

Second Language Preservice Teachers' Accessing of Background Knowledge and the Role of Context

Anne Dahlman¹

Minnesota State University, Mankato

ABSTRACT

This qualitative study examined six second language preservice teachers' active learning processes through exploring their information processing when accessing background knowledge. The study utilized a constructivist view of teacher learning which acknowledges the complexity of real-life learning as part of which teachers make a variety of decisions regarding the information to be learned and the processing and use of that information based on their previous knowledge, experiences, and the context at hand. It is the interplay between cognitive and constructive learning processes, that is, what the learner and context bring into the picture of learning that this study set out to investigate in regard to teacher learning. The findings point to the complex nature of this cognitive process of accessing background knowledge where teachers first engage in *locating* a piece of knowledge and then making decisions about how to *use* that knowledge. The context seemed to play an important role in this process, in that teachers would make a decision, often unconscious, about using a piece of knowledge they had located, based on their affective reactions to the context, for example, their students, curriculum, and other teachers. Often teachers would act against what they knew to be the best way to react because of their strong emotional response to the situation.

INTRODUCTION

Around the mid-1990s, a revised view of second language (L2) teacher knowledge emerged, which challenged the long-standing assumption that the best way to prepare language teachers was to provide them with declarative knowledge about the language they were teaching (Johnston & Irujo, 2001). This new understanding of teacher knowledge emphasized that for L2 teacher education to be successful, teacher educators need to focus their attention more on the teachers they are educating – their thinking processes, views, and perceptions (e.g., Freeman & Richards, 1996; Johnson, 1992a; Richards, 1998; Richards & Lockhart, 1994; Woods, 1996). Ten years later, this strand of research is in continued need for more investigations, especially into such issues as the nature of L2 teachers' knowledge base, the acquisition processes of that knowledge base, and the various kinds of knowledge teachers possess (Johnston & Irujo, 2001).

¹ Anne Dahlman is an Assistant Professor in the Department of Educational Studies, K-12 and Secondary Programs, at Minnesota State University, Mankato. Her research focuses on the education of teachers serving English language learners in the U.S., ESL curriculum, and the integration of ESL and regular classroom instruction. Correspondence should be sent to Dr. Anne Dahlman, Minnesota State University, 313 Armstrong Hall, Mankato, MN 56001. E-mail: anne.dahlman@mnsu.edu.

Our enhanced understanding of teachers' thinking and the various processes involved in their learning plays an important role in L2 teacher education because this clearer awareness assists teacher educators in providing teachers with the most relevant and successful learning experiences. To assure this kind of relevance and thus continue in our efforts to bridge the commonly perceived theory-practice gap (e.g., Reiman & Thies-Sprintall, 1998; Wallace, 1991), we need to further our understanding of the role of context in the processes of teacher learning. In other words, we need to consider the instructional environments where teachers learn to teach, both practical and theoretical, and the intersections between the two.

RESEARCH IN L2 TEACHER COGNITION

Teacher cognition has been defined as “pre- and in-service teachers’ self-reflections; beliefs and knowledge about teaching, students and content; and awareness of problem-solving strategies endemic to classroom teaching” (Kagan, 1990, p. 419). Research in the area of L2 teacher cognition has explored such issues as the beliefs, knowledge, and thinking underlying teaching practices (Freeman & Johnson, 2005; Tarone & Allwright, 2005), which play an essential part in understanding language teaching and teacher learning. An increased focus on teachers’ cognitive thoughts helps us better understand the behaviors and decisions underlying the surface-level phenomena in the classroom (Richards & Lockhart, 1994). This teacher-thinking research paradigm is not interested in the description of the effective teacher but rather seeks to explain and understand teaching processes as they are (Johnson, 1994; Peacock, 2001; Richards & Lockhart, 1994; Woods, 1996). By understanding teachers’ thought processes, we stand to gain insights into teachers’ decisions in the classroom (e.g., Johnson, 1992a; Richards & Lockhart, 1994; Woods, 1996) and their assumptions and beliefs about teaching and learning (e.g., Borg, 1998; Johnson, 1992b, 1994, 1999; Johnston, Pawan, & Mahan-Taylor, 2005; Richards & Lockhart, 1994; Woods, 1996).

One of the areas within the field of L2 teacher cognition that has not been investigated in depth is teachers’ background knowledge (Woods, 1996). Work that has been conducted in this area has mainly focused on the *sources* of background knowledge teachers draw from in their teaching (e.g., Borg, 1998; Freeman, 1993; Freeman, 1996b; Freeman & Johnson, 1998; Freeman & Richards, 1996; Golombek, 1998; Johnson, 1996; Roberts, 1998; Wallace, 1991). What seems to be missing in this body of research are examinations into teachers’ cognitive thinking processes while they are trying to access and utilize their background knowledge related to teaching and learning.

In addition to the established need for further investigations in the area of teachers’ background knowledge, teacher *learning* in language teaching is an area of research that has received less attention (Crandall, 2000; Freeman & Richards, 1996; Freeman & Johnson, 1998; Tarone & Allwright, 2005). The research that exists in this area (e.g., Almarza, 1996; Bailey, 1996; Freeman, 1996a; Freeman & Richards, 1996; Johnson, 1996; Richards, 1996, 1998) focuses primarily on describing the experiences of teachers while learning to teach and attempts to shed light on how teachers “conceive their classroom teaching” (Freeman & Richards, 1996, p. 2). However, none of the studies done so far seem to deal with examining L2 teachers’ cognitive background knowledge structures during teacher learning. Therefore, it was the aim of this study to address this gap in the field by exploring L2 teachers’ thinking processes involved in their attempts to access their background knowledge during their process of learning to teach.

This study utilized an interdisciplinary approach in its investigation of L2 teacher learning by drawing from cognitive learning theory in examining the teachers' knowledge development, especially their accessing of background knowledge. The following is a review of the key issues related to human learning as they relate to teachers' knowledge development.

BACKGROUND KNOWLEDGE AND LEARNING

Declarative vs. Procedural Knowledge

Most information is stored in long-term memory either in the form of declarative or procedural knowledge (Anderson, 1976, 1993, 1995). Declarative knowledge refers to explicit knowledge about facts or information, which can and has been articulated. The defining characteristic of this kind of knowledge is that it consists of descriptions of facts or methods and procedures (Nickols, 2000). Declarative knowledge is stored in schemata, which are the interconnected cognitive structures, concepts, and ideas that make up an individual's mental knowledge base (Anderson, 1976, 1993, 1995; Sweller, 1988). These associations can be in the form of deductions, conclusions, examples, summaries, analogies, and applications between the new and prior knowledge (Clark & Voogel, 1985; Reder, 1980; Weinstein & Mayer, 1986). Schemata are cognitively efficient because they allow people to process large amounts of information more quickly and to treat multiple elements as a single element, thus reducing a person's cognitive processing load (Sweller, 1988). Typically, a learner acquires declarative knowledge before procedural knowledge. A learner acquires procedural knowledge by practicing a way to perform a task that has previously been described to him or her. With time and continued practice the performance of the task becomes automatized (Nickols, 2000). This paper adopts the view of procedural knowledge, according to which it entails the ability to apply and demonstrate knowledge in practice through actions and behavior.

Similarly, declarative and procedural knowledge can be distinguished when talking about teachers' background knowledge base. Declarative knowledge implies factual knowledge about such areas of teaching as subject matter knowledge, pedagogical knowledge, curricular knowledge, and strategic knowledge (Schulman, 1986), and procedural knowledge, that is, the ability to apply this knowledge in the classroom. Alternatively, the notion of teachers' conceptual versus perceptual knowledge (Johnson, 1996) or the distinction between theoretical and practical knowledge (Freeman & Johnson, 1998; Roberts, 1998; Scarino, 2005; Tarone & Allwright, 2005; Wallace, 1991) capture a comparable idea of the two different types of knowledge structures, namely, theoretical knowledge, or conceptual knowledge entails knowing facts, data, and theories which are "either by necessity or by convention associated with the study of a particular profession" (Wallace, 1991, p. 52). On the other hand, the more practical knowledge is acquired through teaching experiences, classroom observations, and teachers' experiences as learners by either directly engaging in the behavior of teaching and learning or being directly immersed in a context where teaching and learning take place (Drever & Cope, 1999; Freeman & Johnson, 1998; Golombek, 1998; Roberts, 1998).

In conclusion, the main difference between declarative and procedural knowledge lies in the fact that the former entails the ability to explain or declare facts about teaching and learning, whereas the latter involves the capability, often implicitly or tacitly (Polanyi, 1966), to apply this knowledge in practice.

The Role of Context in Learning

Research in cognitive learning theory maintains that learning occurs when a person is able to retrieve a certain piece of information from their knowledge base located in long-term memory. For this retrieval to be successful, the learner needs to process the incoming information independently and thoroughly in multifaceted ways. Namely, learning entails an interactive and sequential process where the learner uses information both from the environment, that is, context, and from semantic memory to construct meaning (Bransford, Barclay, & Franks, 1972; McClelland & Rumelhart, 1981). Researchers in the area of cognitive learning theory maintain that forgetting information is typically due to insufficient levels of this initial information processing, in other words, failure to create strong connections between old and new information (Craik & Lockhart, 1972). The adequately rich initial processing of information assumes mental processing involving higher cognitive functions such as deductions, conclusions, examples, summaries, analogies, and applications between the new and prior knowledge (Reder, 1980; Weinstein & Mayer, 1986). In addition to higher level thinking, successful initial processing necessitates: (a) processing an item on the basis of its meaning and (b) incorporating as many contextual codes (Paivio, 1975) as possible related to that information when first encountering that item (Driscoll, 2005). The greater the number of contexts or amount of contextual information encoded with a target item, the better we are able to remember it (Martin, 1968; Paivio, 1975). The importance of context in learning relates to the notion of encoding specificity (Tulving, 1972, 1983), which refers to the fact that our representation of a piece of knowledge has strong associations to the context of the learning situation. Because of this, similar contextual information at the time of acquiring information and later when retrieving that information from long-term memory enhances learning (Craik & Jacoby, 1979).

The contextual associations in our knowledge representations include the interactions of the learner with places, ideas, and other people involved in the learning situation. Researchers call this the situated nature of knowledge (e.g., Elbaz, 1983; Lampert, 1987). In other words, knowledge is said to be highly dependent on such contextual variables as time, place, and environment (Flores, 2001). Thus, these contextual factors are defining elements of a person's knowledge base which needs to be examined and interpreted within these contexts. According to Driscoll (2005), the learner's interactions with the environment are an essential part of learning itself; that is, Driscoll defines learning as "a persisting change in human performance or performance potential ... [which] must come about as a result of the learner's experience and interaction with the world" (p. 11). Similarly, based on the socioconstructivist view, knowledge is constructed on two mental levels, namely, the *interpsychological*, between individuals, and *intrapyschological*, within an individual (Vygotsky, 1978). Knowledge that is being constructed on the intrapsychological level, for example, our ideas and beliefs, can still be characterized as having a social, or interpsychological, aspect to it because we formulate our beliefs and conceptions based on experiences we have had within a sociocultural context (Shotter, 1993; Wertsch, 1991). Thus, educational knowledge and beliefs should be examined and interpreted in relation to the broader social context and against the contextual characteristics of instructional contexts (Pajares, 1992). Tarone and Allwright (2005) call for more research studies on L2 teachers' experiences during their processes of learning to teach, particularly focusing on the context of these learning processes.

The definition that this paper adopts for the term background knowledge is one that has been embraced by other educational researchers, such as Kagan (1990), in general education, and

Woods (1996), in language teacher education. This position maintains that it is often impossible to distinguish between “what the teacher knows, what the teacher believes, or what the teacher believes s/he knows” (Woods, 1991, p. 194). Rather, teachers typically express their pedagogical content knowledge (cognitive knowledge structures) using rather subjective references (affective knowledge structures). However, in this study I did not restrict the possible range of referents in regard to background knowledge within the definition of background knowledge that teachers used in describing their processes of accessing this knowledge because of the focus on context in this study. That meant that dependent on contextual factors, background knowledge referred to different entities, such as pedagogical knowledge, subject matter knowledge, beliefs about teaching and learning, knowledge about their students, or knowledge about the target culture. I believe that keeping the categories suggested by the participants was essential in examining the role of context in their accessing of background knowledge.

Definition of Learning

This paper adopts a view of learning that is based on two theoretical traditions, namely, the cognitive and constructivist views of learning. Cognitivism often defines learning in terms of information processing (Miller, 1956). Learning is viewed as a sequence of cognitive processes, such as sensory responses, encoding, processing, and management in short term memory, and storage in long-term memory. Constructivism suggests the role of learners in learning, namely that of creating knowledge as they attempt to understand their experiences (Ausubel, 1968; Bruner, 1990). This study focuses on the notion of teachers as active contributors in their process of learning to teach. In this process, teacher learners make a variety of decisions regarding the information to be learned, the processing of the information and the use of that knowledge based on their previous knowledge and experiences and the context at hand. Constructivist principles acknowledge that real-life learning is messy and complex (Siemens, 2004). It is the interplay between cognitive and constructive learning processes, that is, what the learner and context bring into the picture of learning. It is these intertwined cognitive and constructive learning processes that this study set out to investigate in regard to teacher learning. Particularly, the aim of this study was to provide snapshots of teachers' processes in learning to teach second languages, especially of their attempts to access their background knowledge and the role of context in this process. The research questions that guided this investigation were the following:

1. What characterizes L2 preservice teachers' processes of accessing their background knowledge while learning to teach?
2. What is the role of context in the teachers' processes of accessing background knowledge?

METHOD

This study utilized a case study approach (e.g., Creswell, 1994; Lincoln & Guba, 1985) in exploring the participants' cognitive learning processes when accessing their background knowledge. This approach was deemed the most appropriate given the fact that case study research emphasizes the role of context in research (Cohen, Manion, & Morrison, 2000; Patton, 2002). The notion of context plays an especially important role in this investigation of L2

teachers' access to background knowledge given the fact that the study set out to take into consideration the sociocultural aspects involved in teacher learning. Instead of imposing an external definition for the notion of context in the study, I followed the participants' descriptions and definitions of context, emerging from their experiences and referring to such entities as time, place, circumstances, emotional state, activities, sensory data, assumptions, reactions, and interactions.

Participants

The participants were six L2 preservice teachers enrolled in a postbaccalaureate initial licensure program leading to a Master of Education Degree at a large Midwestern university. The participants were in the process of becoming licensed to teach either ESL or a foreign language (Spanish, French, or German), or both ESL and a foreign language in a K-12 teaching context. The initial licensure program that the participants attended is unique in that it is a 15-month integrated program where preservice teachers conduct their university coursework and student teaching concurrently. Students are in their student teaching placements in the morning and attend university classes in the afternoon. Throughout the academic year, they also participate in several weeks of full-time student teaching in each placement. In addition, students do their student teaching both at the elementary and secondary levels in each of the languages in which they are seeking licensure, creating a total of four student teaching placements for those dual licensure students. The university courses that the participants attended focus on topics such as curriculum design, cultural diversity, instructional strategies, assessment, L2 acquisition, national and local standards, and the teaching of English grammar.

The participants' prior teaching experience ranged from volunteering in language classrooms to teaching a language class independently for up to three years. All participants had rich experiences studying and traveling abroad. Table 1 describes the participants' educational and professional backgrounds in more detail.

TABLE 1
Participant Profiles

Participant²	Working toward K-12 licensure in ...	Prior K-12 classroom experience	Study abroad
Isabelle	ESL/Foreign Language	EFL instructor; activities coordinator for K-6 summer program.	Language study and teaching abroad.
Helene	ESL/Foreign Language	Volunteer in elementary and secondary foreign language and mainstream classes.	Language study abroad.
Angelina	ESL/Foreign Language	Spanish and ESL educational assistant.	Grew up bilingually.
Beryl	ESL/Foreign Language	ESL tutor/instructor at a minority cultural center; adult foreign language tutor/instructor.	Language study in two foreign countries.
Violet	ESL/Foreign Language	ESL/Bilingual education coordinator for the school district – included tutoring and translation.	Language study abroad.
Jessica	ESL	ESL tutor (secondary) and paraprofessional (elementary)/EFL instructor.	Language study and teaching abroad.

² Names are self-selected pseudonyms.

Data Collection

The data were collected during a nine-month period and emerged from three different contexts: the university seminar that the participants attended once a week, student teaching contexts, and a focus group interview conducted toward the end of data collection. The data collected at the university involved observations in the university setting, interviews, and course assignments. I observed the participants eight times in their weekly, three-hour university seminar course, which is an integrated block of classroom time combining topics related to L2 teaching and learning, such as L2 methodology, assessment, curriculum design, literacy, and so forth. All six participants were observed at the same time. Three of the participants wore microphones during each session, and these accounts were used for data analysis together with field notes. Before and/or after each university course observation, I met with one of the participants to conduct reflective interviews (Spradley, 1979) about the participant's learning experiences in the university seminar in regard to the readings, homework, class discussions, and connections to the student teaching experiences. These conferences were audiotaped and later transcribed for data analysis. In addition, the data included the participants' university course assignments, that is, a Video Reflection-assignment (including a videotaped lesson), a Content-based Lesson Plan assignment, a Curriculum Unit assignment, and a Reflection Notebook (a reflective journal). Descriptions of these assignments can be found in Appendix A.

Secondly, the data were collected in the participants' student teaching placements. I observed each participant one to three times across several student teaching placements. I received a lesson plan for the lessons I observed. I also interviewed each participant after the observation and received samples of other lesson plans the participants had prepared for their student teaching. These postobservation interviews were audiotaped and later transcribed for data analysis.

The last source of data was a two-hour focus group session, which also served as a member-check for this study. During the session, the participants were asked to respond to the emerging themes from the data analysis, which I had written in the form of statements. This was done to assure that the participants' perspectives were represented accurately in the study (Merriam, 1998).

Data Analysis

The data were collected and analyzed in an iterative manner to ensure that sufficient and appropriately focused information was being collected before the completion of the field work (Bogdan & Taylor, 1975). The first phase of data analysis consisted of my engaging in repeated readings of transcripts to become as familiar with the data as possible. After this, I coded the observation field notes, interview transcriptions, and course assignments both deductively and inductively (Coffey & Atkinson, 1996). The deductive analysis involved utilizing categories derived from the literature review and the research questions. These *a priori* categories included identifying instances that reflected the various stages of the participants' knowledge development. In other words, the data were coded based on the following criteria: I sought evidence of (a) the participants' perceptions of their background knowledge related to teaching and learning second languages, (b) cognitive processes the participants engaged in during their accessing of background knowledge, and (c) instances of the interplay between context and cognition during the participants' processes of accessing knowledge. In examining the data, I

also used inductive analysis procedures (Bogdan & Biklen, 1992), which consisted of identifying emerging themes and patterns from the data that represented the participants' cognitive processes during their knowledge development and complemented the preset coding categories.

Throughout data analysis, I employed the constant comparative method of analysis (Glaser & Strauss, 1967) to identify cross-case themes and categories to describe the shared experiences of the participants. The study used a cyclical investigation of the emerging themes and topics in the data (Miles & Huberman, 1994) to encapsulate relationships among the participants' experiences. That is, when a new theme or topic was discovered in one of the data sets, the other sets were compared against that one to identify similar or contradictory instances.

RESULTS

In the following section, I will attempt to describe, with the help of excerpts from the data, the participants' mental processes when accessing their background knowledge during their processes of learning to teach (Research Question 1). In addition, these cognitive learning processes are presented within the social context of the participants' learning processes through explicit references to place, time, and people that played a role in the participants' learning processes (Research Question 2). First, I will present the participants' views about their knowledge base, using their descriptions and categories, which I believe will give the reader an important backdrop, against which to examine the participants' processes of accessing this knowledge base.

Sense of Efficacy about Knowledge Base

One of the compelling patterns in the data regarding the participants' views about their background knowledge suggests that when talking about their knowledge base, the participants tended to use their students' knowledge base as the point of comparison in their descriptions. Particularly, they often referred to the differences in the amount of background knowledge in regard to learning goals as the main dissimilarity between their students and themselves. That is, the participants felt that they possessed a sizable amount of background knowledge in comparison to their students. In fact, the participants seemed to share a strong concern about the lack of background knowledge of their ESL students. This perception related to both language and subject matter content; thus, the participants perceived their main objective as teachers-to-be to help their students build background knowledge. Helene explained:

I believe it is extremely important that my students have the necessary science and language background that their mainstream peers already have. (Helene, Content-based Lesson Project)

In contrast to their students, the participants unanimously acknowledged that they possessed a sizable amount of background knowledge in the area of L2 teaching and learning. They all agreed that they had acquired a substantial amount of knowledge related to various aspects of teaching second languages during their preservice year. Jessica reflected on the background knowledge of the preservice teachers and ESL students as follows:

[Student] teachers have much more background knowledge. The students are full of questions. They don't always see if it's a question that really relates or not and ... I think they try to relate information that they've heard or an experience that they've had but I think for most of them it's hear-say they're trying to relate it to. (Jessica, interview)

What is noteworthy about this example is that the context of student teaching not only helped these teachers learn about teaching and learning a second language but also this context enabled these teachers to learn about their own processes of learning to teach. This sociocultural context of learning, where teachers were being immersed in interactions with L2 learners in the classrooms, demonstrated to the teachers that in comparison to their students they possessed a large knowledge base. This is important because typically the defining characteristic of novice teachers is their inexperience and lacking background knowledge. This was true also in the foreign language instructional context. In that context, the participants tended to view themselves as experts of the target language and the culture they were teaching, again in comparison to their students. In the following, Helene explains how she saw her role as the foreign language teacher in her classroom:

I feel like, part of my role is to be that motivator and ... get them motivated about the language ... some sort of encourager. To get them excited about it. And, I feel like I'm a representative of both cultures. And it's like Spanish – well Latin American culture and of also, American culture, so I feel like, I'm kind of the in-between for the – at least like the students who don't have any, well like most of them ... Ninety-nine percent of them don't have any contact with them. And I also, I guess I'm the expert. I feel like, I'm – I'm the language expert. (Helene, interview, HS Spanish)

In the above example, Helene describes that she felt like the expert compared to her students. Making mental notes about feelings of self-confidence and ability increases novice teachers' feeling of self-efficacy (Bandura, 1994), which plays a crucial role in learning.

As the above examples suggest, the participants tended to refer to various different entities in talking about background knowledge based on the instructional context. Based on the data, a rough division can be made between ESL and foreign language instructional contexts, within each of which there naturally also is variation, but I am using these two categories for the sake of exemplifying the role of context in determining what knowledge the participants seemed to attempt to access. In the ESL context, the participants referred to such issues as cognitive ability, linguistic and substantive knowledge, knowledge about learning strategies, world knowledge, and experiences when talking about their background knowledge. In the foreign language context, the term *background knowledge* seemed to mainly entail knowledge about the target language and culture. The common theme in regard to the sense of efficacy about background knowledge seemed to be that no matter what the participants referred to in terms of their background knowledge, they felt a sense of confidence in the amount of knowledge they possessed related to teaching and learning second languages.

In the following, I will attempt to describe the participants' cognitive processes involved in attempting to access this knowledge base, both declarative and procedural knowledge, as evident from the data. Although some theorists believe that once information enters long-term memory, it will never be forgotten, individuals can struggle with the ability to retrieve this information from their memory (Tulving, 1972). In other words, a mere possession of

information in one's knowledge base does not automatically provide a person access to that knowledge; rather, the ability to access, or to retrieve, information from long term memory is indeed a distinct capability.

Accessing Knowledge Base: Locating Knowledge

The data analysis indicated a variety of characteristics involved in the participants' attempts to access their knowledge base. In addition, the results suggest that the participants' interaction with the context of teaching and learning played an important role in this cognitive process. The process of accessing background knowledge seemed to consist of two separate steps, (a) *locating* knowledge and (b) *utilizing* the located knowledge. I will describe the findings related to the first step below. The results regarding the second step will be presented in the following section.

The first type of process involved in accessing knowledge base was the participants' attempts to locate their declarative knowledge, that is, to be able to describe knowledge they had acquired related to teaching and learning. For example, in the following excerpt, Angelina describes the importance of activating the students in her classroom, which demonstrates her declarative knowledge of the importance of student engagement through her ability to "explicitly articulate" (Helene, focus group) issues related to teaching and learning:

I feel that it is my responsibility to get my students to engage in their learning by having them take responsibility for the information that is being asked of them. In my experience I often come across students who are bright individuals that are accustomed to having the information spoon-fed to them, but I feel that this adds very little value to their learning. (Angelina, Video Reflection-assignment)

Interestingly, context seemed to play two roles in the participants' processes of locating declarative knowledge. In some cases, context assisted the participants in their formulating their background knowledge, as is the case above in Angelina's example. This is evident in her use of the words "in my experience." Thus, context, whether her own teaching, learning, or life experiences, provided her with means to frame her knowledge in tangible terms. Similarly, Helene uses the context of her own teaching and students in explaining her understanding (her declarative knowledge) of what good learners are:

They ask questions if they don't understand something. They will say, "I don't understand". You know in high school it's not cool to ask questions but ... they're good students because they ask questions when they don't understand ... For example, this one girl today, Antonia ... she raises her hand. She's like "Señorita, I don't understand what we're supposed to do." ... so she [will] ask questions and I think that's really important. And they also take responsibility for their own learning. (Helene, interview)

In other cases, however, context seemed to make it more difficult for the participants to locate their declarative knowledge. The following excerpt from Beryl suggests that her mind seems to be occupied with dealing with this contextual information to the degree that it overshadows the issue of focus, be it assessment or literacy instruction. In other words, because of the contextual issues that she tries to process, she feels challenged to pay attention to the

substantive issue at hand and thus locate information related to this in her background knowledge:

When you get into the actual environment where you don't have students coming to class every day or when you don't have homework coming back. And just all these other things. I almost get caught up in thinking about that, like it's almost confusing as to exactly how to deal with the assessment aspect of it. Or you have limited resources so students can't take these books home so if they miss that then what are you going to do? (Beryl, focus-group)

The above example insinuates that because of the contextual factors Beryl experiences in her classroom, she has difficulty with locating her declarative knowledge, that is, determining what she knows about assessment or literacy instruction conceptually, because her mind is occupied with this contextual information.

Accessing Knowledge Base: Utilizing Knowledge

The second phase of accessing knowledge, which the participants perceived to be particularly problematic, entails knowing what to *do* with that piece of information after having accessed it. In other words, this difficulty refers to developing procedural knowledge.

Accessing is one thing but then making a decision about what you're going to do with that information is another. I have tons of knowledge [...], but deciding what you actually want to do with it and how it fits into what you see with your students or in this specific class and what they particularly need is another thing. (Violet, interview)

The important role of context in the participants' utilizing their background knowledge comes from the fact that it is often context that provides learners with the access to procedural knowledge (Anderson, 1982). This is why the participants felt that modeling by mentor teachers and university instructors was so important. Modeling provides teachers with opportunities for observational learning, where they learn by observing behaviors in a social context, that is, how something looks in practice and how a certain teaching strategy is carried out in the classroom, and form their own knowledge base based on their responses to the presented behavior (Bandura, 1994). In fact, there is "very little evidence to support an approach to learning to teach which focuses primarily on the provision of propositional knowledge" (Wideen, Mayer-Smith, & Moon, 1998, p. 160). Helene explained:

I saw it. It wasn't just in text. Someone modeling it to me, this is what it's supposed to look like. It might not go exactly that way but this is a general sort of feeling about how it should happen. Whereas when you're just reading something in a text, it just doesn't sink in. (Helene, interview)

However, in other instances, this contextual information seemed to complicate the process in that the participants felt that they needed to pay attention to many, constantly-changing, context-bound variables in their decision of how to apply declarative knowledge in practice.

There are so many things that I have in my head, so many different considerations. And you have a plan to go with that and when something else comes up at times it's difficult for me to pick out certain things that I know are ideas that I have or techniques that we've read about and actually bring them into the classroom. I think because it's ... changing all the time. (Violet, focus-group)

I think that's part of why I wrote you that I felt like I had an application disorder. Each student teaching placement has been such a unique situation that how do you apply what you know in that specific situation has definitely been a challenge. Because the context can always change in our student teaching placements so when we learn something in class that doesn't have a context with it and then try to bring it into a completely different ... bring it into some kind of context. (Violet, focus-group)

Another factor involved in successful retrieval of information from long-term memory is the depth of initial processing of information (Lockhart & Craik, 1990). The data from this study provide empirical evidence for the importance of this factor in L2 teachers' processes of utilizing their knowledge about teaching and learning. The following quote from Beryl aptly illustrates the challenge of remembering information that has initially not been thoroughly processed:

In my experience, I've learned stuff and I've thought about it, everything that we've learned in class but then I don't use it for a really long time and then I forget about it and then after the fact I'm like "oh wow yeah I knew about this and this would have been really useful in my student teaching at this point in time" but I'm ... because then there's so much other information coming in at the same time that it's hard to remember the stuff that was there from before. (Beryl, focus-group)

Craik and Lockhart (1972) maintain that memory ability is a positive function of the depth of initial processing, which might at least partially play a role in the participants' processes of utilizing knowledge. Context plays an important role in this process as well. Adequate initial processing necessitates information, not only from semantic memory, but also from information from the environment, that is, from the context (Bransford et al., 1972; McClelland & Rumelhart, 1981). The participants felt that it was easier to retrieve their background knowledge when the information they were learning at the university was presented in a similar context or using similar terms and concepts as the situations they were faced with in their student teaching placements. Cognitive learning theorists call this the *encoding specificity effect* (Tulving, 1972). A quote from Angelina illustrates:

I think I'm really lucky because I have a cooperating teacher who has really implemented a lot of the things that you guys talked about and you know, I really do see seminar as part of my student teaching. I have a hands-on place where I'm seeing this being executed. (Angelina, pre-seminar conference)

Isabelle, on the other hand, would have liked more compatibility between the information environment of the university and her student teaching placement. This is significant because all the participants in this study attended the university seminar while they did their student teaching (half-day in each setting). Despite the immediate opportunity for knowledge transfer, Isabelle felt

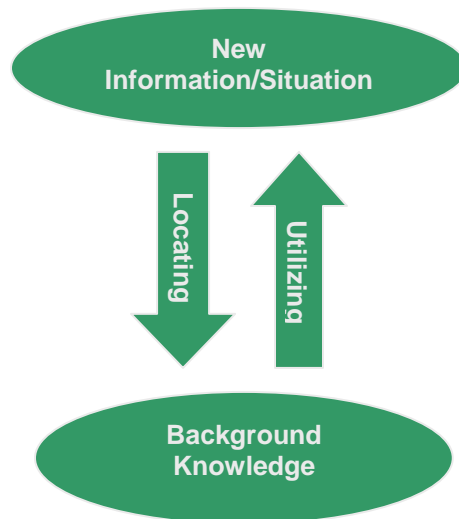
that it would have been easier for her to use the information she was exposed to at the university if it had been presented in a manner that closely resembled the context in her student teaching placement, to have “a heads-up” (focus-group) on what teaching looked like in her placement before actually trying things out in her student teaching placement.

Encoding specificity plays an important role in learning also because presenting information in a similar context during encoding and retrieval presents an opportunity for creating *repeated* connections between the new information and prior knowledge, which is typically a disadvantage that novice teachers face.

The Complexity of Accessing Background Knowledge

As the data excerpts presented above suggest, the process of accessing one's knowledge base is a complex undertaking. This two-way process of accessing background knowledge, involving locating and utilizing, is illustrated in Figure 1. During this process, upon acquiring knowledge or when faced with a new situation (*new information/situation*), a teacher needs to be able to locate this knowledge in his/her background knowledge base (*locating*) all the while considering if and in what way it relates to the situation at hand and then apply that information appropriately in practice by paying careful attention to the contextual information of the new situation (*utilizing*).

FIGURE 1
Participants' Two-way Process of Information Retrieval



In the following, I will further illustrate this complexity with instances from the data that will give us an inside look at the process of accessing background knowledge by the participants.

Movement from Declarative toward Procedural Knowledge

On multiple occasions in the data, the participants demonstrated the possession of

knowledge that did not clearly fall into either of the two categories, declarative (locating) or procedural (utilizing) knowledge. For example, even though the participants were often not yet able to apply their declarative knowledge about an issue, for example, scaffolding and supporting students' mental processing through higher level thinking, the participants' reflections on their teaching suggested that they were in the process of moving toward the possession of procedural knowledge. This can be seen in the following instances where Jessica and Helene reflect on their ESL lessons. It is evident that they possess the declarative knowledge that can be summarized as follows: they should not provide too much scaffolding when students are accessing their background knowledge, rather their students should be actively engaged in their own learning processes. Yet both Jessica and Helene realize that they are not able to provide the optimal amount of assistance in practice in the classroom. It is the level of awareness in these reflections about the disparity between what they know they should do and what they actually do in the classroom that indicates movement in the direction of procedural knowledge. Jessica and Helene wrote:

I started the lesson by asking students review questions. I wanted them to recall what they remembered from the story we'd read yesterday. While watching the video, I noticed right away that I talked a lot more than the students did. The questions were pretty easy for the students, and only required them to respond with one-word answers. (Jessica, Video Reflection-assignment, Kindergarten ESL)

I remember that the class started off fine; all of the students did their morning warm-up question and were quite engaged in answering the questions. When I got to the T-chart comparing city and country life, I felt like it started off strong but went on for too long. I was in a hard spot: do I continue because students are giving me answers or do I move on to the next subject. I also realized that I should have had students brainstorm in pairs and then come back as a class to create a list. In addition, I remember feeling that the vocabulary matching was a bit long and drawn out. What I should have done was have students match the sentences on their own in the worksheet packet ... (Helene, Video Reflection-assignment, middle school, advanced ESL)

The above excerpts from Jessica and Helene seem to indicate that they possessed the ability to identify instances where they acted against what they knew they were supposed to do in theory. I argue that awareness of this discrepancy is a sign of teacher learning toward procedural knowledge

To further clarify this, let us look at the following excerpt from Jessica. What is fascinating about this passage is that it demonstrates both instances where Jessica reflects on: (a) the discrepancy between her declarative and procedural knowledge, but also (b) the alignment of her declarative and procedural knowledge (underlined in the excerpt). In other words, in the first case she recognizes that she was not able to do in the classroom what she knew she should do, and in the latter case she acknowledges an instance where she succeeded in applying her declarative knowledge. Jessica explained:

I think I started off this discussion with the wrong question: "How do you read?" I think the question is too broad and unfamiliar. I got the sense that they didn't understand what I was asking them. Before planning this lesson I should have asked my cooperating teacher

if these students had ever been introduced to reading strategies. I see now that it would have been best to start out with some easier questions that I knew the students could answer. The students did better when I asked them to show me how they follow along with their finger, because they didn't need words to answer the question. (Jessica, Video Reflection assignment, 3rd grade ESL, varying ability levels)

Context and Utilizing Knowledge

Not only is the complexity of teachers' processes of accessing background knowledge suggested in the instances where teachers demonstrate knowledge somewhere in between declarative and procedural knowledge, but also the data suggest that the process of utilizing knowledge does not entail a straightforward cognitive transaction where one takes knowledge A and uses it in a situation B. Instead, the learner herself and the context where the knowledge is being applied add to the propositional value of the knowledge and thus become part of that knowledge and strongly affect the way it is applied in practice. This is illustrated in instances where the participants seemed to knowingly refuse to apply their declarative knowledge. In other words, while they seemed to demonstrate declarative knowledge about an issue, the data suggest that they chose to act in a conflicting manner in the classroom because of certain contextual factors. Thus, the absence of procedural knowledge was not due to lack of ability but resulted from a meta-level decision on the part of the teacher in response to context.

One of the contextual factors that seemed to affect the participants' applying their declarative knowledge in the classroom was the fact that the preservice teachers worked with ESL learners who they perceived as: (a) lacking in background knowledge, as described earlier, and (b) often coming from difficult home situations. In fact, the participants had rather emotional, strongly compassionate, responses to the needs and realities of their ESL students. This is evident in the following response of Isabelle, in which she shares her thoughts about the students in her 5th-grade ESL classroom:

I'm trying to smile a lot more or I'm trying to relax a little bit, and that helps a lot too. ... You know having that greeting is—is a huge help, so that could help their minds—switch them, “OK I am in a comfortable environment”, “I can forget everything for now and just do this and just focus on what's gonna happen.” I don't know about their personal lives ... I want them to be in a comfortable, fun, safe environment. (Isabelle, interview)

The effect of Isabelle's strong concern about her students' well-being on her knowledge processing is suggested in the following excerpt where she anticipates challenges she might face during her lesson. It is interesting that even before teaching the lesson, Isabelle comments on the fact that her expectations for her students might be too low. This implies that she possesses declarative knowledge about the appropriate level of difficulty in instructional materials but because of the ESL context and her work with ESL students, she knowingly does not apply this knowledge in practice:

I hope that the text is not too easy for them to read and comprehend. This book was picked because of their background knowledge, so I hope they don't get bored because they also get this information in social studies. (Isabelle, lesson plan)

A further example of this kind of contextual factor that seemed to affect the participants' knowledge processing by generating a strongly emotional response in the participants is the following passage from Jessica:

I am glad that they understood the question, "How do you know it's a horse?", since this is a higher-level thinking skill. (Jessica, Video Reflection-assignment, ESL, elementary)

The above example suggests that Jessica felt a certain level of unease with posing higher-level thinking questions knowing that they were difficult for her ESL students. The excerpt suggests a conflict in Jessica's thinking; she knows from her teacher education courses that questions eliciting higher-level thinking are important in L2 instruction (declarative knowledge). However, she felt uncertain about applying this knowledge (procedural knowledge) because of her emotional concerns about her L2 learners.

The strong influence of contextual factors, especially emotional reactions to the teaching situation, can be, at least partially, explained by the fact from neuroscience that the brain's main task is to help an individual to survive in a stressful situation. It has been established that novice teachers commonly function in a mode of survival perceiving multiple stimuli that trigger a myriad of undesirable emotions, such as a sense of helplessness and defensiveness (e.g., Kussrow, 2002). In this situation, the new teacher is willing to do almost anything that removes the feeling of uneasiness in the teacher (Kussrow, 2002). Thus, they are willing to act knowingly against what they know they should do, which was the case with Isabelle and Jessica, as illustrated above.

This study provides the beginnings of empirical evidence that context plays a crucial role in the process of teachers' knowledge development from declarative to procedural knowledge. The above findings suggest that the contextual experiences and information presented to the teachers during their practicing of the acquired declarative knowledge affects the application of that knowledge due to the associated emotional responses.

DISCUSSION AND IMPLICATIONS FOR SECOND LANGUAGE TEACHER EDUCATION

The results of this study shed light on the participating preservice L2 teachers' cognitive processes during their processes of accessing background knowledge while learning to teach. The findings suggest that the participants engaged in two kinds of cognitive processes related to accessing knowledge, namely locating knowledge, which referred to identifying and naming information that related to a specific situation (declarative knowledge) and utilizing knowledge, which entailed applying knowledge in practice (procedural knowledge). The findings further insinuate that the process of accessing background knowledge is a complex cognitive undertaking, in which context plays an important role. This complexity is demonstrated in instances where the knowledge structures could not be named either declarative or procedural knowledge but where the participants' knowledge seemed to be in the process of transitioning from declarative to procedural knowledge. This between-stage of knowledge acquisition implies more fine-tuned processes involved in the participants' attempts to access their knowledge. Furthermore, the findings indicate that the contexts in which the participants learn about

teaching, more specifically the participants' *reactions* to the context, affect the ways in which participants utilize their background knowledge.

This study points to the importance of the constructivist nature of learning. The learner, in this case a teacher learner, is an active participant in the process of accessing background knowledge. In this active process, the teacher is constantly analyzing, questioning, searching for explanations, and identifying relations between the new experience and what s/he already knows (King, 1995). This study suggests that it is the information related to the context of teaching and learning, be it related to students, instructional methodology, or teaching materials, that teachers used in retrieving, both locating and utilizing, information. This contextual information did not in all instances make the cognitive processing of accessing knowledge easier; rather, in some cases it complicated the process. This was the case in situations where the participants felt overwhelmed by the constantly-changing, contextual factors of the classrooms, such as student needs, constraints and lack of materials that they had difficulty with either locating knowledge they knew they possessed or utilizing knowledge they had located. In other instances, context assisted the participants in their process of accessing background knowledge. For example, they felt that modeling by university instructors and mentor teachers was helpful and that consistency between contextual information presented at the university and evident in student teaching placements assisted their accessing of knowledge. The important question that arises is: What made contextual information helpful in some cases and hindering in others? It seems that when the participants were presented with a restricted amount of contextual information that directly related to the issues they were learning about or faced with, they perceived this information to be helpful. For example, when university instructors or mentor teachers modeled classroom techniques, the contextual information to which the participants were exposed directly related to that technique by providing additional information about the students, setting, and program. However, when the participants were faced with an excessive amount of contextual information, they felt that it hindered them to be able to focus on the substantive issues at hand. This difficulty relates to the participants' status as novice teachers. Information processing theory tells us that information will be more easily retrievable from memory when there are *repeated* connections formed between the new information and prior knowledge, including information related to context (Mayer, 1987). Given that these teachers are just beginning to make connections between what they know and what they are faced with in the classroom, the retrieval paths in their cognition are not yet well-organized or well-established. Rather, beginning teachers' decision-making is characterized by explicit processing of information, which is cognitively not as effective as information processed through established mental schemata emerged from repeated connections (Salthouse, 1991). These mental schemata are well-organized knowledge structures, which enable easy and spontaneous accessing of knowledge (Stein, Way, Benningfield, & Hedgecough, 1986). The difference between an expert and a novice is that a novice has not acquired the schemata of an expert.

Also, it appears that in instances where the contextual factors caused negative emotions in the participants, such as frustration, feelings of being unprepared, and strong sympathy, the participants perceived this information to be impeding even though it was relevant to the situation. This was evident in cases where a participant might have possessed the declarative knowledge of a certain issue but *knowingly* did not apply this knowledge in the classroom because of the instructional context. Often this contextual factor was the participants' overwhelming concern for their ESL students, their lacking background knowledge, and challenging home situations. Thus, the teachers' emotional response in this kind of situation

seemed to overpower the rational choice of applying information they had learned and knew they should apply. This finding suggests that teachers' use of knowledge is strongly founded in their contexts of teaching.

How can teacher educators support teacher learners in dealing with the excessive amount of contextual information that they are faced with in their classrooms and use this information to their advantage to access knowledge? Cognitive overload is commonly experienced by novice learners, who utilize a so-called means-ends problem solving strategy (Larkin, McDermott, Simon, & Simon, 1980) based upon the principle of reducing the differences between the current state (what one knows) and the goal state (how to apply that information). This strategy imposes high levels of cognitive load because it requires attention to be directed to five different processes: (a) the current state (including information related to context), (b) the goal state (including information related to context), (c) the differences between these two (including information related to context), (d) techniques to reduce those differences, and (e) possible sub-goals leading to solution (Sweller, 1988). In essence, this is the process that the participating teachers are involved in during their two-way information retrieval process, as described in Figure 1. A problem solving strategy that requires a lesser amount of cognitive capacity is a so-called goal-free approach (Ayres, 1993; Owen & Sweller, 1985). What makes this approach cognitively efficient is the fact that instead of focusing on the differences between the current state and the goal state, the learner focuses all his or her attention on the information provided and uses it in all possible ways. Thus, this process involves a forward working problem solving strategy, where the learner begins with information that provides the most information and is the most meaningful to the learner and works his or her way through to solve other, more specific problems. This imposes a lower cognitive load because the learner begins with information that s/he is familiar with and for which s/he has existing mental schemata.

In the context of second language teacher education, this strategy would involve guiding student teachers to direct their attention to a wider range of issues related to a certain piece of information or a situation instead of focusing on a very specific question and/or a piece of information and trying, as the first step, to either find answers to that specific question or a make that specific piece of information applicable to the varying contexts. Below are two examples:

Example A. A student teacher is trying to find ways to solve the behavioral challenges she encounters with one of her students in her student teaching placement. She consults her cooperating teacher, university supervisor, and university instructors in searching for answers. She feels that she has been offered a lot of general information but none of it *directly* relates to her context of teaching. Following the principles of the goal-free effect problem solving strategy, the student could be guided to focus her immediate attention away from the goal state (how to solve the behavioral problem) to consider a wider range of issues related to this situation. What is it that she knows about issues *related* to the situation, that is, the student, the class, the school, the dynamics in the classroom, and so forth? By answering these related questions, it is argued, the student can be led to finding a solution to the immediate problem at hand.

Example B. A student teacher is introduced to a new concept, such as scaffolding, in the university seminar. He is struggling with making sense of it and feels that he cannot attach the new piece of information to anything else he knows, for example, what he has observed to take place in the classroom, what he has encountered when teaching, or what

else he has learned about teaching and learning. The strategy that the student teacher is currently using comprises a means-end approach resulting in a high level of cognitive load. Instead, the student teacher could be encouraged to focus his immediate attention away solely from the new concept and be directed to think about things that he knows related to effective learning, for example, holding students to high standards, comprehensible input, providing input at a slightly higher level than the current level of proficiency, and so forth. Again, we start with something the learner is already familiar with, in which case the knowledge structures are already anchored in the learner's long-term memory and thus do not impose a cognitive load to the working memory.

The results of this study also suggest the irreplaceable value of examples in the process of learning to teach. The teachers in this study strongly felt that the use of examples and modeling enabled them to see certain instructional strategies or principles in a real context, preferably with similar characteristics to the their student teaching placement, which helped them to see what these look like in a classroom (i.e., acquiring procedural knowledge) and thus to transfer this knowledge to their own teaching contexts. Drawing these connections between the university and the student teaching placement should be a regular component of the teacher education experience (Brinton, 2005).

One way to incorporate the use of examples into teacher education is through worked examples (Cooper, 1998; Sweller, 1999). Worked examples entail walking learners through the process of solving a problem from the beginning to the end highlighting the steps involved and strategies used in the process. This process helps learners build mental schemata in their long term memory, which they can later use in solving similar problems (which lower cognitive load).

In L2 teaching and learning contexts, it might be helpful if the teaching and learning experts, the university faculty, supervisors, and cooperating teachers, make the knowledge of teaching and learning they possess explicit to the student teachers by walking them through instructional decision-making processes involved in teaching, which includes decisions related to dealing with information about context. This could be followed by the student teacher working through, with diminishing level of support, the process of making a series of instructional decisions similar to the ones they have been exposed to by their mentor teachers and instructors.

One of the main lessons that this study offers teacher educators is that learning to teach is a process that inherently involves high-element interactivity and thus easily poses high demands for the preservice teachers' cognitive capacity. At the same time that it is important to consider ways to help preservice teachers reduce their cognitive load, it is also important for teacher educators to continue emphasizing the process nature of learning to teach. As part of this, teacher learners should be provided learning opportunities that help them become more aware of the underlying processes and stages involved in teachers' knowledge development. This increased knowledge could help teacher educators provide teachers with more successful learning experiences by making the task of learning to teach a little more manageable. Instead of considering all the things preservice teachers need to learn and do not yet know, the focus should be on raising teachers' awareness of the incremental gains in teacher knowledge teachers have attained. This requires making the tacit knowledge and knowledge development explicit through such tasks as structured and detailed self- and peer-reflections on videotaped lessons or through discussions with well-chosen prompts probing the identification of instances of knowledge development in the form of awareness and action. Teachers' focus should be shifted from using the lens of comparing themselves to expert teachers to analytically reflecting on their own

knowledge gain. Being able to see tangible signs of the gains in their knowledge base helps teachers gain self-efficacy, which plays a crucial part in successful teacher education and teacher learning. Also, it might be beneficial if university supervisors document and discuss these instances with their student teachers during observation feedback sessions. In addition, teachers should be assisted in setting realistic and obtainable goals for their preservice experience; it should be emphasized that the preservice year is just the beginning of a life-long learning process that will span over the period of the teachers' whole teaching career.

ACKNOWLEDGEMENTS

I would like to thank my study participants for so willingly sharing with me their experiences and thoughts. I feel truly fortunate to have been allowed to partake in their, often very personal and emotional, learning-to-teach processes. They, as well as all the other teacher learners I have worked with, continue to serve a tremendous source of inspiration for me as a teacher educator. In addition, I would like to extend my gratitude to Dr. Diane Tedick for helping me review and revise my manuscript.

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APPENDIX A

Descriptions of Course Assignments

Video Reflection

Students are asked to videotape a lesson in their student teaching placement and write a reflective paper on their experiences. The written assignment prompts students to reflect on the various segments of the video and comment on what they thought had happened during class prior to watching the video and after watching the video discuss the discrepancies between their initial perspective and what actually occurs in the video. In addition, students are instructed to reflect on their beliefs about teaching and learning and how they might impact their instructional decision making in the classroom. Students do this assignment multiple times during their preservice experience.

Content-based Lesson Plan

Students design a lesson following the principles of content-based instruction, where language and content are taught meaningfully integrated. Students plan the lesson for a real group of ESL learners who they currently work with in their student teaching placement. Students teach the lesson they design and reflect on the lesson. Students prepare a document describing the students and the context of instruction, state-level content and ESL standards targeted in the lesson, lesson objectives, activities, and assessment procedures. In the last part, students reflect on the process of designing the lesson, the decision-making processes involved and comment on the sources that informed them in that decision making.

Curriculum Unit

Students design an instructional plan for ten hours of instruction that focuses on an overarching academic content area or theme. The components of each lesson in the sequence are similar to those in the Content-based Lesson Plan. The difference is that this assignment sets longer-term goals and targets either a secondary ESL or FL student population because that is the instructional context that the students are doing their student teaching in while working on the unit.

Reflection Notebook

Students keep a reflective journal where they write their responses to the course readings assigned in the university seminar. Students can choose from a list of prompts or come up with their own focus for the reflection. Some of the teacher-provided prompts are “My favorite quotes,” “Connections between what I read for today and what I’m seeing in my student teaching placement,” and “Comparison of issues discussed in the readings in second and foreign language contexts.”