Student-Centered Pedagogy: Co-Construction of Knowledge through Student-Generated Midterm Exams

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Using the example of student-generated midterm exams produced during a university classroom exercise, this narrative account examines student-centered pedagogy from both the university faculty and student perspectives. The central question revolved around how to actively engage a community of diverse university students from different academic, social and ethnic backgrounds in working as partners to co-construct knowledge in a pre-service teacher course. Applying a student-centered pedagogy informed by social constructivism, the authors reflect on how the student-generated midterm exams challenged the participants to think about their approach to learning. Through this experience, students were provided with multiple entry points to access the curriculum and were empowered as active agents of their own learning, while the instructor found an interactive arena for reflection on her own pedagogical practices in action. The authors propose a change from the traditional teacher-centered lecture style to a higher education pedagogy that places students in control of their own scholarship.

Introduction

As a higher education faculty member, I (faculty, first author) have always seen my role as a facilitator of learning, guiding my students to be active and critical participants and agents of their own learning (Freire, 1970). Because of this clear philosophy of teaching, I intentionally promote student-centered learning by staying away from a traditional lecture style. During the past three years as an instructor of Pedagogical Foundations, a post-baccalaureate class open to undergraduate students in the Teacher Education program, I have continued to wrestle with how to make my class an arena where students feel they can take ownership of their own learning and are empowered to construct knowledge with the instructor as well as with their peers (Vygotsky, 1978).

When examining education in the U.S., it is clear that nurturing critical thinkers and independent learners in post-secondary education is a more serious challenge today than ever before, at a time when our overall international academic standing has declined (OECD, 2010) and the classroom itself has undergone extreme demographic changes. Students today are more diverse than at any point in history (Santangelo & Tomlinson, 2009). For example, at our own university in Southern California, which is considered one of the most diverse post-secondary institutions in the U.S., White, Hispanic, Asian/Pacific Islander, and Black students comprise 25%, 30%, 26%, and 3.5% respectively of the entire campus student population (California State Polytechnic University, Pomona, 2009). Based on these statistics, White students are no longer a majority but are the minority here.

Despite the benefits to society inherent in improved access to education for all groups, this increasing racial and ethnic diversification creates a persistent challenge. There have been heated discussions nationally about closing the achievement gap between White and other students from various minority groups. Within our K-12 school system, a clear divide exists between student groups that differ from one another racially, culturally, linguistically, socioeconomically, and geographically (Cochran-Smith, 2010; Ladson-Billings, 2009; Cochran-Smith & Zeichner, 2005; Darling-Hammond, 2006). According to the National Assessment Educational Progress (NAEP), while 51% of White fourth-graders scored at or above the proficient level in mathematics, only 16% of African American, 22% of Hispanic, 21% of Native-American students, and 12% of English Learners reached this level. Similarly, in reading, 42% of White fourth-graders scored at or above proficiency level, while only 16% of African American, 17% of Hispanic, 20% of Native American students, and 6% of English Learners scored at the same level (NCES, 2009).

Although standardized testing of this sort is not administered to college students, we can view the same achievement gap by examining retention rates among various demographic groups. Although 57% of all students nationally finish their bachelor degrees in six years or less, the graduation rates for various groups of students differ markedly, according to the Education Trust. Whereas 60% of White students earn their bachelor's degrees within this time frame, only 49% of Latinos and 40% of African-Americans accomplish the same (Education Trust Data, 2010).

The question, then, becomes one of figuring out how to actively engage a community of diverse learners and provide entry points for each student, regardless of his or her prior academic preparation, current skill level, and background. How do we partner with students to inspire them to be active and critical

learners? We propose that the social constructivist model based on Lev Vygotsky (1978) can inform a powerful pedagogical approach to teaching and learning in post-secondary classrooms.

The application of Vygotsky's social constructivist model of learning is not entirely new. John Dewey, in the early 1900's, proposed lessening the use of competition in education and urged structuring schools as democratic learning communities (Woolfolk, 2007). This concept, commonly called "cooperative learning" or "collaborative learning," was further developed by Slavin and other scholars who saw the opportunity to promote student learning of academic content in small groups so that students could help one another (Slavin, 1995).

Although not without criticism, educators have recognized the cooperative format as a powerful tool in the K-12 classroom and embraced the benefits of providing students with the opportunity to work in small groups rather than relying entirely on the lecture format. This inclusive approach, based on Vygotsky's social constructivist model, encourages learners at different academic levels to work together in the co-construction of knowledge through active exploration and negotiation.

Peer collaboration characterized by open dialogue has proven effective over a broad range of subjects. For example, in reading, Block, Parris, and Whitely (2008) found that standardized reading test scores improved among 257 students at two urban elementary schools after a twelve-week reading intervention program, which used kinesthetic strategies to teach students effective dialogue in both large group instruction and in small cooperative learning groups. In addition, two studies examined the benefits of cooperative learning in mathematics. Dekkar, Elshout-Mohr, and Wood (2006) conducted a case study of two elementary school students in the area of self-regulation during a collaborative math activity. The authors found that even very young students can take responsibility for balancing the various aspects of collaborative experience and that they can successfully monitor themselves and change their learning approach when necessary. The other study by Kramarski and Mevarech (2003) examined mathematical performance of eighth graders who received direct instruction in metacognitive and communication strategies. The results of the study revealed that first, cooperative learning groups markedly outperformed students who received individualized math instruction, and, moreover, groups who received this direct instruction outperformed students who did not, whether they worked collaboratively or received individualized instruction. In the area of academic writing, Carter (2009) described successfully structuring mathematical learning in her classroom, first through whole and small group open dialogue surrounding mathematical concepts and solutions, and later extending the experience into academic writing. She found that using collaborative discussion format facilitated students' academic writing. Finally, in teaching history, Deaney, Chapman, and Hennessy (2009) examined the use of interactive whiteboard technology to support cooperative learning activities for middle school students through a series of six history lessons. The authors found that this electronic medium provided a supportive environment and a meaningful forum for "active student participation, encouraging students to take responsibility for their own learning" (p.383).

These previous studies point to the importance of small group learning opportunities as good teaching practice. However, this particular approach has been slow to reach post-secondary education (De Kock, Sleegers, & Voeten, 2004; Koljatic & Kuh, 2001), which continues to rely heavily on the lecture format and reward individual success. Recent studies demonstrate, however, that cooperative group activities are well received by the majority of university students. For example, Peterson and Miller (2004) surveyed undergraduate educational psychology students who participated in cooperative learning and large group instruction regarding their perceptions of these experiences. The study found that the students were more engaged during cooperative learning and perceived that their learning task during cooperative learning was more important. Hancock (2004) additionally showed that the cooperative learning format benefited even those who voiced a preference for working alone. Moreover, modern technology as used in university coursework has proven adaptable to and beneficial for collaborative learning activities, as evidenced by the peer scaffolding identified by Pifarre and Cobos (2010) during a 12 month electronic discussion board learning project.

It is interesting to note that some K-12 and university educators have expanded the collaborative learning model by teaching metacognitive skills (Block et al., 2008; Pifarre & Cobos, 2010; Carter, 2009). Metacognition is defined as "questioning one's own learning or thinking about one's own thinking" (Loughran, 2006, p.93). This approach has been demonstrated to improve learning for all participants, including comparison groups of individual learners (Kramarski & Mevarech, 2003).

Despite burgeoning research on group work, there seems to be a paucity of study integrating student and educator perspectives. In this paper, we attempt to address this issue.

In discussing the dynamics of small group collaboration based on Vygotsky's model of social constructivism, we suggest that it is possible to shift the power from instructor to student and to make the

students themselves agents of their own learning. This is precisely the nature of our experiment in which university students were placed at the center of pedagogy to generate their own midterm exam questions in collaboration with their peers. These questions were later used in the actual exam for the course (See Appendix). Intense self-reflection was strongly encouraged: students examined their own assumptions about learning, their personal teaching philosophies, and the pedagogical implications for their own future classrooms.

It is thus our intention to examine our own teaching and learning in order to pursue effective pedagogy. According to Shulman (1999), explicating and making public our understandings of practice leads to enhanced understandings of teaching and learning. In this narrative account from the Academic Year 2009-2010, we offer two perspectives based on anecdotal observations: through the lenses of the course instructor and post-baccalaureate student who was initially a skeptical participant of group learning activities but later came to appreciate this approach.

Social Constructivism

Russian psychologist Lev Vygotsky (1896 – 1934), an early pioneer in the field of developmental psychology, theorized that learning and cognitive maturation into higher level thinking develop via social interactions (Vygotsky, 1978). He can be included among the major spokespersons for sociocultural theory (Woolfolk, 2007). As children grow, they are guided by experts such as parents, educators, more capable peers, and the like. This theory can also be extended to various key members of the community such as ministers, sport coaches, and neighbors. Transmission of knowledge is not passive in this equation. Rather, important individuals in a child's life facilitate exploration while the child himself or herself actively participates in constructing his or her burgeoning knowledge. The nature of this interaction has profound implications for both teaching and learning, making teachers and students partners in the latter's growth.

It is important to note that Vygotsky viewed language as the instrument most responsible for shaping an individual's system of meaning and thinking processes – not because of any meaning inherent in units of sound or because of the limitations of grammar or vocabulary or syntax, but because language is actively practiced via social engagement (Vygotsky, 1962). The external dialogue among people provides an interactive platform for learners to collect data, sort and organize experiences, and test or explore new information, all in an effort to create meaning. Vygotsky further asserted that external dialogue was the precursor to the development of internal dialogue,
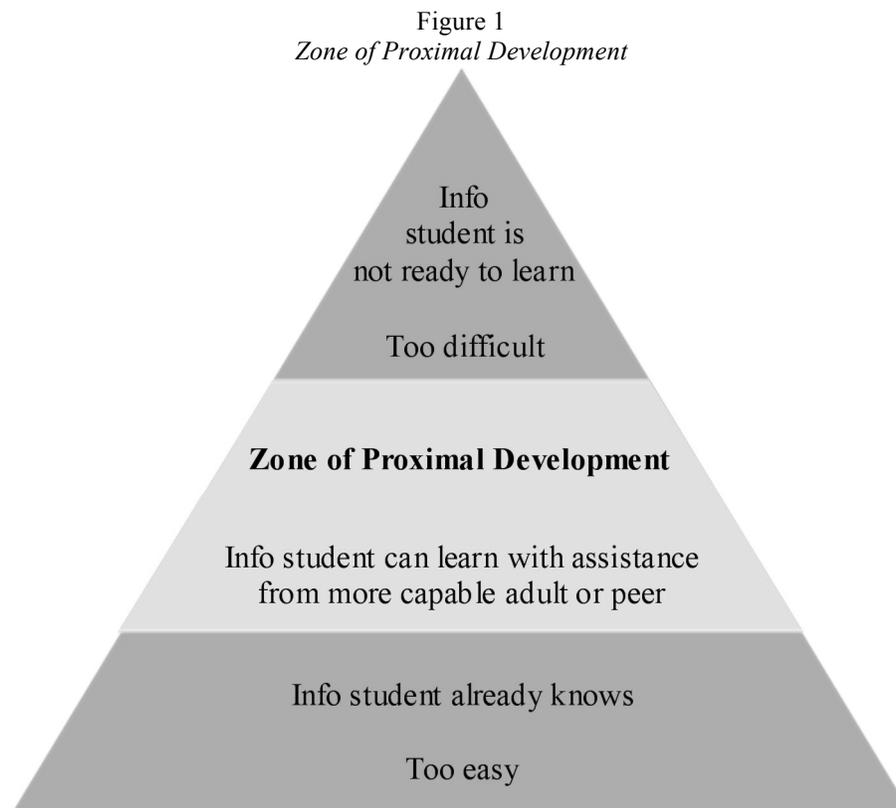
whereby individuals learn to monitor and control their own mental processes. In other words, verbal interactions literally train individuals to engage in inner speech, which "readily assumes a planning function" (Vygotsky, 1962, p.45), or, to use modern pedagogical terminology, to engage in metacognitive thinking.

A central concept in Vygotsky's model is the zone of proximal development (ZPD), which refers to the optimal level of difficulty wherein successful learning occurs (See Figure 1), a zone in which the learning task is neither too difficult nor too easy. Vygotsky defined this as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p.86). The ZPD represents work which learners are capable of accomplishing, through extending their capacities just enough with guidance from an appropriate mentor or teacher.

Modern researchers have extended Vygotsky's work. Donato (1994) looked beyond the concept of expert-novice and identified the relationship between equal learners engaged in a shared task, terming this relationship "collective scaffolding." Van Lier (2004) expanded the ZPD to include learners working with more, less, and equally capable peers; Van Lier also clarified that learners may engage in self-help by using inner resources such as prior knowledge and experiences, as well as drawing energy from their personal commitment to a task. Walqui (2006) asserted that instructional scaffolding, including support for social interaction, is so closely related to the ZPD that it is only within the ZPD that scaffolding can occur. It was precisely on this platform that our co-construction of knowledge took place, as students worked and negotiated meaning with their peers – equal as well as more or less capable – and on their own to create exam questions under the guidance of a professor. This enlarged view of the ZPD, when applied in the university context, can guide educators in providing appropriate entry points for students at various stages of academic preparation to access the course material. In doing so, we facilitate students to negotiate their own role and contributions with each other in both small groups and the whole class setting. This is scaffolding at its finest, occurring seamlessly within the ZPD.

The Process of Co-Constructing Knowledge

Prior to creating midterm exam questions in class, the students received direct instruction from the instructor regarding the cognitive continuum from lower-order thought processes, characterized by memorization, through higher-order thinking

Figure 1
Zone of Proximal Development

Info
student is
not ready to learn

Too difficult

Zone of Proximal Development

Info student can learn with assistance
from more capable adult or peer

Info student already knows

Too easy

such as the synthesis of information following Bloom's Taxonomy (Bloom, 1956; see Figure 2).

By encouraging the class to use higher-order thinking skills, students were able to experience the complexity of creating exam questions that required the synthesis of knowledge acquired during the quarter. Examples of exam questions tapping into the various levels of cognitive processing were discussed (see Tables 1 and 2). Students then practiced drafting questions in their groups, drawing from real life examples that would require an answer that analyzed and synthesized information. It was at this time that students learned that the questions they generated might be on at the next exam.

On the first day, the class split into small groups responsible for one chapter from the course textbook. The instructor selected students who had previously conducted chapter presentations as "expert" leaders. Signs-ups were provided to the remainder of the class in order to motivate student interest and active participation. The newly formed groups were instructed to draft three multiple-choice and two essay questions that would draw on the evaluation and synthesis levels of thinking, rather than eliciting a memorized or rote response. The choice to adopt each potential question required group consensus, and groups were allowed to split the work between individual members in any way

they chose. Once completed, the questions were written on large post-it notes and displayed on the walls around the classroom.

On Day Two, students mixed into new groups so that one member from each of the original groups was represented in each new group. These individuals became the "chapter experts," corresponding to the text chapter they had used to draft exam questions in the previous session. Students visited each chapter station and discussed the material, facilitated by the expert for that chapter. Responsibility for facilitation rotated among all members of the group as they moved from station to station. By playing this essential role, students inevitably became accountable for their own participation and learning, just as creating meaningful questions had ensured responsibility in the first phase of their activity.

Lessons Learned from Students Generating a Midterm Exam

A Student Perspective

I could not help feeling a moment of delight, when I first heard we would be writing our own example questions and allowed to use our notes and textbook during the midterm. "Could anything be easier?" What ensued was instead one of the most interesting and
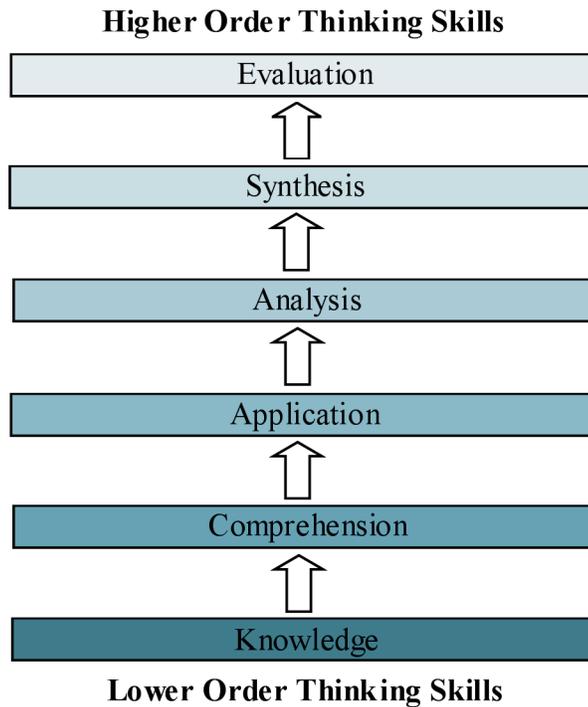
Figure 2
Bloom's Taxonomy

Higher Order Thinking Skills

Evaluation

⇧

Synthesis

⇧

Analysis

⇧

Application

⇧

Comprehension

⇧

Knowledge

Lower Order Thinking Skills

Table 1
Examples of Multiple Choice Questions at Different Cognitive Levels

Memory-tapping Multiple Choice Question	Synthesis/evaluation-tapping Multiple Choice Question

Which of the following is NOT one of Piaget's development stages?
  A. Sensorimotor stage
  B. Preoperational stage
  C. Concrete operational stage
  D. Formal operational stage
	Which example best exhibits a limitation of Piaget's theory?
	  A. A 7-year old and a 12-year old are reading at the same level.
	  B. An adult becomes aware of social issues
	  C. A 7-year old understands laws and conservation
	  D. An adult is able to solve abstract problems in a logical fashion

Table 2
Examples of Essay Questions at Different Cognitive Levels

Memory-tapping Essay Question	Synthesis/evaluation-tapping Essay Question
Why do positive and negative reinforcement differ?	Your students are not performing to expectations you know they are capable of achieving. How would you motivate your students to improve using positive AND negative reinforcement? Give specific examples of each.

difficult tasks I have undertaken as a credential candidate. In our group, we decided that each member would complete the entire assignment – drafting three multiple-choice and two essay questions – before presenting them for a group vote as to the best examples. I was interested to note, however, that other groups divided the work differently among themselves. For example, one group assigned each member a single question which was automatically accepted by the group. Another group chose several writers, who assigned the rest to research specific details on topics they chose for exam questions.

I will never again underestimate the challenge of writing an effective exam that truly monitors student understanding and mastery of the subject. We were stunned by the difficulty of writing higher-order questions, quickly recognizing that easy to draft (and answer) questions along the lines of "Skinner used what type of animals for his conditioning experiments? Cats, dogs, pigs, monkeys, or none of the above?" would not meet the exercise requirements. We were forced, then, to delve deeply into our lecture notes and the course textbook in order to craft the sort of questions that required the type of thinking and elicited the kinds of answers we desired. No group finished on this first day, despite being accorded approximately two hours to meet and work. In fact, one or two groups never fully completed the assignment to draft five questions, even after the exercise was continued to the following week's class meeting.

The second portion of the activity proved equally challenging. As chapter "experts," we each needed mastery over our own questions to facilitate dialogue at our chapter stations, especially since the professor had given clear instructions not to simply pass out the answers. This required skills that were new to me: Not only did I have to encourage my peers' discussion at my station, I also struggled to scaffold information so as to encourage their own understanding rather than resorting to handing out the answers. I found that leading requires an entirely different type of conversational planning than passively dispensing knowledge. I had to mull over the subject matter in reverse, as it were, in order to guide dialogue at my station and aid group members in mastering the topics.

I came through this exercise amazingly equipped to take the midterm exam, understanding the course material much more deeply and with a different perspective than previously. Knowing the exam questions in advance became moot, and being allowed open textbook and notes was rendered obsolete. Although my classmates and I brought these materials to class, I noticed very few students referencing them. We literally knew the subject too well by this point.

This exercise coincided with a shift in my own pedagogy of teaching. Although experienced in the classroom, having been both a substitute teacher and an aide in special education for a number of years, I continued to struggle with classroom management. I realize now that I had an overly traditional view of my and my students' roles in the classroom. In short, I had interpreted my responsibility as imparting knowledge, and it was the students' role to absorb that information. When students performed poorly, I would offer extra help, but essentially I believed that academics (like life) were competitive and not everyone was capable of keeping up. When I experienced difficult behavior, I tended to blame the student.

Working in a group to construct knowledge for all of the participants changed my assumptions about the learning process in general and students in particular. I began to realize that everyone could be successful when we worked as a team and that each of us had something unique to contribute. Some were strong question writers, others had near photographic memory of details in the text, and everyone brought different vantage points to bear in synthesizing the course material. I am a strong student, yet I learned as much, if not more, from my peers as I did on my own during the activity.

As I reflected on this, I realized that the exam writing exercise had provided an entry point for every student, regardless of ability level, and enabled their active and successful participation in the activity, and, thereby, their learning. In addition, each student was accorded the opportunity to be the "star" at some point, whether by sharing a special talent or perspective, or when operating as the chapter expert. Because of this, everyone remained highly engaged and had quite a bit of fun… *preparing for an exam!* This made an enormous impression on me, and turned many of my previous assumptions upside down. I see now that facilitating academic competition and orchestrating the classroom to support individual achievement short changes students who could perform much more effectively with only a simple shift in teaching strategies to something more inclusive and empowering.

The Instructor Perspective

I felt nervous and uneasy when I decided to shift the power of creating midterm exam questions to my students and treat them as partners. The thought of letting go of my power as the person-in-charge initially frightened me. I grappled with my decision in terms of whether it made more sense to take the risk of trusting my students to write meaningful exam questions or to stay in the comfort zone of using questions from past exams or the instructor's manual. This tension or discomfort surrounding teacher educators' learning about their own practice is documented by Berry (2007).

Among the six tensions that Berry identifies, "confidence and uncertainty" and "safety and challenge" best describe my experience. A conflict between the first pair of emotions is experienced when teacher educators experiment with new approaches in the classroom. Similarly, they experience a contradiction between safety versus challenge when "engaging students in forms of pedagogy intended to challenge and confront thinking about teaching and learning, and pushing students beyond the climate of safety necessary for learning to take place" (p.120). Thus, in considering this as an opportunity for me to grow as a teacher educator, I decided to take the risk of a new approach to pedagogy: inviting my students to create their midterm exam questions to be used for the upcoming exam.

In shifting more responsibility over to my students, I had multiple purposes. First, my teaching philosophy is based on empowering students to be active and critical agents of learning (Freire, 1970). As such, the focus of learning should be on students and not the instructor. As a facilitator of their learning, I saw that my students could maximally benefit from being actively engaged in creating their own midterm exam, tapping into higher-order thinking skills to create critical-thinking questions. During the process, I had to remind my students to stay away from creating questions that required rote memorization of facts, but rather, to create questions that required deep understanding of the concepts.

Another important purpose centered on process. While many instructors and students are accustomed to emphasizing tangible products such as test scores and grades, I wanted my students to focus on the process of learning itself by writing their own exam. I anticipated some growing pains for all of us, as it is completely natural to experience disagreements, discomfort, frustrations, and even anger when faced with a demanding, unfamiliar task. I wanted to focus on this very discomfort and facilitate a process where students and teachers alike could work past this stage.

Finally, I saw that prospective teachers would benefit from this type of learning activity as they engaged in deep reflection about their learning process. Zeichner and Liston (1996), extending from Dewey's (1933) and Schon's (1983) work, asserted that reflective teaching was at the heart of teacher education. Through reflecting on our own teaching, we become "more skilled, more capable, and in general better teachers" (Zeichner & Liston, 1996, p.xvii). This includes regularly questioning the assumptions, biases, and values that we bring to our own teaching. Perhaps the most extensive type of reflection is metacognition, defined earlier as "thinking about one's own thinking" (Loughran, 2006, p.93). As discussed previously, the use of metacognition is highly encouraged for students

and teachers alike in teacher education in order to build, extend, and develop ideas. Being engaged in metacognition promotes critical thinking and understanding more deeply about one's own learning. In this case, during the whole process of creating the exam questions, I continued to challenge my students to reflect on their own learning as prospective teachers: Which part of this process is bothering them and why; what is helpful in their learning; and how can we improve this process? In this way, they examined and made sense of their own learning experiences, using extensive reflection and metacognition.

During this activity, while I was monitoring the students' progress, I could see that many of them struggled as they realized the complexity of the activity. I detected through their harsh tone in their questions and comments, as well as flushed faces, that some students were unhappy and initially directed their anger and frustration at me, which made me wonder if I was doing the right thing. Others simply wanted to be spoon-fed, expecting the instructor to "transmit knowledge" or "deposit knowledge" (Freire, 1970). By inviting them to construct knowledge with me in conjunction with their peers, I had caught these students by surprise and pushed them out of their comfort zone with an assignment that was contrary to their expectations. I believe their initial negative reactions resulted from distress arising from cognitive dissonance (Loughran, 2006). While painful, this type of cognitive stretching is necessary for students to learn and grow personally and professionally. Based on their changes in demeanor and statements made after the exercise, I perceived that many students were able to grasp the deep meaning of this process-oriented exercise and came to respect the experience in terms of how it might shape their own pedagogy as a teacher. At the same time, by going through this process of working with their peers, more students seemed to be engaged and not off task. Most importantly, specific tasks and responsibilities were negotiated within the groups rather than being assigned by the instructor. As such, the activity promoted peer accountability because decisions were made collaboratively with peers. While each group had the freedom to decide how to go about delegating responsibilities, each in its unique way accomplished their mission to write three multiple-choice and two essay questions that tapped into higher-order thinking skills.

Sharing the Experience with Other Higher Education Faculty

Shortly after conducting this exercise, we had the opportunity to present this pedagogical approach as a

successful learning experiment to higher education faculty from various disciplines at a regional conference. Believing that participating in students' experiences is crucial for teachers in understanding how our students learn, we designed a miniature activity that duplicated what the students had experienced. We designed single page sheets discussing various theories of cognitive development and asked conference participants to split into groups to draft one question – either multiple choice or essay – and write it on sticky sheets pre-placed around the hall. They were given 15 minutes to draft their question, then mixed into new groups to travel to one or two stations.

Participants were agreeable and seemed to enjoy themselves. However, we noticed that two participants exhibited strongly contrasting responses. One participant seemed especially able to grasp the possibilities for student learning and, in fact, later invited us to facilitate her undergraduate social science class in the same exercise. The other particularly active participant from the humanities department reacted negatively to both the pedagogy informing the activity and the assignment to draft exam questions. This participant objected, "I came here to learn something today, not to write exam questions. I already get paid to do that!" Moreover, this person voiced the concern that less motivated students would quickly take advantage of more engaged students by allowing them to do the work and copying the results. The instructor's apparent lack of trust in students surprised us, as from our perspective, student accountability was inherent in the exercise itself, most notably when each student acted as chapter expert. Misapprehensions such as this are not uncommon regarding constructivist practices.

Fox (2001) suggested that constructivism's call for "active learning" unnecessarily elevates the understanding of concepts over "passive" listening, reading and remembering, when all of these aspects work together. He also argued that the idea of "knowledge construction" offered nothing new and was no more than an elaborate re-statement of previous views. Fox furthermore asserted that the very concept of "social co-construction of knowledge" is flawed, and denies the role or influence of the individual on his or her own learning. To us, it seems that criticisms such as these arise from misconceptions regarding constructivism. Scheuermann & Hall (2007) observe that much distrust stems from a misuse of constructivism's techniques and terminology. In many cases, teachers have neither had the opportunity to participate in a constructivist classroom nor seen it modeled, and so they fall back on traditional methods with which they are more familiar (Allesandrini & Larson, 2002).

We suggest, as believers in constructing knowledge through active interaction, that the dialogue inherent in constructivist teaching approaches benefits student and instructor alike. As mentioned in our brief overview of social constructivism, Vygotsky hinted that the verbal exchanges between learners and more capable parents or teachers literally fosters the development of inner dialogue or metacognition, a concept picked up and elaborated upon by modern practitioners (Walqui, 2006; Wagenheim, Clark & Crispo, 2009). In contrast, the absence of opportunities for external dialogue might actually prevent individuals, including students, from developing the ability to make meaning altogether (Wagenheim, Clark & Crispo, 2009). For teachers, the cycle between external and internal dialogue is equally crucial – as an interactive platform for self-reflection. This is the arena where the assumptions and beliefs behind one's own teaching practices can be either validated or disproved (Wagenheim, Clark & Crispo, 2009). Thus, despite one higher education colleague's outrage, we take the position that collaboration grounded in the social constructivist theory is essential for both student and faculty growth and learning in higher education.

Presenting the Activity to an Undergraduate Social Science Class

As a result of this conference, we were invited to share our experience with an undergraduate social science class consisting primarily of juniors. In order to personalize the experience for them, we examined their course textbook in order to design appropriate topics related to their upcoming midterm exam and identified pages to assign each potential group. Because these students had no prior knowledge or experience with this type of an activity, we had to first provide background to build schema in order to lay the groundwork for our exercise. Students were introduced to the reasoning behind the exercise, Bloom's Taxonomy, the social nature of learning, and Vygotsky's ZPD, before being split into groups. Students were then given about 30 minutes to draft a single multiple choice or essay question before being reshuffled into groups to travel among the stations. Essentially, they went through the same process as the higher education faculty went through at the conference.

Like their graduate counterparts, the students were surprised by how challenging writing exam questions could be. Only one or two groups jumped straight into the activity. Many students did not know how to begin and were at a complete loss for the first 10 minutes, unused as they were to cognitively demanding opportunities that required creativity and tapped into higher-order thinking. They, like the faster acting groups, particularly struggled to draft questions that would require a synthesis of course material rather than eliciting a memorized detail. They were experiencing

cognitive dissonance, faced with a task they expected only teachers to perform and feeling uneasy about their abilities to shift gears.

Even those who cheerfully accepted the challenge were surprised by the effort it demanded. Later during the debriefing time, one student marveled, "I thought writing a multiple choice question would be easy, but it wasn't! We had to think backwards and write the kind of answer we wanted and only then write the question that would pull that response." Another student also expressed discomfort in going through this exercise, joking and making a gesture as if her head were being torn open. When a third student shared, "I just felt really uncomfortable," we assured him that this was actually good. It meant he had been pulled out of his academic comfort zone and stretched intellectually.

This, of course, was exactly the purpose of the exercise. Students used higher-order thinking skills and delved more deeply into the course textbook and material – active learning at its finest - as they engaged in backwards planning to successfully draft exam questions that met the conditions set forth by the assignment. This was precisely the process and outcome we envisioned: The activity facilitated students' transformation from mere memorizers of deposited knowledge into active and critical agents of their own learning (Boyer, 1990; Freire, 1970). During this process, students who initially struggled to lay aside habitual assumptions about typical exam preparation began to embrace the challenge of building their own knowledge in partnership with their peers and professor.

Conclusion

It is our belief based on these interactions that working in groups to construct knowledge improves student participation and can change their approach to learning. By allowing each individual to bring his or her own unique contributions to a particular task, as well as creating a climate of open dialogue between students at all academic levels, learning becomes an inclusive exercise that potentially benefits and empowers all of the actors and excludes none. Moreover, the person-to-person interaction via external dialogue inherent in the social constructivist approach lends itself to encouraging higher order thinking under the guidance of the facilitating professor. It also provides a type of practice or primer that engenders cognitive maturation and, ultimately, metacognitive abilities. Likewise, social constructivist practices benefit teacher educators by providing an arena for self-reflection where the efficacy of one's own pedagogy can be examined in action.

In short, worthwhile benefits can be realized for students and instructors alike within different disciplines through a shift in pedagogy from a traditional teacher-centered to a student-centered approach grounded in social constructivism. This is especially crucial in an era of educational crisis for the U.S. when internationally, as noted by President Obama in his August 9, 2010 address at Texas University, "In a single generation, we've fallen from first place to 12th place in college graduation rates for young adults" (The Daily Texan, 2010). Partnered with the persistent achievement gaps between White and various racial or ethnic groups already mentioned at the outset of this paper, this state of affairs is nothing short of a call to action. Students in post-secondary education must be empowered as agents of their own learning, something which can only be accomplished within a higher education pedagogy that places students at the center of their own scholarship.

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Appendix
TED 406 Midterm Exam

Your Name: _____

Part I: You have <u>30 minutes</u> to answer the following 10 multiple-choice questions.
(0.5 point x 10 = 5 points)

1. Based on the theories of Vygotsky and Piaget, which example exhibits a combination of the two theories?

   a. A 6-year old child tries to understand that the same amount of rice crispies exists in a tall bowl vs. flat bowl
   b. A child learns most in the "Magic Middle": neither too bored or too frustrated
   c. A Native American child learns about his history through Native American dance and weaving
   d. None of the above

2. Which example best exhibits a limitation of Piaget's theory?

   a. A 7-year old and a 12-year old are reading at the same level.
   b. An adult becomes aware of social issues
   c. A 7-year old understands laws and conservation
   d. An adult is able to solve abstract problems in a logical fashion

3. According to Erickson's industry vs. inferior concept, what should a teacher avoid most?

   a. Create challenging tasks to allow students to excel
   b. Display publicly test scores of individual students to encourage competition
   c. Point out general flaws and problems in exams/discussions
   d. Give shorter assignments first and gradually move on to giving longer assignment

4. Which of the following is not an example of grouping/tracking?

   a. The upper tracks tend to attract a higher number of minority group and lower SES group members
   b. Low-ability classes tend to receive lower-quality instruction in general
   c. Grouping/tracking is likely to benefit high achieving students
   d. Possibilities for friendship s become limited to students in the same ability range

5. The following is an example of the Premack Principle:

   a. The teacher gives $1 after her students give her a correct answer
   b. The teacher gives her students a 10-minute recess before they take the test
   c. The teacher gives her students 30 minutes to focus on their assignment first and later shares with them about her recent adventurous trip to Machu Picchu in Peru
   d. All of the above

6.   Gigi and Craig make about $38,000 a year working as a part-time office assistant and full-time gardener respectively. They completed their high school diploma and have been attending a local junior college for the last three years to get their A.A. They have partial health coverage from Gigi's employer. They live in a tiny 2-bedroom house, which they bought last year. Which level of SES do they most likely fit?

   a. Upper class
   b. Middle class
   c. Working class
   d. Lower class

7. Which of the following plays a part in gender-role identity?

    a. Home life
    b. Biology
    c. Interactions with peers
    d. All of the above

8. Billy is stuck on a math problem. Jen is using a number line to complete the problem. Engaging in vicarious learning, Billy would do the following:

    a. Give up
    b. Observe what Jen is doing and apply her method to his own work
    c. Copy Jen's answers
    d. Ask the teacher for help

9. According to Vygotsky, what is the primary role of adults in students' learning?

    a. Facilitate student learning
    b. Providing "scaffolding" to teach in the "Magic Middle"
    c. Guiding student participation
    d. All of the above
    e. None of the above

10. Now create a new multiple-choice question based on the most important concept you have gained from Ch. 2-6. Provide 3-4 answer choices.

Part II: You have 50 minutes to answer the following essay/short answer questions. First, you will **CIRCLE TWO** questions of your choice. Second, begin writing using the attached blank page on both sides, if necessary. Be sure to mark the question # so that the instructor knows which question you are addressing. (5 points x 2 = 10 points)

1. Do you prefer Piaget's theory on cognitive development or Vygotsky's theory on Sociocultural perspective? Why? Describe strengths and weaknesses of each theory and how you would apply the preferred theory in your teaching with concrete examples.

2. Part 1 – What are the differences between positive & negative reinforcement and punishment?
    Part 2 – Your students are not performing to expectations you know they are capable of achieving. How would you motivate your students to improve using positive AND negative reinforcement? Give specific examples of each.

3. Describe culturally relevant pedagogy and give two concrete examples based on your observations and/or experiences.

4. Based on the guest speaker's presentation and the reading, why is it important to understand the human brain when teaching students with learning disabilities? Give specific examples.

5. Based on the textbook and class discussions, describe effective strategies for teaching Special Education students and English Learners. Be sure to use concrete examples.

6. Using metacognition, reflect upon the process of creating the midterm exam. Describe what you learned from this experience and how you would go about creating a test/exam in your K-12 teaching, citing concrete examples.