

Constructing constructivism: how student-teachers construct ideas of development, knowledge, learning, and teaching

Linda R. Kroll*

Mills College, Oakland, CA, USA

This case study investigates the development of the understanding of constructivist theory among students in a Masters level elementary teacher education program within a particular course. The focus of the study is a seminar entitled 'Advanced Seminar in Child Development'. The questions explored include: How do students' ideas of teaching, learning and knowledge develop within the context of their experience in this course? How do they come to understand constructivism? What are their definitions of constructivism? What is the course of the development of this understanding? The nature of the students' learning processes is examined through three sources of data: dialog journals, videotaped sessions and the instructor's reflective teaching journal. The study looks both at student development and instructional practice to further understanding of how student-teachers can learn to apply constructivist theory to their teaching and to understand the learning process, both within themselves and their students. Their development is placed in the context of Korthagen and Kessels's model of teacher understanding and practice, and within a broader context of principles of practice that emphasize a belief in equity and social justice. The case illustrates how the way student-teachers are taught theory can help them integrate their own ideas of learning and teaching with constructivist theory in order to think critically about their own practice in an ongoing developmental manner.

Introduction

As students study to become teachers they must form concepts about what learning and teaching are. Within the confines of a teacher education program that believes in a constructivist and developmental view of the teaching and learning process, students must also develop an understanding of the theory of constructivism. The purpose of this study is to look at one context in which students in a graduate teacher education program at a small liberal arts college in the midst of a large urban school district (where many of the students will teach) develop their ideas of development, learning, teaching, the nature of knowledge and constructivism. The focus of the

*Professor and Dean of Education, Mills College, 5000 MacArthur Boulevard, Oakland, CA 94613, USA. Email: lindak@mills.edu

study is a seminar entitled 'Advanced Seminar in Child Development'. The questions to be answered are: How do students' ideas of teaching and learning develop within the context of their experience in this course? How do their ideas about the nature of knowledge develop and change? How do they come to understand constructivism? What is the course of the development of these understandings in the context of this class experience?

Perspectives

Students who are studying to become teachers begin their studies with personal, preconceived notions about the nature of teaching and learning. They bring with them anywhere from 16 to 20 years of personal experience as students themselves, and, in addition, have often served as teachers in a variety of capacities. The notion of learning as a process of construction and reconstruction often conflicts with their own naïve views of teaching as telling and learning as copying or memorizing what is 'true'. Thus, in the context of a teacher education program built on principles that include the notion of learning as a developmental/constructivist process, we create contexts in which they can challenge their own assumptions.

Constructivism, or constructivist theories, represent a multiplicity of ways to think about learning and development, and consequently about teaching. Steffe and Gale (1995) underscore this multiplicity by noting that a single colloquium series on alternative epistemologies in education included six different constructivist paradigms, which they identify as social constructivism, radical constructivism, social constructionism, information-processing constructivism, cybernetic systems, and sociocultural approaches to mediated action. Thus, in thinking about how to teach about constructivism in the context of thinking about teaching and learning, students need to be exposed to the variety of ways this theoretical perspective is framed. The approaches lie along a continuum from individual construction of knowledge to social construction of knowledge. Cobb (1996) makes an important contribution in demonstrating how the span of the continuum contributes to our understanding of how people learn, with different constructivist perspectives acting as foreground and background for one another. Thus, in thinking about how to teach student-teachers about constructivism, a range of ideas and readings are presented. Students are expected to struggle with the readings and ideas and begin to construct for themselves an articulated vision of learning, teaching, development and knowledge.

We know student-teachers' (and experienced teachers') ideas about the nature of learning, teaching, development and knowledge change across time, as they become more experienced in their profession (Ammon & Hutcheson, 1989). Part of this developmental change is as a result of instructional experiences they have as student-teachers, at the university. All student-teachers have some coursework about development and theoretical perspectives on learning and teaching.

It is well recognized that students have difficulty connecting theory and practice. Korthagen and Kessels (1999) point out a lack of transfer between theoretical content of pre-service programs and teachers' practice. Korthagen and Kessels categorize teacher knowledge as either mostly perceptual and situated or mostly conceptual and

general. They describe the relationship between teacher knowledge and teacher behavior in three levels: 'gestalt' or 'holistic', 'schema' or 'networks of elements and relations', and 'theory' or 'logical ordering of the relations in the schema' (1999, p. 10). Korthagen and Kessels are careful to point out that this is theory with a small 't', a personal theory about teaching, and contrast it to theory with a big 'T', which might include theoretical learning created by others. They also propose that, in order to significantly influence the practice of new teachers, pre-service teacher education programs ought to consider the three levels of teacher knowledge and practice, not just theory. In describing their 'realistic approach' (1999, p. 7) to teacher education, Korthagen and Kessels argue for the need among pre-service programs to provide teacher candidates with opportunities to reflect upon their own *gestalts*. Similarly, reflecting upon schemas in relation to *gestalts* and theories leads to a restructuring of theories that are coherent with the other two levels of knowledge. Eventually, through a process the Korthagen and Kessels describe as 'level reduction', teacher candidates are able to re-combine *gestalts*, schemas, and theories into a single *gestalt* (1999, p. 10). Korthagen and Kessels's model represents a constructivist view of teacher learning. The reflection and reconstruction of ideas at more complex levels, what Korthagen and Kessels call 'level reduction', reflects Piaget's notion of reflexive abstraction (Piaget, 1985) and Vygotsky's notion of the development of scientific concepts (Vygotsky, 1986).

While this course represents the greatest exposure to theory within the teacher education program, the course is taught in such a way that students are constantly being asked to reflect on how what they are reading reflects both their own learning processes and how it might reflect the learning they are observing and facilitating in their student-teaching. This course is designed to help students develop an understanding of theoretical ideas created by others while simultaneously beginning to develop their own personal theories of learning and development.

Methods

This investigation is framed as a case study for several reasons. First, a critical case study allowed me to examine closely students' development of ideas of constructivism within a specific context, namely that of the seminar. Second, a case study allowed me to use my own notes, plans, and reflections about the process as a participant observer. As such, my agenda as a teacher became part of the study, not a variable to control for. Third, a case study facilitates making this work public and open for scrutiny and use by others (Shulman, 2000) and as such can contribute to our understanding of the teaching of constructivism as well as the learning of it. The unit of analysis in our case study is the advanced seminar, although I identify students and myself as an instructor as important subunits (Yin, 1994).

Context for the study

The subjects in the study were 20 graduate students attending a two-year Masters and credential program in early childhood education and teacher preparation. Most of the

students were in their first semester of the program, but three of them were second-year students. All of the students were women.

A principled approach to teacher education. The graduate programs in education at my institution are based on a set of principles that represent the underlying philosophical position of the department with regard to teaching and the care and guidance of children and youth. These six principles are referred to in our department literature, are spoken of explicitly throughout the programs, and are the basis for our current state-approved credential programs. For our multiple subjects (elementary) and single subject (secondary) credential program, the principles are the standards to which our students must strive and toward which we must educate them.

We believe a principled approach furthers our students' ability to build a framework in which they can better understand and control their work. The six principles (see Table 1) get at what we believe is at the essence of teaching: relationships, subject matter, learning and development, context for learning and teaching. Specific expressions of these principles occur in both coursework and fieldwork components of our program and help us and our students think about teaching and learning. The six principles also provide a touchstone for all of us to evaluate and consider our practices in the context of classroom, school, community, and culture.

The principles provide faculty and students with a guide to analyze teaching practice reflected in the following questions: What are the moral consequences of what we are doing and asking students to do? How does this particular activity or discussion or materials reflect the notion of an ethic of care? What essential question can we think about based on what we are teaching? What do we want to know about students' learning and development from this activity? Which students are engaged in what ways with this content? What does this tell us about the nature of what we are trying to teach? What are the larger consequences for learning or not learning this material?

A principled approach to teacher education affords us a set of lenses and language with which to view and talk about teaching and learning. These lenses appeal to a set

Table 1. Mills College principles for achieving equity and social justice in education

Teaching is inherently moral work that must be guided by an ethic of care
Teaching is reflective work that requires active and systematic inquiry for learning throughout the teacher's career
Learning is a developmental and constructivist and, thus, teaching is best guided by those conceptions of how learners come to know
Teaching is connected in deep and important ways to subject matter. A central goal of the work is to prepare students to acquire, understand, and construct powerful subject matter knowledge
Teaching is collegial in that both teachers and students learn in the context of relationships that matter. Colleagues and community are central
Teaching is inherently political in that by definition, it is concerned with matters of change that are neither neutral nor inconsequential

of beliefs that extend beyond theory and that arise from a concern for social justice and equity. In being explicit about these principles and their relationship to everyday teaching practice, we accomplish two important goals. First, we model and promote conversations about teaching and learning that go beyond atomistic instances or anecdotes. Second, we prompt students to consider their own values and beliefs in relation to their teaching. This constructivist feature of our teacher education program agrees with the fundamental tenet in Korthagen and Kessels's (1999) approach of reflecting on gestalts and schemas to achieve integrated theoretical understandings.

The advanced seminar in child development. The advanced seminar is a required course for all of the Early Childhood Masters candidates, those who are earning a Masters degree and those who are earning both a Masters degree and a teaching credential with an early childhood (either regular or special education) emphasis.¹ Most students take it in their first semester, in conjunction with a practicum and course focused on student-teaching in the laboratory school, and often in conjunction with an introductory course in child development. The class is designed differently from any other course in the program. It does not have a reading list that each class year of students reads. Rather, as the instructor, I choose new readings each year, often readings that I am interested in reading for the first time as well. Thus, the nature of the reading list sets us up as learners together from the beginning.

The particular group of students in this study were members of this class in the Fall semester, 2000. We met twice a week for an hour and a quarter each time. A new reading was required for every class. The readings presented a breadth of approaches to constructivism, specifically in relation to children's learning in a school situation. (See Appendix 1 for the course readings.) For the first meeting each week students brought a journal response to the readings for that week. At the second meeting (the next day) I returned their journals to them, with a personal response to their entries. Thus, the journals were conceived of and enacted as an ongoing dialog between the student, the instructor and the particular readings for that week. Students were expected to complete the journal entries before the class discussions. Writing about the readings before coming to class enabled them to be more proactive and participatory in the ensuing discussion. Often students would reflect again on the readings during the next week.

What students wrote in their journals took a variety of approaches. The assignment in the syllabus simply said:

You will keep a journal about the reading you do for this course. You will write in the journal on a weekly basis and I will respond to you and return your logs to you each week ... you are expected to respond in your journal to **all** the readings.

Orally, I emphasized that I did not want students to simply summarize the readings, although they might need to begin by doing some summary. In class we did activities designed to help them get into the readings (e.g. choosing a quote and responding to it or explaining why it was significant, asking a question of the text and then trying to answer it, relating what we read to our own learning and teaching experiences). To

begin with, most students were very uncomfortable with what they saw as lack of direction, or the lack of a 'right answer' to the journals. In my responses, I tried to guide students to deeper thinking through reflecting on what they had said, posing new questions, or soliciting their opinions on particular perspectives (thus asking them to compare their own learning and teaching experience with what was expressed in the readings). Class discussions built on what they wrote about in their journals and often helped them to reconstruct their understandings of the readings on the spot.

Since one of my goals for this seminar was that students would reconstruct their own ideas about teaching and learning, I used a variety of teaching and learning activities. I varied these activities to interpret the readings to both give them tools they could use individually, as they were reading, and tools they could use in the classroom together, to support the social construction of a public understanding about these ideas. One activity was to choose a favorite quote and respond to it, first in writing and then to present this response to a partner, initially, and ultimately to the class. A second similar activity was to ask a question of the text, again working in pairs, in small groups and with the whole group. Throughout these activities we would emphasize mutual respect and turn taking. I encouraged risk-taking—all ideas were interesting and important.

A second discussion generating activity was to brainstorm examples of models of thinking or learning described in the readings. After reading Wertsch's (1995) chapter on activity-centered learning and mediated actions, we generated a long list of human actions that had been changed or mediated by changes in tools. This brainstorming helped the students to better understand what Wertsch was discussing in his chapter. We did this again after reading Rogoff's (1995) chapter on the apprenticeship model. Rogoff uses the sale of Girl Scout cookies for her example of levels of participation. Many of my students were unfamiliar with this activity, but could generate examples of classroom activities that lent themselves to a similar analysis. Similarly, using Duckworth's (1996) model of the difference between beliefs and concepts in describing educational goals to clarify our own understanding of beliefs with regard to particular personal educational goals was very helpful in deepening their understanding of Duckworth's points.

A third activity was to find interesting thinking problems in the readings that they, too, wanted to think about. Duckworth (1996) was a particularly rich source for such problems since she would describe the thinking about scientific and mathematical problems that either children or teachers were working on. Some problems I proposed that we work on, some the students proposed as interesting. During this school year the students identified several problems, including understanding the cycles of the moon and the workings of stable and unstable equilibrium with regard to helium balloons.

A final 'unusual' activity was asking the students to make visual representations of major new terms that we read: zone of proximal development, funds of knowledge, situated cognition, Rogoff's apprenticeship model. These drawings were sometimes done alone, sometimes in pairs and sometimes in small groups. The discussions that occurred during the group drawings and during the explanation added to our public

understanding of what these terms might mean and how we might 'see' them represented in our own learning and teaching experiences. These drawings were posted in the classroom and remained there throughout the rest of the semester as a reference to which we could periodically refer. (In years past we have redone the drawings after a number of weeks and new readings to see whether our conceptions of these ideas can now be represented differently. However, I did not do this during Fall 2000.)

Data sources

To understand the changes and developments in students' thinking about constructivism, and the teaching and learning activities that accompanied this development, there were several sources of data. The weekly dialog journals were available for analysis. Each student wrote a final entry, which directly addressed specific questions about the nature of learning, teaching and constructivism; these writings also form part of the data-set. In addition, the instructor kept a weekly reflective journal and ongoing notes during the seminar meetings. Students' occasional in class writings were collected as well. Videotapes of three selected sessions provide additional triangulating data. Finally, student evaluations of the course, both numerical and narrative, were used to supplement the instructor's view of how students felt about the seminar and what they were learning. An additional data source is the reading list that all students were required to read and respond to.

Data analysis

By examining the weekly dialog journals the development in the thinking of each of 13² of the 20 students was traced. Three students' journals were examined in detail as representative of different ways that students approached the readings and the class. For all students, their ideas at the beginning of the semester about teaching and learning were compared across the semester as their ideas changed. Changes in their use of vocabulary, their ability to take learning or teaching incidents and apply the readings to understanding these incidents differently, and their questioning of the readings themselves were all tabulated and analyzed.³ These categories represent constructivist ways of responding to the content. Vygotsky (1986) emphasizes the importance of language in learning. In considering school-based instruction and learning Vygotsky says 'The development of a scientific concept ... usually *begins* with its verbal definition and its use in nonspontaneous operations ...' (1986, p. 192). Thus, how students used the new vocabulary they were learning, how the use of that vocabulary changed, and how they continually redefined new concepts are constructivist examples of learning new ideas. Their ability to take learning or teaching incidents and apply the reading to understanding these incidents differently is an example of Korthagen and Kessels's process of reconstructing *gestalts* into *schemas*. Taking a teaching (or learning) occurrence where they responded from their previous experience and reflecting on it to see how it fit into the larger scheme of the theoretical ideas being discussed supported this reconstruction to schema process. Reflection and

inquiry are essential to a constructivist process of learning. Raising questions about the readings supported this reflective and inquiring activity.

For all 13 students, their final entries, where they answered questions regarding definitions of teaching, learning and constructivism, were compared with one another and with the ideas they had been considering all semester. (See Appendix 2 for the final question to which they responded.) Student participation, both orally and in writing, was examined as to use of new vocabulary, risk-taking in asking questions of the text and of one another, and in bringing real teaching incidents forward for examination in light of the new ideas being considered. The videotapes showcase two kinds of sessions, one in which the content discussed is the reading and the other in which the content discussed is the students' own learning of scientific content, such as astronomy and physics, in the context of a particular scientific activity (as inspired by Eleanor Duckworth). Student qualitative and quantitative evaluations of the seminar for the past three years (1998–2000) were compared.⁴ A last piece of analysis was examination of the instructor's role in facilitating the seminar, both in writing in the dialog journals and in questions and activities during the seminar itself. How and if students responded to questions in the journal, and how that correlated with students' developing ideas were two perspectives taken on these parts of the data.

Findings

Student evaluations

Student evaluations rated the course over the past three years as uniformly excellent. Students felt challenged and stretched by the material and by the perceived radical way in which the course was taught. Students commented on their initial sense of unease and eventual celebration of the learning process.

Journal analysis

Three of the 20 student journals were analyzed in detail for the three identified aspects: use of new vocabulary, relating the readings to their own learning and teaching experiences, and asking questions of the text itself, or of the ideas presented in the text. These students were initially selected because they represented my assessment at the end of the semester of the range of student understanding of the material. Thus, I identified one very able student, Krissy⁵ (with regard to this material), one middle level, Maria, and one seemingly struggling with the material, Laurie. As I said, this was my assessment before examining their journals with regard to these criteria. We shall see whether this assessment represents a reality. In any case, these students certainly responded differently to the readings and the class.

Krissy came to the class as a first-year student with two years of assisting in a kindergarten classroom in a private school as her prior teaching experience. She was a very serious student, particularly concerned about getting the right answer and doing what was expected of her. Maria was also a first-year student whose previous teaching experience included substituting in a local school district in very challenging,

urban settings and assistant teaching in a small parochial school where she herself had been a student. Maria, too, was a very serious student, who throughout the semester questioned both her own ability and her own passion about being a teacher. Laurie, also a first-year student, was older. She had been working in many different settings with children and their families, particularly with Native American children. She herself is Native American. Her goal differed from that of Krissy and Maria, who both intend to become classroom teachers at the K-5 level. She was enrolled in the Early Childhood Special Education credential program (as well as the Masters in Early Childhood). Laurie struggled the most with the readings, but had a vast experience on which to draw to help her understand what we were doing.

One interesting finding is the percentage of comments that were representative of each of the three categories: vocabulary, relating the readings to one's own experience and questioning the reading (see Table 2).

Krissy and Maria had a similar number of entries that could be categorized. Laurie's journal was somewhat shorter, but the lower number of categorical entries is primarily due to her spending most of her time writing about her own teaching experiences in light of the readings. Her tendency was to select a quote or concept in the current reading, and then associate what she understood from that quote to her own past or current teaching experience. Her extensive previous experience was the lens through which she could make some sense of these highly abstract, theoretical readings. Early in the semester she said:

... As I sit in class listening, reading the material and listening to the discussions in class, my mind thinks about all the situations I've encountered that relate to some of the theories we are exploring.

Reflecting on Duckworth's explanation or Piaget's theory on 'Understanding Children's Understanding' he [*sic*] illustrates a model to explore two children's thinking. A similar experience occurred in the preschool one afternoon ... (Laurie, Journal 2, 12 September 2000)

She then wrote in great detail about an experiment two children made with 10 feet of plastic gutter, water and sand. She described in careful detail each child's reactions and each child's attempts to explore the functioning of these materials. She then concluded:

I learned here in this situation several things. One, the 3.10 child's thought processes were not as developed as the 4.2. Two, the 4.2 explored through observation all the possibilities (I think) on what effects the water would have on the sand [wet and dry] ...

My thinking on Duckworth's chapter on 'Learning with Breadth and Depth' tells me that the 4.2 year old's thought process are [*sic*] beginning to make different kinds of

Table 2. Journal entries by category and student

Student	Vocabulary	Reading to own experience	Questioning reading or ideas	Total
Krissy	47% (43)	38% (35)	15% (14)	100% (92)
Maria	42% (35)	28% (23)	30% (25)	100% (83)
Laurie	30% (7)	70% (16)	0	100% (23)

connections as he gradually explores different spheres of experiences. (Laurie, Journal 2, 12 September 2000)

She made use of two major points about these chapters—one, that it is important to understand how children understand a particular situation, and that a teacher can make sense of a child's understanding through observation and through setting up interesting activities for children to engage in that will challenge the child's assumptions; and two, that children need time to explore an activity in order to make different conceptual connections. Thus, for Laurie, relating the readings to her own teaching experiences was a way of making sense of the main points of the reading.

It is also interesting to look at the kinds of responses the students made over time. For example, in Maria's journal, most of the questioning items (21/25) occurred in the first two months of the semester (end of August through end of October). Less than one-half (14/35) of the vocabulary occurred during that same time. Maria spent the first half of the journal vociferously questioning the readings, her own ideas, her own experiences and the overall philosophy that she sensed in the program. With the first reading (by Duckworth), she began by questioning what she perceived of as our society's goals for our children. 'Why are we in such a hurry to speed up development and understanding? Is the goal to enhance the child or the educator's pride?' (Maria, Journal 1, 4 September 2000). She bombarded her journal reader with questions about what teachers ought to do: 'Doesn't a teacher have to be practical? ... How many nine-year olds can see the relevance of grammar and long-division? Where is the line between creative thought and societies [*sic*] necessities?' She also asked questions that related to teaching to individual differences: 'How does a teacher guide and educate a group? ... If you present the same information four different ways, couldn't that lead to confusion rather than clarity? Plus, how do I as the teacher learn to see information from various perspectives? Am I to somehow overcome my own, natural view or way of learning?' (Maria, Journal 1, 4 September 2000). She acknowledged her franticness later on in the entry, but continued to question vehemently for the next few weeks. At the same time, she continually considered her changing definitions of learning and teaching:

Until last week, I truly thought that if a child paid attention and if I explained the information correctly, then learning would happen. Now I don't really see my presence as all that necessary. (Maria, Journal 2, 4 September 2000)

In order for me to learn how children are thinking, I need to first become a better listener ... I am sure that if I spoke less and listened more, better results could be achieved ... I need to accept and apply the idea that learning does not need to include getting the right answer. (Maria, Journal 3, 13 September 2000)

In response to Duckworth's statement that wrong ideas can be productive (Duckworth, 1996), she commented 'What I still cannot get beyond, is the shame I feel when I don't get something right' (Maria, Journal 4, 13 September 2000). Thus, Maria's way of getting into the readings was quite different from Laurie's. While Laurie used her own experience with children to understand what the readings mean, Maria asked questions of the reading, of her own beliefs and of her own actions, to make sense of what she was reading. By the end of the semester she asked fewer questions and her questions were at that point about what something meant, rather than

about whether her beliefs were right or wrong. In response to Von Glasersfeld she wrote:

It's my opinion that no one can completely control what someone else learns. I think that a teacher must do her best to determine what a student knows/thinks/believes and then work from there ... to work within a child's ZPD [zone of proximal development].
(Maria, Journal 24, 12 December 2000)

Maria worked her way through the readings primarily through questioning and redefining the vocabulary.

Rather than ask questions of the text directly, as Maria does, Krissy sought to define what was meant by the old and new terms she was reading. In response to Rogoff's presentation of the apprenticeship model, she attempted both a verbal and visual representation of what Rogoff means. Here is a small portion of her reflections:

A key factor in Rogoff's theory is that these realms, the personal, interpersonal, and the cultural, as well as the concepts of apprenticeship, guided participation, and participatory appropriation, cannot be separated from one another. They are completely interdependent, and even though one may examine a part of this relationship, it is crucial to see that part as one element in a system that relies on all parts working together ... I don't even know if a visual model will help me understand the relationship between these concepts, but I have been trying to figure out what it might look like [and she includes a drawing]. (Krissy, Journal 6, 19 September 2000)

She took a chapter she found very dense and, in a variety of ways, attempted to clarify for herself what each of the new terms meant and how they related to one another. This process, that she used repeatedly, allowed her to adopt the new vocabulary (with her own understandings of what these new terms mean) into her own thinking about learning, teaching and knowledge. Because she used this process to directly address the readings, my responses to her (in the form of questions—'where are you now with your question about individual development') propelled her to continually reconsider her assumptions and to try to fit her own understandings into what she thought the authors of the texts meant.

In addition, she applied the experiences she was having *in the class* to understand what the readings meant.

I really enjoyed seeing the way this concept of many understandings unfold(ed) in our discussion on Thursday. We were all trying to figure out what Timmy was understanding. [reference to Duckworth (1996)] We were trying to understand why it was so difficult for him to figure out why he needed 13 more blocks rather than 9 ... Almost each person had a different way of teaching this, thus a different way of making sense of it and understanding it. I was thinking of a solution in a certain way. Then Ellen suggested that Timmy make Sammy's model look just like his, then count up the blocks he took off, then add them to his to make it complete. Brilliant. I never thought of it that way, but it is the way that makes most sense to me ... We found in our discussion that seeing a problem through many eyes leads to a much more thorough solution than seeing it through just one set of eyes." (Krissy, Journal 4, 13 September 2000)

Krissy reflected in the journals repeatedly how she was making the ideas more her own.

As I reflect upon my learning style I realize that I am a constructivist learner. In the beginning of this year I was not truly comfortable with this type of learning ... Although

inspired from different authors and discussions, my thoughts and ideas are my own. It is really interesting for me to reflect upon myself as a learner. (Krissy, Journal 20, 28 November 2000)

She referred repeatedly to how she was questioning her old assumptions, using the new ideas she has gleaned to make them her own. Thus, she combined defining the new vocabulary with relating these ideas to her own learning (rather than to her teaching experience). This process enabled her to construct and reconstruct her own ideas about learning and teaching and the nature of knowledge.

Analysis of the final answer

Each student showed growth and development in her ideas about her own learning and the learning of the students with whom she worked, and developed a complex definition of learning, teaching and knowledge construction grounded in the variety of readings and theoretical perspectives experienced during the semester. The final question asked them to reflect on their own learning over the semester by rereading their journal and my responses, and then to consider the larger questions we had been grappling with all semester—questions like: What is learning? When does it occur? What is teaching? How can we most effectively teach? What is knowledge and where does it reside? (See Appendix 2 for the final question.)

Again, we look in detail at the three identified students. Each of these women had approached the readings in different ways. Each of them wrote an interesting thoughtful answer, attempting to incorporate some or all of the different readings and perspectives that we had examined over the semester. Using the lens of constructivism and the various categories of response, I found that each of these answers was valuable and represented important development and learning for each student. Each student maintained her ‘way’ of approaching the readings in thinking about the final question. Laurie took a single incident and related many of the readings from the class to interpret it. She also made use of the readings from the class in development and learning that she was taking simultaneously. Integrating her learning from both classes, she says ‘I find myself looking for opportunities to enhance a child’s learning. Opportunities are everywhere a child is at’ (Laurie, final question, 8 December 1000).

Maria began her response to the final question by reflecting on her journal as a whole. ‘Looking back through my journal it seems that I have used this semester to focus on the role of the teacher; how she affects her student’s learning and development.’ She traced the evolution of her thinking about this question through most of the readings, and concluded:

Despite all of my questions, I feel as though I have a stronger understanding and appreciation for what it means to be a constructivist teacher. I feel more confident because I do not feel the pressure to always have the right answer...

I now swim in my confusion; I am no longer drowning in it. I almost hope my disequilibrium continues throughout my career, only temporarily cleared by new understandings because the best blessing I can imagine is to always find new ideas with which I can struggle. (Maria, final question, 8 December 2000)

Maria used her questions, of the readings and herself, as a way to understand the readings and, ultimately, as a way to respond to the final question. This resulted in an integration for her of the readings under the aegis of defining the role of the teacher and allowing herself to be not sure or confused some of the time.

Krissy began her answer to the final question by examining her own experience in the class and relating those experiences to the general ideas of Piagetian and Vygotskian definitions of development and learning. She said: 'People actively construct their understanding through interaction with objects and individuals, through questioning and exploring, through discussion and reflecting' (Krissy, final question, 8 December 2000). She talked about how she saw this process in practice in the seminar and then went on to consider how questions about learning, the role of the teacher and the role of the school were answered and explicated by the different readings we discussed. She moved from understanding the part children's understanding plays in their learning to looking at her own role as a teacher in the child's learning process, to the nature of knowledge. She said:

The constructivist notions of where knowledge resides runs the gamut from being held within the individual to being totally distributed among a group, to lying within the activity of that group ... it is impossible to consider the individual without considering the environment and activities that surround them [*sic*] and that they are a part of ... it is also impossible to consider the environment or the activity without considering what each individual brings to that activity and what each individual will get out of it.

... I have come to an understanding that knowledge is constructed by individuals through interaction with other individuals involved in a culturally based activity. In this construction of knowledge, different individual's funds of knowledge [Moll, 1991], distributed cognitions [Salomon, 1993], and group discourse all play a significant role. The social, cultural and historical aspects of the activity also play a significant role in the individual's construction of knowledge...ultimately, this construction occurs in the mind of the individual ... (Krissy, final question, 8 December 2000)

Krissy concluded with an important insight: 'We can develop our understanding...through discussion and reflection, but in the end, the knowledge that we construct is unique to ourselves. It is as individualistic as a fingerprint' (Krissy, final question, 8 December 2000).

There were individual differences in the ways students went about making sense of the readings and the discussions and in the conclusions they drew about their own learning. There was also diversity in their own personal definitions of constructivism. In the answer to the final question, students demonstrated varying ways of making connections between the theories they had been learning about and their own burgeoning personal theories of learning and teaching. It is probable that this understanding was temporary and in Korthagen and Kessels's terms schematic, and not yet in the category of level reduction of theoretical understandings (Korthagen & Kessels, 1999). As interesting as the conclusions that they drew are, equally important to their development is the process of developing these conclusions. To look more closely at the process, I briefly examine my own role in the seminar, looking at my responses to the journal and my reflections in my own journal about what I was trying to achieve, as well as the class activities we did to clarify and expand on the readings and written discussions.

Journal responses

Journal responses varied with individuals.⁶ Despite my recommendations, some students felt compelled to summarize the readings. Others summarized the readings to clarify their thinking about them. My comments were designed to push them forward in the readings. One way I responded was to comment on something they had said and confirm that it was interesting and, perhaps, elaborate on it or put it in my words as ‘I think this is what you are saying and here is what it makes me think about’. For example, Maria says in response to readings from Scholnik *et al.* (1999):

It also helped me to realize that new theories begin by examining old ones. I admit that I have been wondering why theorists focus on what I sometimes see as minute details. Now I think that through their efforts of explanation they may inspire others into further research...It helps (me) when I first read, then discuss with my classmates and then go back to the reading on my own. (Maria, Journal 17, 14 November 2000)

I responded:

It is a very intelligent observation to make—that theorists build on each other’s ideas—and are inspired by each other to further research. And your analogy with your own learning—how you understand better once you have read, then talked and then reread is very insightful. (16 November 2000)

Another way I responded was to ask questions. I often asked them to consider or reconsider some of their stated ideas, or to clarify what they meant. In response to some comments she made about the relationship between concepts, educational goals and beliefs, I asked Gloria a question about a Duckworth chapter (1996): ‘Why does she [Duckworth] use the word beliefs instead of educational goals?’ (6 September 2000). Gloria responded at length:

Her possible reason for that didn’t come to me until the end of class Wednesday. Because some people went through the exercise you posed to us by trying to phrase their educational goal to fit into each of Duckworth’s beliefs, it became clear that some goals can be phrased in more than one way and that the way you phrase the goal will influence how you go about teaching that goal. By using the word belief instead of educational goal, Duckworth highlights that our ‘goals’ are not as objective as we may think, but that our teaching goals are influenced by our subjective belief system. (Gloria, 12 September 2000)

Gloria’s response indicates that this written dialog was facilitating changes in her understanding of essential ideas in the readings. Her comments also indicate that she was making connections between the readings, the journal discussion and the class activities.

Gloria was one of those ideal students who continually problematized what she was reading to relate it to all aspects of the class. However, other students had more difficulty grappling with the material and, thus, my questions to them were designed to help them consider the readings and the ideas in the readings. Rhonda, for example, began each journal entry identifying what it was she did not understand and then going on to relate the readings to her own experience and to try to clarify the vocabulary. Early on I asked her questions to which she responded dutifully. In a discussion on this same chapter to which Gloria has referred, Rhonda says:

I hadn't ever pondered over the term 'concepts' like Duckworth did, but in reading the chapter I was able to understand the dilemma of not being able to sum up a number of ideas into one term or one noun ... I never thought about there being different kinds of beliefs ... it is difficult to incorporate the beliefs described in this chapter in teaching ... is it a step-by-step process or are we only capable of instilling 'the-way-things-are' beliefs in students? (Rhonda, 6 September 2000)

After making a number of comments about her entry, I asked Rhonda 'How do you think she [Duckworth] might be thinking about knowledge?'" Rhonda replied:

I don't think she's thinking about knowledge at all. I think she is more concerned with the items that make up knowledge. From all the Duckworth readings it seems as though she's looking more at the parts rather than at the whole picture. She seems to be taking things apart and making sense of these things on their own rather than in connection with something else. (Rhonda, 13 September 2000)

A fascinating response, which I believe shows how *she* (Rhonda) is understanding what we are reading! Her response provoked an ongoing discussion between us for two more turns, in which she reflected on her own growing understanding of the relationship between the parts and whole of what we were reading. Rhonda was one student whom I frequently questioned, trying to push her forward in her reasoning and thinking about the chapters.

While Rhonda was able to fairly quickly internalize the response–reflection–response cycle into her own thinking about the readings, other students had more difficulty with this. Two students, for example, Barbara and Laurie, had more difficulty making sense of the readings. Barbara's tendency was to ask questions in order to make sense of the ideas. In her journal entries, questions comprised 42% of her entries (which was more even than Maria who used questions to good advantage to begin with). I frequently did not understand to what her questions referred, so I asked questions about her questions. In reflection, I do not think this was particularly helpful to Barbara. I said as much in my final response to her.

Laurie, on the other hand, related all the readings to her own experiences. My efforts to take her beyond her own experiences were not as effective as I would have wished. For example, in response to one of her entries I said:

I think you are talking about Tudge's [Tudge, 1990] experiments with peer collaboration in your discussion of the children playing the hi ho cherry-o game—and you also refer to Piaget's ideas about preconceptual and intuitive levels of thinking [here I'm trying to model for her how to relate the readings to her examples]. But I'm not clear how these relate to your example. Next time, why not give me a quote or short paraphrase of what you are referring your own experience to. (15 October 2000)

In the next entry, Laurie literally followed my suggestion. She began her entry with a quote from Salomon, the current reading, and then gave an example of what she thought Salomon meant. This was definitely progress, but it meant she was only thinking about one small part of the reading, and neither considered the ideas in the reading as a whole, nor compared one to another.

Thus, the responses I made to their journal entries were directed and constrained by their responses. In retrospect, this seems the mark of a true dialog, a positive finding. Each student began at her own level of understanding with regard to reading

these difficult theoretical pieces. Each of them made good use of the journal to reflect on the readings, to take them seriously, and to relate them to her own practice.

Findings from the class activities

The students had identified Duckworth's moon observation problem as something they would like to try. We worked on the moon problem part of every class meeting for about four weeks. We began by observing the moon over a number of evenings and recording our observations. In Duckworth (1996) she presents a drawing of the moon and a question about whether and when the moon could 'look like this' (p. 81). This drawing sparked discussion about the phases of the moon, and an investigation. After a week of observing, I checked to see what questions people had that they wanted to continue investigating. Some people had several questions with regard to phases, speed of rotation, tides and the moon, how much of the moon do we actually see, people's moods and the moon, myths about the moon, and so on. The students posed their questions with an agreement to come back the next week with more information. We continued these discussions and reviewed who was still interested for another two weeks. At the end of this week, Jessie posed a question to the group and herself. She said, 'I have been spending all my time looking up information about the moon, and I asked myself, "why am I doing this?" I should be spending my time on my classes' (my reflective journal, 30 September 2000). Other people in the class were also wondering why. We agreed as a group to have one more meeting in which everyone brought ways to show their understandings or to explore their understandings.

At this final 'moon' meeting we first discussed the answers to everyone's question as best we could, using balls, a globe, a flashlight, reference books, tide tables, newspaper information, and so on. We then talked about 'why we did this'. I videotaped this particular session. Students quickly connected the activity we had been doing with the readings. Jeri said:

I really understood what we were doing when I read the Reggio readings (Forman and Fyfe, 1998). This wasn't a big project, but it began with our questions, what we wanted to know and moved on to bigger questions. We had to bring in cultural artifacts to help us understand. This is more than I have ever known about the moon.

Janie added that she really understood what we were doing this time when people had brought in the artifacts for exploration, that what she had learned about herself as a learner was that she needed the hands-on materials right away to understand the questions and the answers. This activity represented a watershed in the group's understanding and engagement in the class. A variety of questions arose in this discussion: Was it true for everyone that they needed the hands-on materials from the beginning? Was everyone interested in the same question or any of the questions at the same time? What about students who were not very interested in the problem? What about the questions that arose now that we were leaving the topic? The discussion moved back and forth between what we had learned about ourselves as learners and what we had learned about learning and teaching from the readings we had been doing. These classroom exploration activities engaged the students and

raised questions about the nature of learning and teaching in a way that simply reading about them had not.

Discussion: return to the principles

My goal in this seminar is to stand my students' concept of what a graduate seminar in theory ought to be on its head. I want them to gain confidence in their own ability to read difficult material, make sense of it both independently and in conjunction with one another, and to become confident and courageous teachers. To do this, the problems have to be difficult, and the students have to take seriously their own efforts to solve them. In order for that to happen, the students have to want to solve the problems, in spite of their difficulty, and they have to feel comfortable with not knowing everything at the end, but to be accepting of their continued and continual learning. To achieve this, I try to live the principles on which our program is based in this seminar. The first step is to create a context in which students feel safe to take risks, to disagree with one another and with me, and to admit they do not understand something. Thus, the first principle, that teaching is a moral act invoking an ethic of care underlies my relationship with the students in this class and focuses me on the sort of atmosphere I want to create.

The second principle, that teaching is reflective and requires an inquiry stance, is obviously a big part of this seminar. Students are expected to reflect on the readings, on what their classmates say, on the questions I pose and the questions they pose, and on their own reflections. The readings are difficult enough that reflection is not simply an act of self-congratulation, but involves the admission of confusion or of not being sure. As the instructor, I experience these confusions as well. While I use some readings year after year (Eleanor Duckworth and Luis Moll are a constant presence in our seminar), each year I introduce new readings that I am interested in exploring with the students, in the context of this subject matter about teaching, learning, knowledge, development and constructivism. My own reflection and my own vulnerability and confusion are made public for the students, to invite them into the process.

The third principle, that learning is a developmental/constructivist process, is exemplified by the readings that we do and the process by which we make sense of them. Each student makes his/her own growth in this seminar. They all attempt to integrate the different points of view with one that they are developing themselves, but different students are at different developmental levels of being able to make integrated sense of these readings. I do organize our reading of them to encourage such integration. Ending the semester regularly with Cobb's (1996) chapter 'Where is the Mind?' and Von Glasersfeld's (1996) introduction to Fosnot's *Constructivism: Theory, Perspectives and Practice* pushes many of them to integrate the disparate readings we have done, that represent a span of psychological and social constructivist views. They appreciate Cobb's conclusion that cognitive constructivism and social constructivism can provide foreground and background for one another in our appreciation of children's learning and the activities and contexts in which they learn.

The questions I ask them in their journals also push them towards integrating what they are reading. Sometimes the questions I ask are right on the mark, and students answer them directly. Sometimes they ignore them for a while and return to them later on in the semester. Sometimes they ignore them totally. When that happens, I realize that I have not found their zone of proximal development with regard to this material, and that I will need to try something else. I feel privileged to read their thoughts and to have an intimate dialog with each of them. It helps me as a teacher to focus on each of their individual constructions as well as the group work that occurs in class. The journals give me multiple opportunities to do this—unlike a more typical class where students turn in one or two written assignments over the semester.

This leads us to the fourth principle, that subject matter matters. In this seminar the subject matter is the heart of why we have come together in this program, to understand the nature of learning, teaching, knowledge and development. It is not the only place in the program where these questions are raised, but it is the first place, for most of the students, where they are able to question their own assumptions about knowledge, learning and teaching, and to learn the new language of constructivism.

The fifth and sixth principles come together in this class. The students are expected to develop strong bonds of collegiality. This is a challenge for me as an instructor, to help them develop an atmosphere where everyone's contributions are valued and respected, no matter how different they may be from one another. Sometimes it is a challenge for me as well, if a student is particularly challenging or withdrawn from the discussion. But the sixth principle, that teaching is a political act, supports us all in this work, because we expect that there are numerous ways to approach the material and numerous perspectives to draw on to understand the nature of learning, development, knowledge, and teaching. These perspectives, and the conclusions we draw from them, have cultural and political ramifications that we need to be considering throughout our discussion of how we apply these ideas we are reading to our real teaching lives.

Conclusion

Korthagen and Kessels (1999) describe a process by which teachers connect understanding with behavior. I believe that, at least temporarily, these students reorganized their gestalt understandings of learning, knowledge, development and teaching to schemas. They had not yet attained a complexity of relationships in their understandings toward a personal theory of learning and teaching, but they were well on their way to this process. Hopefully, during the next year and a half, they would be able to engage in level reduction that would integrate their growing personal theoretical understandings with their developing teaching practice. They had developed the habit of mind to reflect and consider what learning and teaching were occurring and how they might be connecting.

There is general agreement that teachers must have some understanding of theories of learning and development in order to be effective teachers and self-sustaining lifelong learners. It is not clear, however, that what happens in a traditional course in developmental theory or learning styles is ever thoroughly integrated with a teacher's

own ideas or theory about learning, development and teaching. Constructivism as a theory of learning is different enough from commonsense ideas about how people learn things to be confusing and, thus, ignored even when it is presented in an engaging and substantive way to pre-service teachers. The seminar that is the subject of this study seeks to change how pre-service teachers are taught theory in the hopes of helping them to integrate their own ideas of learning and teaching, primarily based on their own school experiences, with the constructivist theories that have been developed, explicated and accepted in the fields of educational research. While theory may seem to make things more complicated, in fact a strong understanding of one's own theory and those of great educational and psychological thinkers can give teachers strong tools and skills with which to think critically about their own practice in an ongoing developmental manner.

Notes on Contributor

Linda R. Kroll, Ph.D., is Professor in the Department of Education at Mills College, Oakland, California. She has taught at Mills since 1988 and served for 2 years as Dean and Chair of the department. She co-directs the early childhood portion of the Teachers for Tomorrow's Schools program, known as Developmental Perspectives in Teaching. Her research interests focus on applying developmental and constructivist theory to understanding and facilitating children's and teacher's learning. Her work with children focused on urban settings for children with special needs, English language learners and children of color, who are traditionally underserved. Her work with teachers has focused on urban school settings and the Mills College laboratory school. She is a contributing author to *Reframing teacher education: dimensions of a constructivist approach*, edited by Julie Rainer, and to *How students learn: reforming schools through learner-centered education*, edited by Nadine Lambert and Barbara McCombs. She is past president of the Association for Constructivist Teaching.

Notes

- A version of this paper was presented at the annual meeting of the American Educational Research Association, New Orleans, April, 2002.
1. All regular education credential programs at Mills College are CLAD emphasis programs. The ECE emphasis is an additional part of these particular students' education.
 2. The other seven journals were not available because I failed to copy them before returning them. These seven were primarily handwritten, which made them more difficult to copy clearly and to use them as data. However, they were as complete as all the other journals and quite comparable.
 3. To assure reliability in identifying these categories I asked a colleague to read and categorize five different entries from two students' journals. The agreement between us was 95% both for differentiating between categories and identifying an entry as falling into a particular category.
 4. This comparative data is included to provide a further context for the case study.
 5. All student names are pseudonyms.
 6. In this section I will use examples from other students, in addition to the original three.

References

- Ammon, P. & Hutcherson, B. P. (1989) Promoting the development of teachers' pedagogical conceptions, *The Genetic Epistemologist*, XVII(4), 23–30.
- Cobb, P. (1996) Where is the mind? A coordination of sociocultural and cognitive constructivist perspectives, in: C. T. Fosnot (Ed.) *Constructivism: theory, perspectives and practice* (New York, Teachers College Press), 34–54.
- Duckworth, E. (1996) *The having of wonderful ideas' and other essays on teaching and learning* (2nd edn) (New York, Teachers College Press).
- Korthagen, F. A. J. & Kessels, J. P. A. M. (1999) Linking theory and practice: changing the pedagogy of teacher education, *Educational Researcher*, 28(4), 4–17.
- Moll, L. C. (1990) *Vygotsky and education: instructional implications and applications of sociohistorical psychology* (New York, Cambridge University Press).
- Piaget, J. (1985) *The equilibration of cognitive structures: the central problem of intellectual development* (Chicago, IL, University of Chicago Press).
- Rogoff, B. (1995) Observing sociocultural activity on three planes: participatory appropriation, guided participation, and apprenticeship, in: J. V. Wertsch, P. Del Rio & A. Alvarez (Eds) *Sociocultural studies of mind* (New York, Cambridge University Press), 139–164.
- Salomon, G. (1993) No distribution without individuals' cognition: a dynamic interactional view, in: G. Salomon (Ed.) *Distributed cognitions: psychological and educational considerations* (New York, Cambridge University Press), 111–138.
- Scholnick, E. K., Nelson, K., Gelman, S. A. & Miller, P. H. (1999) *Conceptual development: Piaget's legacy* (Mahwah, NJ, Lawrence Erlbaum Associates).
- Shulman, L. S. (2000) From Minsk to Pinsk: why a scholarship of teaching and learning?, *Journal of scholarship of teaching and learning*, 1(1), 48–52.
- Steffe, L. P. & Gale, J. (Eds) (1995) *Constructivism in education* (Hillsdale, NJ, Erlbaum).
- Tudge, J. (1990) Vygotsky, the zone of proximal development, and peer collaboration: implications for classroom practice, in: L. Moll (Ed.) *Vygotsky and education: instructional implications and applications of sociohistorical psychology* (New York, Cambridge University Press), 155–172.
- Von Glasersfeld, E. (1996) Introduction: aspects of constructivism, in: C. T. Fosnot (Ed.) *Constructivism: theory, perspectives and practice* (New York, Teachers College Press), 3–7.
- Vygotsky, L. (1986) *Thought and language* (Cambridge, MA, MIT Press).
- Wertsch, J. V. (1995) The need for action in sociocultural research, in: J. V. Wertsch, P. Del Rio & A. Alvarez (Eds) *Sociocultural studies of mind* (New York, Cambridge University Press), 56–74.
- Yin, R. K. (1994) *Case study research: design and methods* (2nd edn) (Thousand Oaks, CA, Sage).

Appendix 1. Required readings

Fosnot, C. T. (1996) *Constructivism: theory, perspectives and practice* (New York, Teachers College Press).

Class Reader

Duckworth, E. (1996) *'The having of wonderful ideas' and other essays on teaching and learning* (New York, Teachers College Press).

Introduction (xi–xii).

Chapter 3, 'Either we're too early and they can't learn it, or we're too late and they know it already': the dilemma of 'applying Piaget' (pp. 31–49).

Chapter 4, A child's eye view of knowing (pp. 50–63).

Chapter 6, Learning with breadth and depth (pp. 70–82).

Chapter 7, Understanding children's understanding (pp. 83–97).

Wertsch, J. V., Del Rio, P. & Alvarez, A. (1995) *Sociocultural studies of mind* (New York, Cambridge University Press).

Chapter 2, Wertsch, J. V., The need for action in sociocultural research (pp. 56–74).

Chapter 6, Rogoff, B., Observing sociocultural activity on three planes: participatory appropriation, guided participation, and apprenticeship (pp. 139–164).

Scholnick, E. K., Nelson, K., Gelman, S. A. & Miller, P. H. (1999) *Conceptual development: Piaget's legacy* (NJ, Lawrence Erlbaum Associates).

Chapter 2, Case, R., Conceptual development in the child and in the field: a personal view of the Piagetian legacy (pp. 23–51).

Chapter 3, Meltzoff, A. N. & Moore, M. K., A new foundation for cognitive development in infancy: the birth of the representational infant (pp. 53–78).

Chapter 11, Saxe, G. B., Sources of concepts: a cultural–developmental perspective (pp. 253–267).

Chapter 12, Nelson, K., Levels and modes of representation: issues for the theory of conceptual change and development (pp. 269–291).

Moll, L. C. (1990) *Vygotsky and education: instructional implications and applications of sociohistorical psychology* (New York, Cambridge University Press).

Chapter 6, Tudge, J., Vygotsky, the zone of proximal development, and peer collaboration: implications for classroom practice (pp. 155–172).

Chapter 12, McNamee, G. D., Learning to read and write in an inner-city setting: a longitudinal study of community change (pp. 287–303).

Chapter 14, Moll, L. C. & Greenberg, J. B., Creating zones of possibilities: combining social contexts for instruction (pp. 319–348).

Salomon, G. (1993) *Distributed cognitions: psychological and educational considerations* (New York, Cambridge University Press).

Chapter 4, Salomon, G., No distribution without individuals' cognition: a dynamic interactional view (pp. 111–138).

Chapter 5, Moll, L. C., Tapia, J. & Whitmore, K. F., Living knowledge: the social distribution of cultural resources for thinking (pp. 139–163).

Chapter 7, Brown, A. L., Ash, D., Rutherford, M., Nakagawa, K., Gordon, A. & Campione, J. C., Distributed expertise in the classroom (pp. 188–228).

Edwards, C., Gandini, L. & Forman, G. (1995) *The hundred languages of children: the Reggio Emilia approach to early childhood education* (1st edn) (Norwood, NJ, Ablex).

Chapter 10, Forman, G., Multiple symbolization in the long jump project (pp. 171–188).

Edwards, C., Gandini, L. & Forman, G. (1998) *The hundred languages of children: the Reggio Emilia approach—advanced reflections* (2nd edn) (Norwood, NJ, Ablex).

Chapter 13, Forman, G. & Fyfe, B., Negotiated learning through design, documentation, and discourse (pp. 239–260).

Chapter 14, New, R. S., Theory and praxis in Reggio Emilia: they know what they are doing, and why (pp. 261–284).

Chapter 19, Forman, G., Langley, J., Oh, M. & Wrisley, L., The city in the snow: applying the multisymbolic approach in Massachusetts (pp. 359–374).

Appendix 2 Education 290 Advanced Seminar in Child Development

Final Question, 30 November 2000

For your last journal entry I would like you to **reread your journal and my responses** and reconsider the readings we have done this semester—which are broad and far ranging.

We have looked across the spectrum of constructivist thinking about learning, about knowledge, about teaching. How do these ideas impact your own thinking about teaching, learning and knowledge?

What about notions of development? How do they fit into this spectrum of ideas? What do some of these writers seem to think about development? What do you think about it? How socially specific or domain specific is it? How can you tell?

What about knowledge? Where is knowledge, who has it, how is it distributed among individuals within a social context? Who writes about these questions and how do they help you to think about it?

These questions are designed to help you think about what we have done over the semester. The bottom line is to think about how these ideas have impacted your own

thinking about teaching, learning, knowledge and development. How do you see these ideas reflected in your own practice today?

If you can think of other questions that will help you consider the range of readings we've done—by all means answer those questions instead.

We'll talk about our answers (for the moment) next week and also about how Von Glasersfeld definition of constructivism contributes to our understanding of this.

Remember, I really want you to reread our exchanges—your journal entries and my responses—as you think about your final entry.

Please turn in the entire journal—in chronological order. Your entries and my answers!!

Copyright of Teachers & Teaching is the property of Carfax Publishing Company and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.