MATHEMATICS/COMPUTER SCIENCE

Ignatian Pedagogy in Collegiate Mathematics Education

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During my participation in a Manresa Experience in the Fall of 2007, I was introduced to the concept of Ignatian Pedagogy. Considering myself to be a practitioner of culturally relevant pedagogy, I was struck by the similarities between the two pedagogical approaches. I became interested in viewing my classroom practice through the lens of an Ignatian pedagogical framework. I have always maintained a reflective journal of my classroom practice and so I decided to use that as a place to begin accounting my observations. I made journal entries during the Fall and Spring semester of the 2008-2009 academic year, presented here in summarized form. The courses discussed include MATH 120 (Elementary Functions), MATH 150 (Elements of Calculus I), MATH 201 (Foundations of Arithmetic for Early Childhood Education) and MATH 211 (Foundations of Arithmetic for Middle Childhood Education).

Ignatian Pedagogy embodies five key teaching elements--Context, Experience, Reflection, Action, and Evaluation. Under each element, I provide a brief overview of the tenets of that element (referenced from Jesuit Education and Ignatian Pedagogy September 2005, Association of Jesuit Colleges and Universities, Rev. Peter-Hans Kolvenbach, S.J., Superior General of the Society of Jesus http://www.ajcunet.edu/index.aspx?bid=526). I then provide my observations (italicized) regarding that particular element in my own pedagogical practice.

Context

What needs to be known about learners (their environment, background, community, and potential) to teach them well?

Cura personalis--personal care and concern for the individual--is a hallmark of Jesuit education, and requires that teachers become as conversant as possible with the context or life experience of the learner. Since human experience, always the starting point in a Jesuit education, never occurs in a vacuum, educators must know as much as possible about the actual context within which teaching and learning take place.

This is something I really try to instill in my preservice teachers. The tenet itself is supported by the National Council of Teachers of Mathematics. In its description of a worthwhile mathematical task, two of the 11 points delineated are as follows:

The teacher of mathematics should pose tasks that are based on-
…
2. knowledge of students' understandings, interests, and experiences;
….
10. display sensitivity to, and draw on, students' diverse background experiences and dispositions;
….

At the beginning of the semester we explicitly discussed these points. Preservice teachers are asked to consider every assignment within this framework of context and to explicitly state how their homework addresses these tenets.

This tenet of Ignatian Pedagogy is very much in line with culturally relevant pedagogy, in that the culture of the learner is recognized, appreciated, and incorporated in the learning experience. Culture here is defined as the political, socioeconomical, religious, racial, and moral background of the learner.

Experience

What is the best way to engage learners as whole persons in the teaching and learning process?
Teachers must create the conditions whereby learners gather and recollect the material of their own experience in order to distil what they understand already in terms of facts, feelings, values, insights and intuitions they bring to the subject matter at hand. Teachers later guide the learners in assimilating new information and further experience so that their knowledge will grow in completeness and truth.

I find I do this more (or better) in my calculus and precalculus classes. Using prior knowledge as a springboard for acquisition of new knowledge is the foundation of my pedagogical approach. In particular, I want my students to realize that they do know SOMETHING about mathematics. Overcoming issues of math anxiety is the greatest challenge in MATH 120 and MATH 150. The first thing students say on entering the classroom or my office hours is " I am not good at math"," I have never been good at math", "Math is not my best subject", "Math has always been my worst subject". Helping them realize they have a valid starting place in what they do know, empowers them, motivates, them, encourages them to try to learn more. So considerable time is spent gathering and recollecting "the material of their own experience in order to distil what they already understand" as a spring board for what knowledge I want them to acquire.

My approach is different with my preservice teachers. Particularly in MATH 201 and 211, students enter the classroom believing that they already know the content and are more than willing to "gather and recollect the material of their own experience". In fact, most preservice teachers enter the classroom with the intention of teaching the way they have experienced their own learning. So my intent here is to show many of them a different way of understanding what they know, so that they can create different learning opportunities for their future students. I want them to experience and consequently learn to facilitate learning opportunities that expand beyond rote memorization of facts, rules, and formulas and that delve into conceptual understanding of the mathematics at hand.

Reflection

How may learners become more reflective so they more deeply understand what they have learned?
Teachers lay the foundations for learning how to learn by engaging students in skills and techniques of reflection. Here memory, understanding, imagination, and feelings are used to grasp the essential meaning and value of what is being studied, to discover its relationship to other facets of human knowledge and activity, and to appreciate its implications in the continuing search for truth.

Preservice teachers in my courses are required to keep reflective journals. This practice may be considered unusual in a mathematics content course. But I want my students to reflect on their own learning experiences as a way to inform their future teaching practices. Thinking about how they felt about (affective domain) or how they understood (cognitive) a particular mathematical concept should inform their future practice. Student comments like, "I wish I had been taught this way. It makes more sense" or "I am frustrated by this method and my students will probably be too" are important aspects of the learning process for which I want my preservice teachers to make note. However, when I review their reflective journals, the content is not as reflective as I would like. Perhaps I need to rethink my direction for this requirement. Maybe check the journals more than twice a semester. Future goal: to be more specific about content of the reflective journal. Future requirement: it must be separate from class notes.

Action

How do we compel learners to move beyond knowledge to action?
Teachers provide opportunities that will challenge the imagination and exercise the will of the learners to choose the best possible course of action from what they have learned. What they do as a result under the teacher's direction, while it may not immediately transform the world into a global community of justice, peace and love, should at least be an educational step towards that goal even if it merely leads to new experiences, further reflections and consequent actions within the subject area under consideration.

I try to create opportunities for my preservice teachers that allow them to actually practice what they are experiencing. I require them to design lessons and make class presentations. Class discussions and peer feedback from these presentations add to their opportunity for reflection on actual practice. We have had very explicit

conversations about issues of diversity in background, socioeconomic status, and types of learners. We have discussed issues of bias in standardized testing. Hopefully these types of conversations contribute to the development of this particular tenet. Though mathematics is often viewed as rote memorization of facts and figures, I want my students to experience it within various contexts so that they will teach it in like manner. Despite the fact that my courses are content courses and not method courses, I think it is important to give students an opportunity to do, practice, and teach mathematics, not just study it. Student feedback on my course evaluations indicates that this is a valuable part of the course for the majority of them.
Future goal: incorporate mathematics as social justice into my MATH 120 and Math 150 courses.

Evaluation

How do we assess learners' growth in mind, heart, and spirit?
Daily quizzes, weekly or monthly tests and semester examinations are familiar instruments to assess the degree of mastery of knowledge and skills achieved. Ignatian pedagogy, however, aims at evaluation which includes but goes beyond academic mastery to the learners' well-rounded growth as persons for others. Observant teachers will perceive indications of growth or lack of growth in class discussions and students' generosity in response to common needs much more frequently.

Open class discussions have been extremely revelatory for me this year, particularly in MATH 201 (Foundations of Arithmetic for Early Childhood Teachers). These preservice teachers have been very willing to be open in class discussions about their opinions, viewpoints, and understandings (or lack thereof as the case may be). This is has really serve to validate my requirement of class attendance and participation as 20% of the final grade.
It makes evaluation much more difficult for me if a student never says anything in class. Class participation also often differs from performance on standardized assessment methods. So students may exhibit understanding in their oral communication that does not translate to written assessment. Hence I include alternate means of assessment such as: board presentations, curriculum development projects, and worthwhile mathematical tasks.

In MATH 120 and MATH 150, the students who exhibit the most improvement in their academic performance are those who are willing to talk to me and others in class. Small group work really seems to help those students who are struggling with a concept, particularly when they are grouped with a student who exhibits strong academic performance. They may not be comfortable talking to me, but they seem to work well with their peers, if I form the groups appropriately.

Conclusion

Having identified the five aspects of Ignatian pedagogy in my own practice, I realized that I not only value the aspects of the pedagogy, but I believe all teachers should incorporate these aspects into their practice. Hence, my experience in the Ignatian Mentoring Program has led me to the development of a future research project (Fall 2009) that will investigate preservice teachers' beliefs about teaching mathematics within the framework of an Ignatian pedagogical approach. In an effort to provide preservice teachers with a learning experience that models the way I hope they will teach mathematics, my desire is to exemplify these tenets in my own classrooms, such that future teachers will exemplify like tenets in their classrooms; thereby perpetuating an endless cycle of Ignatian pedagogy within countless mathematics classrooms throughout the world. My desire, my prayer, is to fulfill Matthew 5:16:

Let your light so shine before men, that they may see your good works, and glorify
your Father which is in heaven.