# The Intersection of Post-Modernity and Classroom Practice

By Nancy S. Lewis

## Introduction

In 1993, William E. Doll, Jr., a professor at Louisiana State University, created a post-modern curriculum matrix. Instead of the old three Rs, reading, 'riting and 'rithmetic, the curriculum framework Doll envisioned is compromised of the four Rs: richness, recursion, relation, and rigor. The different categories of the four Rs are not mutually exclusive. The overlap and the boundaries that differentiate them are blurred, not hard and stable. As elsewhere in the post-modern paradigm, the matrix does not consist of closed boxes that contain different ideas, but have many attributes that are shared. The four Rs curriculum matrix is based on the transformative nature of open systems. Richness refers to the curriculum's openness and layers of meaning. Recursion is used to describe reflection, which helps curriculum grow in richness. Relation in the four Rs curriculum framework is multi-dimensional. First, relation reflects cultural connections. Culture provides a lens through which learners interpret curriculum at a local level, while at the same time local culture connects to a larger global community. Second, relations are evident within subject areas and between subject areas. For example, within mathematics multiplica-

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tion and addition are connected, but also strong connections exist between mathematics and science. Doll's (1993) definition of rigor, finally, differs substantially from the modernist notion of rigor. Two characteristics of a rigorous and transformative curriculum are indeterminacy and interpretation. Because certainty can never be attained, even at extremely high probability, rigor refers to ". . . purposely looking for different alternatives, relations, connections" (p.182).

The four Rs curriculum matrix served as a platform to examine the practices of three elementary teachers in Central Florida. This study illuminated both the ways in which post-modernity was evident in three elementary school classrooms and the role that aligning beliefs with practice plays in creating curriculum.

## Modern and Post-Modern Paradigms

In the course of human history there have been two major paradigm shifts. The first such shift occurred when humans changed from being nomadic hunters and gatherers to members of societies characterized by feudal city-state communities that were supported by agriculture. The second paradigm, modernity, moved humans from the feudal society to a capitalistic, industrial-based economy that relied on science and technology. In this economy, resources were consumed at an alarming rate as economic growth was unrestrained. The valued thought processes where typified by logical, rational thought (Slattery, 1995).

Today, our culture is moving into a new paradigm, post-modernity. Slattery (1995) illustrates features of post-modernity according to the Center for a Post-Modern World. Post-modernity challenges some of the dominant aspects of modernity. For example, the post-modern paradigm considers human endeavors to be connected with the natural world rather than separate from nature. One notes the use of an ecological metaphor for human activities, replacing the machine metaphor that typifies the modern paradigm. Capra (1994) applies ecological metaphor to describe the post-modern conception of education; diversity brings richness. The world is full of important connections and organisms are not isolated, but exist within a complex and dynamic system. Likewise, different parts of the curriculum should be connected to each other and connected to the learner, making learning a complex and dynamic activity.

Similar to connectedness, cooperation is another feature of post-modernity. Relationships illustrate cooperation rather than competition. Both connectedness and cooperation follow the post-modern paradigm belief that conflicts can be resolved through peaceful negotiation. Wisdom and respect that are embedded in numerous cultures are celebrated, at the same time questioning the Eurocentric perspective of the superiority of European traditions. While it is acknowledged that the natural sciences have a valuable method of scientific investigation, there are other cultural institutions also containing important truths. Finally, a consciousness of the world as a whole transcends nationalism and individualism. "In short,

postmodernism regards the world as an organism rather than as a machine, the earth as a home rather than as a functional possession, and persons as interdependent rather than as isolated and independent" (Slattery, 1995, p. 19).

Although many scholars point to the beginning of post-modernity as around 1960 (Dupuis & Gordon, 1997), paradigms do not pivot on a point and change, but rather the changing of paradigms takes place through a process. Rethinking entrenched beliefs and transforming paradigms is not easy. While many parts of our culture operate in the post-modern paradigm, some have not left modernity. To date, many of educational practices and beliefs are firmly rooted in modernity.

Betts (1992) coined the phrase "paradigm paralysis" (p. 38) to describe the state of American education. Like trying to force a square peg into a round hole, schools have very little success in changing paradigms. Many schools today focus on standardized testing; rigid boundaries exist between subject areas, and, for the most part, knowledge is imposed on students, rather than constructed by students. Although Betts refers to a new paradigm as systems thinking, the difference between systems thinking and post-modernity mainly lays in language. Some of the characteristics shared between post-modernity and systems thinking are connections, integration and openness. Betts describes systems thinking as embracing the whole because the whole is often more than the sum of its parts. Similarly, post-modernity views the world as a system of interconnected parts.

In addition to Betts (1992), other researchers have found education to be very rigid and unchanging. Marsh and Willis (1999) acknowledged that there is a pattern of stability in American schooling. American schooling has neither evolved nor changed much from the traditional forms of schools that were typical in the 19th century. "For instance, widespread calls in the 1980's and 1990's for basic curriculum reiterated many 19th century assumptions about what basic curricula should be" (Marsh & Willis, 1999, p. 45). Elkind (2000) describes some of these assumptions as provincial with conservative social values. He noted that in times past occupational roles were delineated along gender lines. Roles of teachers, parents, principals and children were clear within firm boundaries. School was for work and home was for play. Middle class values were perceived as superior values that should be instilled in all children. Schools were a place where a more knowledgeable person transmitted knowledge to those with less knowledge. Post-modernity transcends many of these provincial assumptions. Values and traditions of diverse populations are now embraced. Boundaries between school and home become blurred, as the schools take on many of the roles that have traditionally been relegated to families, such as gun safety, dental hygiene, and after-school care, to name a few. Students are taught to be active learners, high-level thinkers, problem solvers, and to question the status quo. The post-modern perspective of curriculum respects the messiness of the whole and does not try to objectify and segment parts of the whole into closed boxes. In this open framework, there is room for play, chance, and the turmoil inherent in learning. Learning does not always have to

proceed in sequential steps, but is complex and moves in fits and starts. The post-modern paradigm embraces exceptions and does not feel a need to find the ultimate truth. Curriculum is understood as an open system awash in complexity and characterized by understanding, relationships and paradox. The post-modern paradigm appreciates difference, particularity, and irregularity (Elkind, 1997).

Today's post-modern curriculum is grounded in the open systems that can be found in a number of disciplines like biology, chemistry, and philosophy (Doll, 1993). Open systems exchange both energy and matter. While closed systems at best transfer, open systems transform. Open systems are characterized by porous boundaries that allow energy to cross. In post-modern curriculum, subject areas have porous boundaries. Content is integrated, allowing for energy to cross into different content areas. For example, a student may be excited in science to learn about the processes that shape our earth. Volcanoes, earthquakes, weathering, and erosion all act to make our world dynamic and ever changing. The student's excitement is energy. The energy generated by this science unit may cross into social studies and language as students read about Pompeii.

Post-modern curriculum values the process of learning as much as it values the product. According to the National Council of Teachers of Mathematics (NCTM) Principles and Standards for School Mathematics (2000), simply attaining the correct answer for a mathematical problem is not the entire goal, but the process of working through the problem is also important. The NCTM Principles and Standards consist of five content standards and five process standards illustrating the emphasis on process. In addition, the National Science Teaching Standards (1996) underscore the use of inquiry in science teaching.

The foundation for inquiry rests on students and their questions. Curriculum is made meaningful when students systematically investigate questions they have developed. Both the NCTM Principles and Standards for School Mathematics and the National Science Teaching Standards are documents that reflect post-modernity. They are well aligned with Doll's (1993) perspective on post-modern curriculum since lessons do not necessarily end with the right answer; each ending can be a new beginning as the student extends learning and continues to ask questions.

Post-modern curriculum is open and places a high value on human thought. Learning is conceived as a complex, social activity where the student makes his/her own meaning as opposed to having the teacher transfer knowledge (Bruner, 1986). Meaning is constructed by the learner and is affected by the student's multifaceted lived experiences. The emphasis is on critical thinking and meta-cognition rather than factual knowledge. Many times there is no one correct way to learn or one correct conclusion to a problem. Learning can proceed through multiple connections, depending on the autobiography of the learner. The journey, not just the destination, is important.

## Research Design

Qualitative research frequently uses inductive logic and moves from the particular to the general (Creswell, 1998). In this research, a collective case study design was used to examine the curriculum of three individual teachers. "Collective case study" is the term used by Stake in Denzin and Lincoln's Handbook of Qualitative Research (2000, p. 435) to describe research that jointly studies several cases simultaneously. While a single case study is concerned with a better understanding of one particular case, a collective case study is used to study a phenomenon, population, or general condition. The objective of this study was to gain a better understanding of how post-modern curriculum was evident, if at all, in the participants' classroom practice. The cases themselves were of secondary interest and played a supporting role to understanding how accomplished teachers incorporated the four R's in their practice. The study took place in central Florida in fourth, third, and first grade classrooms. Multiple data points were collected over approximately a three-month period of time. I spent one day a week in each of the participants' classrooms, taking copious amounts of field notes. In addition, informal and formal interviews were conducted. Some of the informal interviews and all of the formal interviews were taped. Likewise, student interviews were taped, as was a teacher focus group. Artifacts in the form of plans, student work, and curriculum guidelines were collected.

## Three Teachers

The three teachers who participated in this study were awarded master's degrees from the Lockheed Martin/ UCF Academy for Mathematics and Science (LMA). The LMA is a standards-based, graduate program at the University of Central Florida and is targeted for teachers of mathematics and/or science, kindergarten through eighth grades. Program goals are to provide for an enriched theoretical context of education where inquiry and collaboration serve as catalysis for leadership and change in mathematics and science education. Problem solving, inquiry, educational change, and the educational reform frame the LMA curriculum. Reflection is one crucial characteristic that permeates the LMA from essential reflections during courses, to an action research thesis required for graduation. The coursework and philosophy of the LMA are firmly grounded in post-modernity.

In 1998 the National Science Foundation awarded the University of Central Florida a grant to conduct a longitudinal evaluation of the LMA. During the course of the evaluation over one hundred observations were conducted of LMA graduates teaching mathematics or science. The Reformed Teaching Observation Protocol developed by Evaluation Facilitation Group of the Arizona Collaborative for Excellence in the Preparation of Teachers was adapted and used during the observations. The protocol utilizes a four-point scale for an overall rating for the observed teaching practice and is divided into four main sections: design, imple-

mentation, content, and classroom climate. Each observation is given a final rating of inadequate, adequate, good, or accomplished. The three teachers who participated in my research were all identified as having accomplished practice by the program evaluation team. Although this study on post-modernity is not evaluative in nature, the information on the teachers' common connection to the LMA provides background of their professional growth.

To protect the participants' privacy, their names, the names of their schools, and the names of their students have been changed. Mrs. Sanders taught third grade in Sommerset Elementary. She had 23 students in her class. Of these, 11 were exceptional education students (three learning disabled, five gifted, three speech). Sommerset Elementary had a free and reduced lunch rate of 41%. Mr. Evers taught fourth grade at Fable Elementary. His class of 21 students included 4 students that received exceptional education services (ESOL, emotionally handicapped, speech). Fable Elementary had a free and reduced lunch rate of 38%. Mrs. Day was a first grade teacher at Vista Elementary. Vista Elementary had a free and reduced lunch rate of 11% and three of Mrs. Day's students participated in the school's ESOL program.

## Data Analysis

Data analysis was conducted throughout this study following the assertion by Ryan and Bemar (2000) that analysis can be ongoing, not saved until after the data have been gathered. Adhering to this principle of qualitative research, analysis began on the first day in the field. As I observed and took field notes, I color coded the field notes when anything happened in the classroom that would fit into the four R curriculum matrix. Although these categories were predetermined, I also looked for other patterns to emerge. As the patterns began to surface I noted them in the data. Once all the data were collected, there were over 200 pages of field notes alone, plus the interview and focus group data, and the artifacts. The data were organized into a large three ring binder and the inductive analysis began to find emerging themes. First, every piece of data was read. The field notes were further coded and categorized. Once the initial categories were formed, they were combined again as some of the categories overlapped. The final categories that resulted from this process were barriers, shared power, framing lessons, class environment, and questioning and communication.

Next, the field notes marked richness, relation, recursion, and rigor were revisited. They were color coded and compiled for each teacher yielding stacks of field note entries printed on colored paper. Each set of papers represented one of the teachers and contained all of the entries from my field notes for richness, relation, recursion, and rigor. After the field notes were sorted, coded, and categorized, the categories were cross-referenced with other points of the data, which provided structural corroboration.

## Intersection of the Four Rs and Classroom Practice

The four Rs were evident in the practice of the three participating elementary teachers in two distinct ways. First, many learning activities were designed to be open and in congruence with the tenets of post-modernity. For example, Mrs. Day's students graphed their favorite kind of apple: granny smith or red delicious. Then the students were asked to write a question that could be answered by the graph. This activity gave the students choice in the questions to ask. Multiple questions were correct, thus supporting divergent thinking. Second, language was used to open the more closed curricular designs. Not all the curriculum of the participating teachers was designed to be open and flexible. Parts of the curriculum in the participating teachers' classrooms were more closed and traditional in design. Yet the teachers' language opened curriculum that featured a closed design. For example, Mr. Evers' students graded their own homework. The homework consisted of finding the right answers to problems in their mathematics textbook. The discussion that took place during the grading activity illustrated that the process of finding the answer was valued. He asked, "What do you do if you don't know seven times six?" thus making it explicit that critical thinking and problem solving skills were valued. Divergent ways of solving the problem were supported. In this example, one child answered that he would draw seven circles and put six dots in them. Another student said she knew six times six and then would just add another six.

All three teachers designed much of the curriculum with their own learning goals in mind, but the processes used to reach those goals were open to their students' needs and interests. The students were not given step-by-step directions that would lead them to a predetermined answer. Much like the meaning of currere from which the world curriculum is derived, the running of the racecourse was emphasized, not just reaching the finishing line. In other words, the objective was more than reaching the correct answer. According to Duckworth (1996), "... when we have learned something only in the form of a word or formula, we may not even recognize situations where this knowledge or formula is pertinent" (p. 46). The open learning activities were designed with the process in mind. The process of learning was valued itself and the teachers made this clear. The students understood that the process was important, as reflected by Lindsey when she spoke of Mr. Evers: "He asks you how you figured it out. He doesn't ask you what the answer is, he asks you how you figured it out. He makes it more challenging." Learning activities frequently offered situations where children could expand their thinking and come to know the content in new ways. Mrs. Sanders' talked about ways in which her child-centered teaching was different from what her students had previously experienced: "They [the students] were talking about that even last year they had to sit with their hands folded in their laps. They weren't allowed to talk unless a teacher asked them a question. And then they come to this [her classroom] and it was kind of hard for them to get used to the inquiry that we do."

The materials chosen for learning activities also helped to open the curriculum. Many learning materials were chosen for their potential value in creating excitement, curiosity, and extending learning. Indeed, when I asked a group of students to relate a good learning experience in Mr. Evers' class, they recalled working with batteries and circuits. Jim talked about how he liked "putting it together and seeing if it worked." Susan enjoyed, "trying it your own way; try and have fun and do it in different ways." The teachers did not close down learning by declaring factual knowledge. Instead, activities were designed for the students to construct their own learning in social settings.

For example, Mr. Evers designed experimental science activities that made controlling variables, recording data, and analyzing data crucial to the goals of the lessons. One such learning activity immersed the students in measurement. The students took liquid and linear measurements in addition to finding the mass of common objects. When directions were given for measurement centers, Mr. Evers emphasized the ways in which the students could think about what they were doing. He modeled not only measuring the different objects, but also how he thought about what he was doing. By conducting think-alouds, he explicitly encouraged the thought process. For example, Mr. Evers talked through how to find the mass of a book as the students were gathered around the mass learning station. He began by using 100 grams on the scale, but commented that 100 grams was too heavy. He modeled his thought process of using 50 grams, but found that was too light. If 50 was too small, and 100 was too big, it would be sensible to add gram weights to the 50 grams. He could choose to add either 10 or 20 gram weights. As Mr. Evers continued to model aloud his thinking, he continuously asked the kids what would be sensible. In this way Mr. Evers illustrated his thinking as he verbalized his decision-making.

The reflective class discussion at the end Mr. Evers' science learning activity focused on what the students did, how it was done, what it meant, and how it related to the way in which scientists conduct science. This open-ended learning activity supported many students in constructing their own meaning and is indicative of a post-modern curriculum. Variables that caused differences in the groups' finding were explored through class discussion, as were the different ways in which the students thought about what they did. One learning station was framed by the question of how many drops it takes to fill a spoon. There was a wide range of answers for how many drops does it take to fill a spoon. During the discussion Mr. Evers prodded the students to question why they developed such different answers if they all used the same tool. Students identified pressure as a variable. The amount of pressure that they used as they squeezed the dropper most likely caused the differences in the findings. Mr. Evers made it clear that making mistakes was a part of doing science, but learning from mistakes was important. He explained to the students that scientists discuss their work: "The next time they want to do a better job, so they discuss. One thing they want to find out is where they made mistakes."

Although Mrs. Sanders' instructional style varied from Mr. Evers' style, science was also part of her frequently open-ended curriculum. However, she felt constricted by her school's curriculum guide that outlined what and when concepts would be taught. Mrs. Sanders talked about the rigid curriculum imposed upon her by her school: "I have to teach weather in one week. Next week, I've got a week and a half to teach space science. Then I have one week to teach the water cycle. It's very rigid and you have to do it because we are audited on it with our lesson plans." Mrs. Sanders found that she had a little time for inquiry science, which was the topic of her action research. "I know what to look for now, to find where they [the students] want to go with their questioning. But because of the stringent guidelines as far as curriculum goes, I don't have as much chance to follow the data I do collect." Nevertheless, she was still able to have a partially open science curriculum. The first hour of the day, Mrs. Sanders usually had an experiment or observation in which her students engaged. She typically did not give lengthy directions, model the learning activity or participate in any think-alouds as Mr. Evers did. Instead, she was likely to quickly introduce the activity if it was new, and let the students proceed through the activity with little direct guidance. Her students appreciated this mode of instruction. Mike commented on it when asked how Mrs. Sanders supported student learning: "I think she tries to give them the information without giving the answers." The children figured out how to solve most problems on their own. Moreover, interdependence was evident, as students relied on each other. Another student in Mrs. Sanders' class commented on interdependence, "It helps you see what other kids think about, and when you put all their ideas together, it really gives you the idea of what you are talking about."

Similar to Mr. Evers' measurement activity mentioned earlier, recording data was an important part of most of Mrs. Sanders' hands-on science activities. Observations were common in her room, and the students would usually proceed with modest guidance rather that direct instruction about what to do. The students were very familiar with different ways observations could be recorded. Indeed, the students used a variety of ways to record observations, from illustrations to lists. Processes for both observations and experimentation were as important as the product. This was evident in the time Mrs. Sanders gave for the process, even though she was not likely to lead students in a direct manner. However, not all of Mrs. Sanders' science instruction provided a platform for a post-modern curriculum. Sommerset Elementary required that teachers give science tests from the science text and that acted as a force to narrow and close the curriculum. The tests were not aligned with the ways that Mrs. Sanders taught science. Because she rarely used the textbook the tests did not reflect her teaching style. Mrs. Sanders gave class time for test preparation, which was mostly low-level recall of factual information.

The vast majority of Mrs. Day's first grade curriculum was designed to be open. There were a variety of ways for the students to accomplish the learning activities in her classroom. For example, each day began with students writing a journal entry

to Mrs. Day. The journals were for personal communication between the student and the teacher and the journal writing did not follow a writing prompt. The unstructured written communication gave the students a vast amount of freedom in what to write. Daily centers also consisted of mostly open-ended learning activities. Literacy instruction in Mrs. Day's classroom was woven together as a process. The students continuously read and wrote in the classroom. Phonetic skills were not isolated, but taught in context while learners read and wrote. All of the learning activities in Mrs. Day's classroom were situated in a social manner. Whether or not the learning activity was specifically designed to be collaborative, the students were always free to talk and work together.

While the above examples reflect an open, post-modern curriculum, the participating teachers' entire curriculum did not reflect an open learning design. Parts of the curriculum were more closed in curricular design. Language proved to be a tool used to open a closed-in curricular design and, at the same time, convey what the teachers valued. In addition, the four Rs were evident in many activities that reflected a closed design. For example, during a short homework review in Mr. Evers fourth grade classroom, which could have easily been a closed activity with predetermined answers, alternate ways of solving the problems were supported, encouraged, and discussed. Thus, the curriculum was rigorous. Recursion was also evident in multiple ways. The students were asked to explain their thinking. The meta-cognition involved in explaining the thought processes forces the learner's thoughts to loop back on them. Both recursion and relation were evident when Mr. Evers related the homework assignment to a previous lesson. The way in which the homework was discussed gave richness to the activity. Areas of disequilibrium were sought out and used as a platform for learning. The homework items that did not cause any questioning by the students were quickly checked. However, rich discussion arose when the item caused uneasiness or created a situation where the students had to think critically.

Similarly, the problem of the day (POD) and daily oral language (DOL, sentences incorrectly written that students must make right) in Mrs. Sanders' classroom were handled in a comparable manner. The students solved the problem with their morning work, but the ways in which the students attacked the problem were discussed later in the day. Recursion in the form of meta-cognition was common in this part of her curriculum. The students explained their thinking: why they solved the POD in a particular way or why they chose to change the DOL. Richness was also evident, as the learning existed on variety of levels and hinged on disequilibrium. Not all students were expected to make the same sense out of the DOL, nor were they expected to solve the POD in predetermined ways. The DOL offered a situation where there could be multiple ways to correct the incorrect sentence. Similarly, the POD had multiple paths to solving. Here richness and rigor overlapped. Although the POD and DOL do not lend themselves to relating to other subject areas, the POD does relate to different areas within mathematics. For

instance, the relationship between counting by two's and multiplication illustrates connections within mathematics. In addition, the DOL and POD in Mrs. Sanders' classroom practice helped to establish positive relations among the students and between the students and the teacher, resulting in a good classroom culture. The discussion of the POD and DOL was done in a respectful and rigorous manner. The students were not afraid of sharing their work and thought processes with the class. They were not expected to get everything right and were not disappointed when peers added to what they shared as evidenced by their acceptance of classmates' ideas. The frequent discussions made it explicit that there were multiple ways of interpreting and solving the POD and DOL.

## Beliefs

In addition to illustrating the four R's, the preceding examples from the participating teachers' classrooms illustrate how language was used in ways that promulgated an open, post-modern approach to curriculum. Moreover, language also conveyed the belief structure of the teachers. According to Dewey (1938), children learn many unintended lessons in school. One such lesson is the beliefs and values of the teacher. Similarly, Bruner (1986) writes that teachers take stances towards the curriculum. These stances that teachers take are implied in their language. The ways in which teachers converse with students can act to invite further thought by the students. In addition, Bruner believes there is a duality of language. First, clearly language exists as a way in which to communicate a message. But language is also a way the speaker represents the world about which he or she is communicating. Through language, the teachers in this study demonstrated to the learners that they conceive of knowledge as post-modern, uncertain, and negotiable. The teachers communicated their views of reality and what was important in the curriculum. For example, deconstructing the learning experience is very important to Mr. Evers, and so there were frequent reflective conferences in his classroom. He believes:

> At the end of the day, if you don't take apart the end of the lesson, or even if it is just once a week to take time to reflect, to sit and chat or allow the kids time to respond out of their own spontaneity about what you're doing. If you don't do that, I think you lose something then I think you're taking a pencil and erasing a whole thought you had and you move onto another one. And that was a good thought. So I think you erased it. Reflection kinda holds the thought.

Mrs. Day believes that empowering her first grade students is important. She teaches them to solve personal problems, as well as supporting them to be active learners:

> I don't always feel like I have to be in charge every minute, all of the time. I think that I can step back now and watch the kids do things on their own and not have

> to be there with them every minute, you know telling them exactly what to do, how to do it, or giving them the right answers to everything.

## Classroom Environment

The most basic way in which the teachers' beliefs impacted curriculum was through the classroom environment and the stances they took in regards to the curriculum. The classrooms in this study can be described as learning cultures. The role of language in creating these learning cultures was crucial. Students were supported in meta-cognition, extending their learning, and making connections through the use of language. In addition, language accompanied by action positioned the teacher more as a guide in learning than as a transmitter of knowledge. The classroom cultures in this study encouraged students to figure things out for themselves. Inquiry and testing were valued in the classrooms. The teachers did not position themselves as the owner of knowledge or as a settler of disputes. In the words of one teacher, "They [the students] know they can come to me and suggest things, and they can talk to me and they can have opinions and that's OK. And they know it, too, and they don't feel threatened to come to me and talk to me about whatever, and that's nice."

The data indicate that the teachers shared control of the classroom. Mrs. Day admits that this was something she had to learn because she is a perfectionist by nature, "That is something I have worked on a lot, trying not always spoon feeding everything to them [the students]."

She also says, "They have a choice of the work they get to do or they kind of guide you through what you're teaching because they'll help you figure out what topics and themes [to teach]."

Students had numerous encounters with content in a social setting. Learning is a communal endeavor and lesson designs can support the social aspect of learning. In the words of Bruner (1986), "It is not just that the child must make his knowledge his own, but that he must make it his own in community of those who share his sense of belonging to a culture" (p.127). The students did not work alone and isolated from other learners. They worked together to negotiate the curriculum and make sense out of their experiences. Students realized that they benefitted from working together as evidenced by the following comments: "Kids kind of know some stuff that teachers don't know"; "Its funner when you are working with your friends and stuff"; "If one brain can't think right, the other can"; and "Because it helps you see what other kids think about it and when you put all of their ideas together it really gives you the idea of what you were talking about."

Through a consistent and repeated use of learning activities, the students returned again and again to process concepts. For example, the concepts of variables, data, analyzing and recording data were encountered again and again in Mr. Evers' and Mrs. Sanders' classrooms.

Sharing power helped create the classroom cultures that reflect some of the tenets of the post-modern paradigm. According to Bruner (1986), "In this view, a culture is as much a forum for negotiating and renegotiating meaning and for explicating action as it is a set of rules of specifications for action" (p. 123). The class cultures established a risk-free environment where the students were free to interact with the curriculum. In addition, the students were encouraged to dialogue with each other and with the teacher as mentioned earlier. Collaboration was apparent not only between the students, but also between the teachers and the students. The teachers treated the students with respect, and in turn the students treated others with respect. Students were expected to take care of interpersonal problems. In first grade, Mrs. Day explicitly taught children to think about ways to solve social problems and help the classroom run smoothly. Problems that arose during the day were addressed through discussion. Numerous ways to solve them were discovered at class meetings. By sharing power, the teachers helped create a culture of learning and problem solving. In addition, students were given freedom to move around the room. For example, if a student needed to use the restroom, converse with a peer or get something from a different area of the room, they did not need to raise their hand for the teacher's permission because they were free to move to take care of the situation.

## Pedagogy

In summary, the beliefs of teachers provide a platform for curriculum. The most basic way the beliefs impact curriculum is through the class environment. The foundations of the class environment are the beliefs about teaching and learning to which the teacher adheres. The teachers in this study believed that students learn by constructing knowledge in social setting; thus the classroom environments were created to support such learning. One reason this is important is that the class environment provides a fertile landscape that sets the stage for learning as pedagogy emerges.

As discussed earlier in regards to pedagogy, the data illustrates two distinct ways the curriculum was open and reflected the tenets of post-modernity in the classrooms of the participating teachers. First, the design of many learning activities provided a platform for open learning. For example, by conducting observations in a science class or writing a journal to the teacher, the curriculum was open yet existed within a bounded system. There was not one right way to observe or write in a journal, but a variety of ways to accomplish the task.

The data of this study reveal that the most open parts of curriculum in the participating teachers' classrooms were mathematics and science. I theorize that this is because the content and pedagogies that the teachers encountered while working on their masters degrees in the LMA were centered on mathematics and science.

Clearly, the LMA impacted each of the three teachers. They all talked about ways in which their action research impacted their practice. Mr. Evers credits the

LMA with his growth as a listener, writer, data collector and reflective practitioner. Mrs. Day's action research was conducted on cooperative learning. Certainly, the students in her class spend much of their day in cooperative groups. Inquiry was the topic of Mrs. Sanders' action research. The course work of the LMA provides students with five courses that center on mathematics or science pedagogy. When asked about the impact of the LMA, the teachers spoke of overall growth in teaching and learning, and not specifically to mathematics and science instruction. The mathematics and science curriculum of the participating teachers could be described as much more progressive than the literacy instruction, with the exception of Mrs. Day who exhibited excellent literacy teaching. Literacy was the most important part of the curriculum at Mrs. Day's school, while science did not hold an important place in the first grade curriculum at her school. Consequently, Mrs. Day taught science mostly by integrating it with literacy. Science processes were also present in Mrs. Day's mathematics lessons. The students gathered, displayed, and interpreted data. In addition, mathematics in Mrs. Day's classroom clearly reflected national standards, as did the mathematics instruction in Mrs. Sanders' and Mr. Evers' classrooms.

The second way the curriculum was open relied on the use of language. While working within a more closed and traditional curriculum design, the teachers were able to open it by using questioning techniques. The dual pedagogical strategies of design and questioning reflect the teachers' beliefs about teaching and learning.

Language was an ongoing pedagogical tool in parts of the curriculum that could very easily have been closed. In activities much like the learning activities that were open in design, the teachers asked the students to verbalize how they figured things out. This was highly frequent in mathematics. There were numerous discussions centered on how students figured out and solved problems. Metacognition worked to make the curriculum rigorous as students found alternate paths to understanding. Higher order thinking was encouraged through the use of negotiation and speculation. The teachers' language did not imply there was one correct way, but rather multiple ways of understanding and making meaning. All three of the teachers asked the students to explain their thinking. This repeated teaching strategy supports the students' development of verbal skills and metacognition. In addition to developing those skills, listening to the ways in which peers think makes it explicit that there are a variety of ways to think about concepts. This notion that there are numerous of ways to solve problems, conduct investigations, write a message, and attack an unknown word both open the curriculum and create a richness in it. The teachers believed the mind is a tool of construction.

My conclusions have described how beliefs help establish a classroom environment and that the class environment is where pedagogy emerges. This brings me to the final piece of the discussion. Although it is crucial to support teachers in aligning their beliefs and practice, there is an important place for helping teachers explore new, overt teaching behaviors in a rich and supportive environment.

## Discussion

If the objective of continuing education is to bring about post-modern classroom practice, then aligning belief systems with post-modernity is the first step. The three accomplished teachers in this study were somewhat unique in that their pedagogy and belief systems were well aligned. Although teachers may espouse post-modern beliefs, Argryis (1993) has found that often times there exists a divide between beliefs and actions. The interview and observational data collected in this study reveal that teachers were often able to design learning activities that were well aligned with their beliefs. Likewise, their beliefs about teaching and learning guided their pedagogy on the occasions when the curricular plan was not well aligned with their beliefs and more closed in design. Continuing education could serve to help teachers develop a high level of congruence between beliefs and practice. Bringing tacit beliefs and assumptions to the surface gives teachers more control over their practice. Once teachers begin to focus on why they do what they do, they begin to look more critically at the curriculum of their classrooms. Deep understanding of what teachers believe about teaching and learning helps guide them through the complexity of curriculum. Self-understanding should help guide teachers as they pick and choose learning activities that are aligned with their belief systems. Continuing education should also help teachers alter learning activities designed in ways that are not congruent with their belief system. The teachers in this study were not adrift in a sea of curriculum; their clear understanding of their beliefs provided a rudder that guided them in decision-making. Teachers are continuously bombarded with new curriculum and teaching strategies. It is crucial that they have the tools to make informed decisions about how to incorporate or not incorporate new curriculum and pedagogies into their classrooms.

The findings of the longitudinal evaluation of the LMA illustrate that the accomplished teachers in this study encountered sustained development in the risk-free and collaborative environment provide by the LMA (Moskal et al., 2000). Continuing education is an ongoing process. Teachers need time to examine their assumptions and tacit understandings about teaching and learning. Learning is inherently risky, so a supportive environment is crucial to the process (Fullan, 1991). Teachers can increase congruence between their belief systems and pedagogy through reflection and dialogue (Daniels, 2001). New post- modem pedagogies can be introduced, modeled, reflected upon and read about. In a safe environment teachers are free to fail forward. Challenges will be encountered as new post-modern ideas and pedagogies are incorporated into their classrooms. A collaborative environment can help teachers examine challenges and hone the new pedagogies. Dialoguing with others who are trying new ideas and pedagogies provides a supportive environment in which learning can flourish (Fullan & Hargreaves, 1996). Continuing education could center on the teacher reflecting and improving his or her practice in a supportive, post-modern, and collaborative environment.

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