to teacher educators and how prospective teachers' view impacts their own learning.

Epistemological beliefs may also have an impact on how students solve ill-defined problems. A study conducted by Dunkle, Schraw, and Bendixen (1995) found that epistemological beliefs play an important role in solving ill-defined problems. They stated that ill-defined problem solving requires "epistemic monitoring," which refers to assumptions made about limits and certainty of knowledge during problem solving. The results indicated that "epistemic beliefs accounted for substantial proportion of variance in the observed level of ill-defined problem solving." Since teaching is a complex enterprise and a paradigmatic example of an ill-structured domain, it might be helpful to understand how epistemological beliefs impact preservice teachers in situations that require "subtle judgments and agonizing decisions" (Shulman, 1992, p. 20).

A Study of Epistemological Beliefs, Hypermedia, and Video-Based Cases

In the present study, we seek to understand how preservice teachers' epistemological beliefs impact their learning from hypermedia-enhanced video cases using Reading Classroom Explorer (RCE). Using video footage from a diverse set of cases, RCE seeks to portray "exemplary teachers engaged in the process of teaching reading" (Hughes et al., 2000). Previous research with RCE has shown that preservice teachers perceive this hypermedia system to compliment and extend the traditional approaches to teacher education (Oliver et al., 2001). However, there has been no study of how preservice teachers' epistemological beliefs impact what they observe from video cases.

Preservice teachers' prior epistemological beliefs have the potential to influence how they learn with RCE given prior studies suggesting the extent to which beliefs in general, and epistemological beliefs in particular, impact how preservice teachers perceive instruction. Because case-based approaches represent an instructional mode rooted in honoring the contexts, complexities, and ill-structuredness of teaching, it is reasonable to suspect that some epistemological beliefs (e.g., that knowledge is simple) may be less compatible with case-based instruction. Given the additional complexities, ill-structuredness and nuances offered by the addition of video and hypermedia, epistemological beliefs may have even greater impact on what students learn from a case-based approach. It is interesting to note that the very characteristics of hypermedia itself (its nonlinearity, its complexity) may conflict with

some epistemological belief profiles held by students (Jacobson, Maouri, Mishra, & Kolar, 1996).

The research question addressed in this study involved if preservice teachers' epistemological beliefs influence how they learn from, and interact with, a case-based hypermedia system designed to highlight exemplary elementary literacy instruction. Specifically, the study examined if students' epistemological beliefs influence: (a) What cases they select within the hypermedia system; (b) What they observe and find salient within each case.

The researchers hypothesized that students with more complex beliefs about knowing (e.g., learning is integrated and learning happens slowly over time) would look for cases of teaching and learning that were consistent with their complex belief system. Similarly, students on the simple end of the continuum of beliefs (e.g., knowledge is fixed and learning is quick) would also seek cases consistent with their beliefs. We also hypothesized that in the description of video clips, students with complex epistemological beliefs would introduce more and different concepts than their counterparts at the other end of the "epistemic dimension" (Dunkle et al., 1995).

METHOD

Participants

Eleven preservice teacher education students from a nationally-recognized teacher preparation program at a large Midwestern university took part in the study. All of the participants were female, with a mean age of 21.2, and a range of 21-22 years of age. The participants were enrolled in a elementary education literacy methods course that focused on literacy and reading instruction for elementary students. The instructor of the course decided to use RCE as a part of the course curriculum. Participants were paid for their time in the study.

Procedure

Near the beginning of the literacy methods course, before their first use of RCE, participants completed the epistemological survey created by Schommer (1990) to assess their beliefs regarding nature of knowledge. During one of the early sessions of the literacy methods course, the first author introduced and demonstrated the various features of RCE to the participants (and nonparticipants) as a part of whole class instruction. Over the

course of the semester, the participants used RCE as a part of their class curriculum, explored and interacted with RCE within the classroom, and also on their own as part of their class assignments. They watched the cases of reading instruction available in RCE, searched for clips and used the discussion board to respond to each other and to another literacy class using RCE at a different university.

After six weeks, participants met individually with the researcher in a reserved computer room. Each participant was given one hour to search for RCE clips that they thought represented the best teaching practices in each of four given categories. These categories included: Clip 1: Reading instruction for beginning readers; Clip 2: Reading instruction for diverse students; Clip 3: Writing instruction for emergent writers; Clip 4: Developing strategies for reading/writing. After a participant had found a RCE clip for a particular category, they wrote responses to questions about their selection. For example, after the participants had searched for a clip that they thought was a good example of reading instruction for beginning readers, they responded to the following questions:

1. What sort of things is the teacher doing here?;
2. Why do you think that this clip shows a good example of reading instruction for beginning readers?; and
3. What else could the teacher do to improve her literacy practice?

Participants typically wrote only one to three sentences (total) in response to these questions.

Data Coding and Analysis

Using Schommer's (1990) methodology, responses to the 63 item epistemological questionnaire were used to generate the four epistemological factor scores: *Fixed Ability*, *Simple Knowledge*, *Quick Learning*, and *Certain Knowledge*. Fixed Ability and Simple Knowledge accounted for most of the variance in Schommer's study, and therefore were the two epistemological beliefs occurring with the most predictive power. Accordingly, they were used as the focus for the quantitative and qualitative analyses in this study, and suggested categories for coding participants' responses.

To determine if there was a consistent pattern relating participants prior epistemological beliefs to the clips they chose, the scene depicted in each video clip chosen by participants was blind-coded according to their content along both epistemological factors (Fixed Ability and Simple Knowledge)

using indicators from Schommer's (1990) study. For example, Schommer's Fixed Ability factor distinguished between those who believe, on one extreme, that the ability to learn is innate and does not change over time, and those who believe, on the other extreme, that the ability to learn is learned and changeable. Specifically, the survey instrument asked participants to agree or disagree with 16 statements such as: "learning happens the first time or not at all"; "learning is unrelated to hard work"; "learning is a skill to be learned"; "learning and hard work are related"; "learning happens over time"; (Schommer, 1990). One rater (blind to participant identity) viewed each video clip chosen by participants, and rated (using the indicators from the survey) whether the classroom events in each video clip were more consistent with the view of learning as innate (assigned a value of -1) or learning as learned (assigned a value of +1). In cases where no clear assignment could be made in either direction, a value of 0 was assigned. In analogous fashion, participants' video clip selections were coded on the dimension for Simple Knowledge (-1, 0, +1), which distinguishes between those who (on one extreme) believe that knowledge is made up of simple, unambiguous answers and isolated information and those who believe that knowledge involves seeking multiple, integrated answers and requires a tolerance for ambiguity.

We were also interested in studying the relationship between participants' prior beliefs and the ways in which they wrote about their clip selections. Accordingly, participants' written responses and reflections about their video clips were also rated using Schommer's (1990) criteria on the same 3-point scale (-1, 0, or +1). These written reflections and analyses were coded independently from the classroom video they were analyzing. It was possible, therefore, that they may have chosen a clip that was coded to be naturally depicting episodes of "complex knowledge," but wrote about it in ways that indicated they were using a "simple knowledge" epistemological lens. In total, each video clip selection received two ratings (Fixed Ability and Simple Knowledge) and each written reflection received two ratings (Fixed Ability and Simple Knowledge).

For the purposes of reliability, a second rater who was blind to the participants' fixed ability and simple knowledge scores, independently coded one-half of these clip selections (24 clips), and one-half of the participant written reflections (24 reflections). Overall, the inter-rater agreement using the coding scheme for the video clips was 100% when coding along the fixed ability dimension rating scale, and 87.5% on the simple knowledge rating scale. For the written reflections, the inter-rater agreement was 87.5% on both rating dimensions. When there was a difference in coding, the original

rating was used, in order to be consistent with the remaining one-half of the data (which was coded by only the first rater).

Two types of analyses are used to uncover meaning and relationships between participants' prior belief and their clip selections and written reflections. Qualitative analyses (e.g., case studies) were used to reveal, in detail, the choices selected participants made and how those choices related to their prior beliefs. In contrast, quantitative analyses were used to determine if a pattern emerged across all participants, and thereby enrich and generalize relationships found in the qualitative analyses.

To perform the quantitative analyses, participants were divided into an *upper* and *lower* group for Fixed Ability and Simple Knowledge based upon their prior epistemological beliefs score (measured using Schommer's survey). For example, participants' scores on the Fixed Ability dimension ranged between 6.85 (indicating a belief that learning is learned) and 10.18 (indicating a belief that the ability to learn is innate). The five scores at 8.2 or below were assigned to the *Learned* group, and the remaining six scores higher than 8.2 were assigned to the *Innate* group. Participants were also split into an upper and lower group using their Simple Knowledge belief scores.

Using a quasi-experimental design, participants clip selection ratings and written reflection ratings were used as dependent measures. The difference between these two groups (upper and lower) on the dependent measures was the focus of the analysis. For example, participants' written reflection Fixed Ability scores were used as a dependent measure to explore if the upper and lower Fixed Ability groups differed in the ways in which they wrote about their clip selections. The corresponding analysis was also conducted using the Simple Knowledge written reflection scores for the upper and lower Simple knowledge groups. Similarly, two analyses were performed for participants' clip selection scores. For each of the four analyses, we performed a 2 (upper vs. lower) x 11 (Participants) ANOVA with the 44 clip ratings used as the dependent measure (or alternatively the written response ratings. This design accounted for the within subject variation caused by the 4 (potentially similar) clips selected by each participant (the 11 participants were nested within the 2 levels of the epistemological belief in this design). Due to the low sample size used in this study, the quantitative analyses have low statistical power, and therefore should be treated as descriptive of trends and not as strong tests of hypothesis.

To provide a focused qualitative analysis of how participants' prior beliefs influenced the video clips they chose and the written reflections on those clips, two participants were selected from each end of the continuum for both belief factors for further case study. The participants chosen for the case study, and their positioning on the beliefs scales is summarized in Table 1.

Table 1

Participants Used in the Qualitative Case Study, Their Prior Beliefs, and the Mapping to the Schommer's (1990) Study Factors

Epistemological Stance	Data Source	Exemplary Focus Cases
Learning is innate – The ability to learn is fixed or static; learn the first time or not at all; can't learn how to learn.	High score on Schommer's fixed ability factor	Mary and Kimberly
Learning is learned - Learning is improvable over time and experience	Low score on Schommer's fixed ability factor	Susan and Emily
Simple knowledge - knowledge is made of isolated bits; seek simple answers; avoid integration; avoid ambiguity; depend on authority	High score on Schommer's simple knowledge factor	Emily and Sarah
Complex knowledge - knowledge is made of integrated concepts;	Low score on Schommer's simple knowledge factor	Susan and Kate

For example, on the upper end of the continuum of the Fixed Ability factor were Mary (9.45) and Kimberly (9.33), indicating that they believed that learning is innate, and that it is unrelated to effort. On the other end of the same dimension, were Susan (6.85) and Emily (7.18) who held beliefs more consistent with the idea that "learning is a skill to be learned," "learning and hard work are related," and "learning happens over time." Accordingly, Mary and Kimberly (Learning is Innate) and Susan and Emily (Learning is Learned) are the focus of a qualitative study.

Similarly, an analysis of the Simple Knowledge factor score indicated that the two highest scorers, Emily (11.49) and Sarah (11.11), had beliefs more consistent with a philosophy that sought simple answers and avoided ambiguity. In contrast, Susan (8.9), and Kate (9.05) were more likely to believe in seeking multiple answers and tolerate ambiguous answers. Emily and Sarah (Simple Knowledge), and Susan and Kate (Complex Knowledge) were also the focus of the qualitative analysis.

RESULTS

Qualitative *and* quantitative analyses were performed to investigate how participants' prior beliefs influenced the video clips they chose and how they wrote about those clips. The quantitative analyses focused on the extent to which a pattern emerges across all participants, whereas qualitative analyses were used to show, in detail, how this pattern manifested itself for selected participants.

A consistent pattern was found across all participants in the study (Table 2). Participants' prior beliefs about Knowledge (as being either simple or complex) predicted the views of knowledge featured in the video clips they selected. Preservice teachers tended to choose clips that featured classroom activities illustrating knowledge being represented in ways consistent with their own beliefs—in simple, unambiguous ways for the group of participants in the *Simple* group (mean rating of -.157) and in multiple, interconnected ways for participants with beliefs consistent with the *Complex* grouping (mean rating of .450). This observed difference in the rating of their clip selection was statistically and practically significant, $F(1,33) = 6.76$, $p = .014$, $h2 = .170$. We observed a similar trend connecting participants' beliefs about learning to their video clip selections. Participants with prior views of learning as innate and unchangeable tended to select clips that have these features (a mean rating of -.167, see Table 2). Likewise, participants who perceived learning as something to be learned tended to select clips consistent with their view (a mean rating of .250). Although this difference was in the hypothesized direction, it was not statistically significant, $F(1,33) = 3.52$, $p= .069$, $h2= .096$, although the effect size was similar to the others reported in this study.

Participants' prior beliefs also clearly had an impact on how they chose to write about their clips (see Table 2). Written responses from participants with a prior belief that knowledge was *Simple* tended to raise similar points in their reflections (as indicated in a negative mean rating of -.208), and those with *Complex* beliefs also used this as a means for justifying their selections (as reflected in their positive average score of .400). This difference is, again, statistically significant, $F(1,33) = 5.73$, $p = .023$, $h2 = .148$. Similarly, beliefs about learning were a statistically significant predictor for how participants wrote about their clip selections, $F(1,33) = 3.52$, $p = .031$, $h2 = .134$.

Table 2

Mean Group Differences in Clip Selections and Written Reflections by
Beliefs About Learning (Innate vs. Learned) and Knowledge
(Simple vs. Complex)

Beliefs about Knowledge	Clip Selections	Writing about Clips
Simple, ave (std. dev)	-.157 (.16)	-.208 (.17)
Complex, ave (std. dev)	.450 (.17)	.400 (.19)
p-value	.014	.023
Effect size	.170	.148
Beliefs about Learning		
Innate, ave (std. dev)	-.167 (.15) [a]	-.125 (.13)
Learned, ave (std. dev)	.250 (.16)	.300 (.14)
p-value	.069	.031
Effect size, η^2	.096	.134

[a] Adjusted means and standard deviations from the 2-way ANOVA are reported.
= The difference between the two groups is statistically significant, p<.05.

So far, the quantitative analyses has illustrated that participants' prior
beliefs impact both the types of clips they selected for various literacy activ-
ities, and how they chose to write about those activities. The remainder of
this section will use focal cases to demonstrate how this effect plays out in
the clip selections and reflections of individual teacher-education student
participants. For each belief (knowledge and learning) two cases from the
extreme ends of the epistemological belief survey ratings were selected for
these focal cases to highlight differences (See Table 1 for a description of
the chosen focal cases and their relationship to the epistemological dimen-
sions). For each focal case, their clip selections and their writings about
those clips will be analyzed in terms of their prior epistemological beliefs, in
order to examine the extent to which they confirm the results of the quantita-
tive analyses presented.

Learning is Innate

Mary. Mary was a 22 year old Caucasian female majoring in elementa-
ry education/language arts with a GPA of 3.4. Based upon her survey scores,

Mary believed that students who are average will remain average. The clips that Mary chose in the search activities, and how she chose to write about those clips are consistent with her prior held beliefs.

Mary's selection of video clips in each of the four search activities, suggested that she believed learning comes from the teacher (and not developed within students), and thus, is consistent with Mary's belief that learning is innate. In selecting an exemplar clip of reading instruction clip and highlighting the actions of the teacher (Clip 1), the teacher first "modeled" the reading to students and then the students themselves shared the stories with their peers following the same modeling. Thus, even though the students were supposedly working "independently" they were basically following the path (reading the story) that the teacher had already modeled for the students. Similarly, when selecting a clip of reading instruction for diverse students, Mary chose the clip where the teacher was doing a lot of direct instruction. In this particular video the teacher was working with a struggling reader going over his work, when she came across a mistake, she herself wrote the correct answer without working with the student or giving him the opportunity to discuss his writing. Mary's selection for Clip 3 highlighted a similar pattern where the same teacher was working with another student giving her answers instead of helping the student work through them. Mary's choice of clips clearly exhibited her stance that the students should get it right the first time and the teacher needs to provide the solutions to the problems.

Similarly, Mary's written statements about the video cases revealed her belief that learning is innate. For example, in describing a good teaching practice in the cases, Mary said that the teacher was doing a good job "modeling" the desired behavior so that the students could merely follow her along, stating that the students needed "the teacher to model the desired behavior and/or reading." In her response to Clip 2, Mary stated that the student should be careful while writing the first time so that it is coherent, when it is read later. Suggestions that students needed to have something the first time were indicators that Mary does not believe in a process that allows the student to make mistakes and learn and develop over time. In her response to Clip 3, Mary suggested the need for more one-on-one learning from the teacher (a key indicator in the belief for learning is innate and therefore must be directed from others). Mary's response was representative of her belief that you can learn the first time or not at all, when she highlighted that the teacher should work with the student so that she gets it right the first time while it is still fresh in her mind.

In both choosing video cases, and in writing about those video cases, Mary displayed her belief that the ability to learn was innate, and could not

be developed over time. As such, the role of the teacher is paramount, and most of the learning that occurs in a classroom has to come from the teacher or through more knowledgeable peers. Accordingly, Mary chose clips in which the teacher tended to directly model instruction, or work very closely with students to help them develop their skills. In writing about these cases, Mary gave more explicit voice to this philosophy.

Kimberly. Kimberly was a 21 year old Caucasian female majoring in elementary education with a GPA of 3.33. Kimberly also believed that people are born good learners and just have a limited ability to learn (i.e., their learning is innate). Her video case selections were very similar to those of Mary—in fact, she chose the same video cases for reading instruction for beginning readers (clip 2) and writing instruction for emergent writers (clip 3). As pointed out in Mary's portrait, Clip 2 and 3 were examples of where the same teacher was working with two different students and in both examples the teacher did not give the students any opportunity to talk about their errors or discuss the mistakes with the students, she just corrected them herself. Just like Mary, Kimberly's choice of video clips pointed to a pattern in which the role of the teacher was highlighted as the key means of modeling and instructing for students who are struggling. This was suggestive of Kimberly's belief that because the ability to learn does not develop over time, learning must come from more knowledgeable others (e.g., the teacher).

It is clear that Kimberly's prior epistemological belief that learning is innate influenced how she wrote about those clips and what she observed about literacy instruction. In writing about the video clips, Kimberly rarely expanded beyond what was shown in the video clip in her answers and failed to suggest any alternative views of teaching reading instruction. She tended to merely repeat what the teacher was doing in the clips. Her responses highlighted her belief in the limited ability of students to develop in their learning. Her responses underscored that struggling students have difficulty learning on their own and require one-on-one help from a teacher or a more knowledgeable peer so that the student "can use his buddy as an aid for spelling when they write" (Clip 2 response).

Her responses often indicated that students who were not good at reading and/or writing were not good at metacognitive strategies to correct their own errors and mistakes, but need "the teacher to explain why things are the way they are" to "find errors and fix them." As previously discussed, Kimberly picked the same clip as Mary for two of the search criteria. Kimberly, similar to Mary's response emphasized that the students in the clips needed help from others to successfully read and/or write. Kimberly responded to

Clip 2 by writing, "I feel that conferencing one on one with their work is a good way for writing instruction..."

Kimberly's selection for the first clip seemed to contradict this. In the video, the teacher was talking about the various teaching strategies that she uses in her teaching, which build upon student's familiar knowledge base, and prior knowledge that they bring with them. The teacher in the video highlighted that learning should be fun, and her desire to make literacy fun for the students. Kimberly's choice for Clip 4 also focused on a lesson where the teacher conveyed that learning is learned and gave the students control of their learning. The clip showed the teacher using KWL strategy where the students wrote what they already Knew, what they Wanted to know, and what they Learned. The topic for the lesson was newspapers and the students had further opportunities to explore their questions on a field trip to a local newspaper. Across the four clips, Kimberly chose two clips where learning was emphasized as being innate and two clips where the teaching lesson underscored learning as being learned. Kimberly's response for Clip 1 did not offer any bias towards either highlighting that ability to learn is innate and fixed or that it can be improved with time and experience. However, her response for Clip 4 exhibited that the teacher recognized that students' can build on their prior knowledge. This is highlighted when she stated that the teacher is "having the students apply/use their previous knowledge" and also "allows them to find new things on their own."

Learning is Learned

Susan. Susan was a 21 year old Caucasian female majoring in language arts with a GPA of 3.36. Her responses on the epistemological questionnaire suggested that she believed that successful people are able to improve their ability to learn, and thus increase their learning. Susan's beliefs are confirmed through her selection of the clips and responses to the questions, indicating that students were better able to learn on their own and improve on their own with teachers providing minimal instructional help.

Susan's choice for a clip that highlighted good instruction for beginning readers (i.e., Clip 1) featured the teacher working with students to help them figure out a word on their own, and how to sound it out, instead of giving them a direct answer. The teacher also helped students to use the word in a sentence when a student suggested that it might be helpful to see how the work makes sense when used in context. In short, the teacher was encouraging the students to respond and work on problems with her. Similarly, for

Clip 2, Susan chose an episode where the teacher was not doing any direct instruction, but was using real life examples that were meaningful for the students, such as using grocery items that start with the letter "F." Susan's selection of clips highlighted her philosophy that it is important to know how to find the answers rather than knowing the answers (Schommer, 1990). The selected clip to represent writing instruction for emergent writers showcased Susan's belief that learning is learned and can be improved with time and experience. In this vignette, Billy, a struggling writer, improved and progressed by writing mail letters to the teacher's husband when he went on business trips as part of a class activity. The teacher in the clip created a comfortable experience for the students where mistakes were seen as a part of a learning experience. The teacher encouraged all forms of writing in her class including scribbling and Billy had progressed over the course of the year and was enjoying writing.

Susan's philosophy was also reflected in her responses to each clip. This was especially true for her writing about emergent writers (i.e., Clip 3) in which she wrote, "encouraging students to write with little or no further instruction.... It allows the children to write without the fear of being judged or criticized. This is important for emergent writers to take the time exploring the written language." In her response to Clip 4 (a clip about developing strategies for reading/writing), Susan indicated that it was important for students to "activate their prior knowledge concerning newspaper" and be in control of their own learning by writing "what they know and then moving into discussing what they want to know from the lesson on newspapers." Furthermore, her response to previous clips suggested that she agreed with the statement "wisdom is not knowing the answers, but knowing how to find the answers" (Schommer, 1990). Susan stated, "It is great for the teacher to instruct students on the ways they can look at an unknown word to figure out the word name and meaning" (Clip 1) "... it is important for emergent writers to take the time exploring the written language" (Clip 3). Susan also credited the teacher for using practical examples from students' lives that they can relate to study phonics. For example, she stated that the teacher could give an example of how to sound unknown words and then give more examples to students to do on their own and then discuss the possible words together as a group. Thus, on each opportunity to search for a video case of literacy instruction, Susan sought clips in which teachers let students develop their own learning skills. Moreover, when describing these video cases, Susan was eager to express her philosophy that emphasized the importance of having children develop their own learning skills as emerging readers and writers.

Emily. A 21 year-old Caucasian female majoring in special education with a 3.6 GPA. Emily's case represented an interesting one. Even though her fixed ability score indicated that she held more intricate and complex beliefs about learning, her responses presented two contrasting images. On one hand Emily, like Susan, believed that it was important to build on student's knowledge and that a variety of literacy methods could be used for students with varying reading and writing ability levels. This was highlighted through her selection of clips and her responses to the questions about those clips. For example, her choice for Clip 2 featured a multi-level teaching approach where the teacher accommodated students with different ability levels and the students were given appropriate opportunities to learn and grow with guidance from the teacher. Emily chose the same clip as an example of both reading instruction for beginning readers and writing instruction for emergent writers. The teacher in this clip built on students' prior knowledge and provided them with time, resources, and guidance to read and write. The students in her class used various forms of print, such as drawings, to communicate and slowly begin to write words and even sentences. As illustrated in Mary's case, Emily chose a complex clip that featured the teacher giving up control and letting the students decide what they would like to learn and having a class discussion to come up with answers. Thus, the students did not need to depend on authority for answers, instead they could utilize resources and their peers to understand and problem solve.

In her response to Clip 2, Emily suggested that by using a "multi-level teaching," a teacher was able to meet the diverse needs of students and also use the students' strengths to support their learning. Thus, she acknowledged the different ability levels of students. Yet, her responses suggested that students with limited ability could improve with time and experience. She highlighted that students do not have to get it right the first time and can build their writing upon various building blocks. She illustrated this point through her own words stating, "students can begin through drawing with pictures, then letters, slowly developing into sentences and stories" (Clip 1) "... students can first draw the pictures and then slowly emerge into a writing form with letters and eventually sentences" (Clip 3). Thus, Emily focused on the complex aspects of *Emergent Literacy* (Clip 1 & 3) which accentuated her belief that learning is learned and can be improved with time and experience. Furthermore, her responses to *Emergent Literacy* were much more elaborated and more indepth than Kimberly's response for the same clip.

However, in spite of her complex belief structure about the nature of learning, Emily focused on use of concrete examples to justify her stance on what forms a "good" literacy instruction and was unable to provide any

propositions for the teacher to improve her practice. This might be explained by the fact that although she had an elaborate belief structure about the nature of learning, she held a simple disposition towards the nature of knowledge as indicated by her simple knowledge score (11.49), which was quite high (i.e., the higher the score more simple the beliefs). Duell and Schommer-Aikins (2001) indicated that a person's epistemological beliefs were not necessarily in sync and it was possible that a person might be on opposing extreme ends of the four beliefs that Schommer (1990) proposed. More discussion of Emily's high simple knowledge score can be found in the next section.

Simple Knowledge

Sarah. A 21 year-old Caucasian female, Sarah was majoring in elementary education with a GPA of 3.6. Sarah's simple knowledge score was 11.11. As highlighted earlier, avoiding ambiguity was a component of simple knowledge score. Sarah's responses indicated that she was trying to avoid ambiguity by keeping the control of the classroom and having the students "read aloud" together as a whole class so that there was no confusion when the students read alone as they were becoming "familiar with the book" and it helped keep the students on the right track. In selecting the clip for reading instruction for beginning readers, Sarah chose a clip in which there was a lot of direct instruction involved, and the teacher was standing in the front of the room pointing to the words as the students followed her along. They were reading as a group while the teacher directed them like a symphony director. For the second search activity (Clip 2), Sarah chose something that did not even match the criteria (i.e., reading instruction for diverse students). In a pattern similar to this, Sarah's choice of a clip as an example of writing instruction for emergent writers (Clip 3), further demonstrated her simplistic view of the nature of knowledge. In this clip, the teacher went over a student's writing journal along with the student, and used her authority to give answers to the students without explaining the rules of grammar or encouraging the students to supply suggestions on how to fix her writing. Sarah's responses were short where she looked for single answers in the video clips and tended to merely repeat what she observed in each clip.

Thus, Sarah's responses indicate that her prior beliefs about the nature of knowledge influenced the clips that she chose as exemplary teaching of literacy instruction and what she observed in those clips. Sarah did not elaborate on what she observed in the clips that she had chosen and her response

presented a very simplistic view of the teaching literacy and perhaps teaching in general.

   Emily. The two coders disagreed on categorizing Emily's responses as reflecting that she believed that knowledge is made up of isolated pieces rather than being made up of integrated concepts. While the coders were able to see each others point, they were unable to come to a consensus. Thus, Emily's is a challenging case to portray. For example, Emily's responses on the survey suggested that she believed that teachers build on what students already know and that knowledge is made up of integrated concepts. On the contrary, her responses to the clips underscored that she was looking to avoid ambiguity in the video clips.

   It is interesting to note that even though Emily had a high overall simple knowledge score, her "depend on authority" score was relatively low (2.33) ("depend on authority" combines with "seek single answers," "avoid integration," and "avoid ambiguity" scores for an overall score of simple knowledge). This signified that Emily's belief about depending on authority did not support the assumption that someone with authority (i.e., teachers, parents) held absolute knowledge and knew the truth. This was reflected in her responses where she gave importance to giving students freedom to express "literacy in a variety of forms" and "give students the choice to pick their books to read" (Clip 2). On the other hand, Emily chose clips where the teacher was not necessarily the one transmitting knowledge and the students did not have to depend on the teacher for answers. As an example, in Clip 4 the teacher gave the students opportunities to be responsible for their own learning and discuss the questions they brought with the whole class to have them work through the problems instead of transmitting the knowledge (having the students depend on authority for answers).

   However, with her simplistic view of the nature of knowledge, Emily looked for specific facts and strategies that the teacher (in the video clip) was incorporating in her teaching and focused her discussion around it. Emily centralized her responses and supported them by focusing on the fact that the teacher was clear cut in her practice. She indicated that the teacher demonstrated a "realistic view of reading instruction" and a "well-rounded approach" where she knew what she was doing and was unambiguous in her approach to teaching. This suggested that Emily was looking for clips where the teacher was trying to avoid ambiguity and was clear in her approaches to teaching. This view was further stressed in her response to Clip 4, where she stated that the teacher was using a good organizational model and "it helps focus their [students] attention and guides them as they read." Emily's responses also suggested that even though she believed that it is important to

give freedom to students, the teacher should still not give up complete control. Her response to Clip 2 suggested the same, where she wrote, "I could still give students the choice to pick their books, but focus it around a particular theme [to maintain control of the classroom and avoid ambiguity]".

However, Emily's responses to Clips 1 and 3 showcase knowledge as being complex, indicating she believed that nature of knowledge is simple and made of isolated bits and is passed down from authority. Overall, the portrait of Emily is ambiguous—at times she focuses on clear, particular pieces of information, but in other circumstances, is open to the idea that knowledge is more integrated. Perhaps this is due to her low "depend on authority" score, which de-emphasizes the role of the teacher in any analysis.

Complex Knowledge

Susan. Susan was a 21 year-old Caucasian female, majoring in elementary education and language arts, with a GPA of 3.4 and a simple knowledge score of 8.90. Susan believed (based on the survey) that knowledge does not constitute a discreet set of facts that need to be learned, cannot be just passed down by authority, and that a problem does not necessarily have one solution. Rather her survey score indicated a belief that knowledge is complex, a process of active assimilation and is made up of integrated concepts. Susan's responses suggested that she believed that it is best to work out the solutions to difficult problems on one's own rather than depend on authority for solution.

Her beliefs were evidenced in her response to Clip 1 where she suggested that it was important for the teacher to let the student "figure out the name and meaning" of an unknown word while reading. She believed that knowledge was contextual and it was important for the students to learn "what word would make sense with the rest of the sentence" (Clip 1). Unlike Sarah, Susan was not afraid of loosing control and being in an ambiguous situation. She had the reverse approach to classroom management than Sarah, where she wanted the students to "work on their own and then come back together to discuss."

As pointed out earlier, Susan's beliefs that students are able to learn better on their own, showcased that she was not afraid to give independence to students and the ambiguity in the classroom that might follow after that. Susan's belief that integration was a vital aspect of knowledge was highlighted in her responses to Clip 3 and 4, where, she highlighted how the teacher was using real world examples that were relevant to the students'

lives and integrated them into her reading lesson. She further discussed that
the teacher was also having the students activate their prior knowledge and
integrating it with new ideas that they were learning. This is an important as-
pect of her complex simple knowledge set of beliefs where she believed that
it is important to "integrate new ideas in a textbook with the knowledge you
already have about the topic" (Schommer, 1990).

Thus, Susan's choice of clips and her observation of the teaching and
learning process going on in the classroom showcased her philosophy that
knowledge is contextual and is not comprised of isolated bits and pieces.
Furthermore, her emphasis on the importance of connecting students learn-
ing to real life examples displayed her philosophy of the complex nature of
knowledge.

Kate. Kate was a 21 year-old Caucasian female majoring in elementary
education with a GPA of 3.65. She, like Susan, had a complex set of beliefs
about the nature of knowledge with a simple knowledge score of 9.05. She
also believed that it is important to integrate new ideas with existing ones,
and that most problems have multiple solutions. It is clear that Kate's prior
epistemological belief that knowledge is complex influenced her choice in
which clips to select and how to write about them. For each clip that Kate
selected of the four categories, three showcased knowledge as being made
up of integrated concepts. In Clip 2 the teacher was using guided reading
with a group of students. The teacher was not giving any answers to the stu-
dents, instead asking them for the response and leading them to solve the
problems to get answers. The teacher had the students use the difficult
words in the context of the story and then their meanings for these words.
The same was true for Clip 3—where the teacher gave a student opportunity
to correct her own errors. In Clip 4 a student showed her ability to integrate
knowledge across chapters to learn about wheels and one does not have to
read the chapters in sequence.

Kate strongly advocated the integration of new information with prior
knowledge and with other concepts. She emphasized this point when she re-
sponded to Clip 1 that when students were reading something that they were
familiar with, they were "working on word and sound recognition. Putting
these two things is difficult, and by using something the children already
know, it makes it easier." She underscored her belief that knowledge was
not necessarily passed down by authority and that knowledge was construct-
ed by the student. She highlighted the fact that the teacher was working with
individual students and helping to focus on the student's individual needs.
However, the teacher was not giving the students right or wrong answers,

but was discussing the student's work with him/her and having him/her work on it again instead of just telling him/her what the right answer was (this is highlighted in her response to Clips 2, 3, & 4). Thus, Kate in accordance with her belief about the nature of knowledge, sought clips that represented complex nature of knowledge and her observation of those clips also focused on the integrated and contextual nature of knowledge.

DISCUSSION AND CONCLUSION

Bullough and Knowles (1991) asserted that the beliefs about learning and teaching form lenses through which prospective teachers interpret teaching. They also influence the decisions that these novices make about their own teaching (Hollingsworth, 1989; Weinstein, 1990; Borko & Putnam, 1996). These case studies indicated that preservice teachers' views about the nature of knowledge and learning impacted what they observed about teaching and learning from video cases. For example, the case of Kimberly held the belief (i.e., learning is innate) that the teacher passes down knowledge to students, and that children cannot easily learn on their own. In contrast, Susan held the prior belief that learning was something that is learned over time and not something innate. As such, students are capable of improving over time (with the guidance of a teacher). Using these contrasting beliefs, both Susan and Kimberly went into the hypermedia video library and found video cases in support of good literacy instruction and selected clips that matched their own belief system.

The influence of their existing beliefs went beyond their selection of clips to include what they wrote about the clips, and how they chose to analyze the teaching depicted in the vignettes. Through quantitative and qualitative analyses it was found that participants prior held epistemological beliefs were predictive of the statements in their written responses. Often a very similar situation could be written about in very different ways depending upon the epistemological beliefs of the participants. For example, Sarah and Kate chose two clips where the teacher is in a writing conference with the students. Sarah, with a simplistic view of knowledge, focused on how the teacher pointed out the mistakes in student's writing and corrected the errors without explaining the rules of grammar. Kate, on the other hand, highlighted how the teacher gave the student opportunities to correct her own errors instead of merely correcting them for the student.

The findings corroborate well with other preservice literature investigating the influence of beliefs. Richardson (1996) stated that teacher education students bring beliefs with them that strongly influence how and what they learn from the teacher education program. Previous research has also indicated that preservice teachers' belief structures about the nature of learning and teaching have been formed long before they enter the teacher education programs and impact their experiences and learning in the teacher education (Ball, 1988; Bird 1991). Our findings add to these by suggesting that other course experiences, such as using RCE, are impacted as well. It also extends these findings by suggesting that how teacher education students actually view teacher-student interactions (through video clips) are also impacted by students' prior epistemological beliefs.

The interplay of epistemological beliefs and what preservice teachers find salient in video cases has important implication for teacher educators who want to use video cases. Teacher educators cannot merely assume the teacher candidates "to see" what was intended when they watch teaching and learning depicted in video cases." That is, preservice teachers use their prior epistemological beliefs as a lens to view episodes of teaching. How can teacher educators confront these prior beliefs and move beyond them to help teachers see key elements of video cases? First and foremost, educators must use approaches that get these differing viewpoints out on the table. For example, teacher educators might assess teacher candidates' epistemological beliefs at the beginning of the semester and pair up students with opposing belief systems for the use of video cases. This would allow the students to confront each other's epistemological beliefs and create a meaningful discussion about what the students with opposing belief systems observe in the video cases. Furthermore, it might be helpful to have prospective teachers express what they see in the video cases through journal writing or assignments. Such an activity would allow the teacher educator to review what preservice teachers are thinking and also provide feedback to them.

By using approaches that get differing viewpoints out on the table, teacher educators might be able to design cases that explicitly confront prior beliefs, with the hope of changing them. If left to their own interpretations of video cases, preservice teachers are likely to continue viewing classroom episodes with their prior lenses (even though their instructors might assume different interpretations). In contrast, discussions around a variety of clips (and their multiple interpretations) may prove useful in providing the ground necessary for a change in thinking.

Qualitative and quantitative analyses from this research support the claim that epistemological beliefs influence what preservice teachers think about teaching reading instruction depicted through video-cases. More

work, however, needs to be done in this area to investigate the full impact of beliefs on students' use and interpretation of case-based hypermedia environments. Another promising area of research should focus on the potential of case-based hypermedia to make an impact on beliefs of teacher candidates. As previously discussed, video-case based environments such as RCE have been hypothesized to challenge prospective teachers' beliefs, but the extent to which this happens remains largely unanswered. Research focusing on the design of instructional approaches, the design of video cases and sequences, and how they interact with different types of prior beliefs are paramount for tapping the potential of this medium to impact teacher candidates' beliefs.

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Notes

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