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ABSTRACT

This study examined 65 preservice teachers' metaphors for describing roles of the mathematics teacher. Previous research suggested that metaphors for teaching typically ascribe three distinct roles of the teacher: teaching, assessing, and classroom management. The findings of this study reveal that student metaphors were not systematic across the three roles. Actualizing visions of mathematics learning consistent with constructivist pedagogy will require teachers and pre-teachers to reconcile beliefs with personal interactions and roles in the classroom by engaging in critical reflection about teacher roles. Contains 10 references. (Author/MKR)

A Study of Preservice Teachers' Metaphors for the Different Roles of the Mathematics Teacher

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A STUDY OF PRESERVICE TEACHERS' METAPHORS FOR THE DIFFERENT ROLES OF THE MATHEMATICS TEACHER

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This study examines preservice teachers' metaphors for describing roles of the mathematics teacher. Previous research (Tobin, 1990; Tobin & LaMaster, 1992) suggested metaphors for teaching typically describe three distinct roles of the teacher: teaching, assessing, and classroom management, and consistency of metaphor is important for classroom effectiveness. The findings of this study reveal student metaphors were not systematic among the three roles. Actualizing visions of mathematics learning consistent with constructivist pedagogy will require teachers and pre-teachers to reconcile beliefs with personal interactions and roles in the classroom by engaging in critical reflection of teacher roles.

From a feminist epistemologic perspective, there is an inherent conflict between the hermeneutic idealism and moral imperative of preservice elementary education majors, (a largely female population), and the policies and techniques of public schools, with an emphasis on "functional efficiency and social control" (Goodman, 1992, 181). If we adopt Dewey's vision of teacher preparation (Dewey, 1933), focusing on reflective practice, an important goal for teacher education programs is to encourage critical, deliberative, reflection-in-action on what being a teacher means.

Tobin's work with practicing science teachers suggests the power of having teachers construct and explore their own metaphors for the various roles of the teacher (Tobin, 1990; Tobin & LaMaster, 1992). Reflecting on her metaphors describing the roles of the teacher for managing, assessing, and facilitating learning of science students, one novice teacher was able to discern inconsistencies in her metaphors and classroom practices and modify her vision of classroom interactions to fundamentally change her approach to teaching (Tobin & LaMaster, 1992). What happens when preservice teachers construct and examine their own metaphors for the various roles of the mathematics teacher? Can exploring the systematicity of metaphor help preservice teachers gain a clearer picture of what it means to be a teacher?

The current study adopts the view that metaphorical language orders individual personal realities (Lakoff & Johnson, 1980) and can be examined to reveal philosophical orientations to knowing (Fleener & Fry, 1994). The role of metaphor for organizing and communicating thoughts about one's personal reality is central to a constructivist approach to language which views individual constructions of personalized realities as limited by individual knowledge and language.

Fundamental human interests are reflected by systematic orientations to problem situations (Habermas, 1971). These fundamental interests intercede and condition human experience and action. Fundamental human interests are affected by cognitive as well as experiential characteristics of the individual. Three fundamental human interests (technical, practical, emancipatory) are described by

Habermas and consistent with theoretical orientations toward knowing (empirical-analytic, historical-hermeneutic, and critical) (Grundy, 1987). In this study, analysis and interpretation of student metaphors use Habermasian categories to orient student perspectives.

Guiding Questions

This investigation considers the systematicity of beliefs about mathematics teaching revealed through metaphor analysis of journal entries of preservice teachers.

Guiding questions for this study are:

1. Within a Habermasian framework, what is the relationship among students' conceptualizations of different roles of teaching as expressed through metaphorical language?
2. What does students' examining the systematicity of their own metaphors reveal about their understanding of the complexity of the classroom and what it means to be a teacher?

Procedures

Participants

Sixty-five preservice elementary education majors in two sections of an intermediate-middle school mathematics methods class participated in this study. All students were in their last semester of coursework before student teaching. All but four were women; 80% were under the age of 25; and 90% were Caucasian.

Data Sources

The primary data source was student journals which included reflections on student logs, class discussions, and written assignments. Previous research (Tobin, 1990; Tobin & LaMaster, 1992) suggested metaphors for teaching typically describe three distinct roles of the teacher: teaching, assessing, and classroom management. Because 'classroom management' is itself a dead metaphor (Fry & Fleener, under review), we asked students to construct metaphors describing the role of the mathematics teacher for a) enhancing learning (teaching), b) assessing learning, and c) performing other duties (which might include but need not be limited to classroom management). Students shared their writings in class and discussed the metaphors for teaching expressed by their writings in small groups. Further assigned journal entries during midterm and finals summarized group discussions and assessed individual changes in metaphors for the roles of the teacher.

Analyses

A matrix of metaphors for the three roles of mathematics teaching was constructed from student journal reflections three times throughout the semester. Metaphors were independently grouped according to Habermasian interest cat-

egories of CONTROL and HERMENEUTIC/EMANCIPATORY by each of the investigators. Because the hermeneutic and emancipatory categories seem to overlap (see Fleener & Fry, 1994; Fry, in press), these categories were collapsed for all analyses. Any disparities in categorization were discussed among the researchers until a consensus was reached.

To determine whether Habermasian interests as expressed through metaphor were systematic, patterns of responses across teaching roles were examined. Three separate Chi-square tests of pair-by-pair comparisons of metaphors for the three roles of the teacher were performed to examine whether student metaphors across roles were systematic. A model of expected frequencies for metaphors in each pair-by-pair comparison was determined by prior research (Fleener & Fry, 1994). In order to address the second question, student interpretations of the consistency of their own metaphors and reflections on how their metaphors changed were examined. Students' beliefs about the systematicity of their own metaphors to describe the various roles of the mathematics teacher were examined to assess understanding of the complexity of the mathematics classroom and determine what students believed about what it means to be a teacher.

Findings

Student metaphors for each of the three roles of the mathematics teacher were categorized according to Habermasian interest expressed by the metaphor. For example, the metaphor "Teacher as Guide" was categorized as expressing an interest in hermeneutics if the student description included a focus on understanding and/or consensual agreement of class content. The same metaphor, however, was categorized as expressing controlling interest if the student described a pre-existing path and/or direction down which the teacher guided and the students followed.

A Chi-square test of group differences was performed on categorical data to determine whether student responses across teaching roles were consistent, from a Habermasian perspective. Three analyses were performed, comparing metaphors for enhancing and assessing learning (TEACH x ASSESS), enhancing learning and performing other duties (TEACH x MANAGE), and assessing learning and performing other duties (ASSESS x MANAGE). Significant differences between categorization of metaphors for the various roles of teaching were found by all three analyses: TEACH x ASSESS ($X2 = 5.34$, $p<.05$), TEACH x MANAGE ($X2 = 9.55$, $p<.01$), and ASSESS x MANAGE ($X2 = 13.14$, $p<.01$), suggesting, as a group, these students did not use metaphors for describing the various roles of the mathematics teacher that were consistent across roles from a Habermasian framework.

When asked to evaluate their metaphors for consistency, students provided three specific explanations of how their metaphors for the roles of the mathematics teacher were related. Twenty-five of the sixty-four students felt their metaphors were consistent even though, they admitted, the metaphors were quite different. Eighteen students felt their metaphors were consistent and similar; thirteen expressed the opinion their metaphors were consistent and expressing authority or

control relationships; and eight felt their metaphors were inconsistent but offered no clear explanation of how their metaphors were inconsistent.

Even though 56 students felt their metaphors were consistent, only 20 were able to explain the coherence among the roles of the mathematics teachers by expressing a root metaphor connecting the three metaphors for those roles. Those who did indicate a systematicity of metaphor often were not able to articulate the relationship but were able to describe how the metaphors were related. For example, one student implied the root metaphor "Teacher as Role Model" to systematize her metaphors "Teacher as Mentor," "Teacher as Manager," and "Teacher as Mother." Another student described how her metaphors expressed aspects of professionalism. The root metaphor "Teacher as Professional" seemed to tie for her the roles of the teacher as Magician, Electrician, and City Planner.

Eight of the thirteen students who expressed the belief their metaphors were consistent based on the authority relationship the teacher had with the students, were able to provide root metaphors. For example, one student reasoned the metaphors were consistent because they all put the teacher in control, "like a Queen Bee." For her, the root metaphor Teacher as Queen Bee systematized her metaphors Teacher as Guide, Teacher as Coach, and Teacher as Telephone Operator and, from a Habermasian perspective, these metaphors did all reveal an interest in control. Another student explained the common feature of her three metaphors was encompassed by the metaphor Teacher as Authority. Her metaphors were Teacher as Coach, Teacher as Principal, and Teacher as Parent.

Discussion and Implications

By generating metaphors for the various roles of teaching and examining their metaphors for consistency, preservice teachers engaged in opportunities for critical personal reflection and individual meaning-making. This study examined their beliefs and the consistency of those beliefs about the various roles of the teacher as expressed through metaphor.

The findings of this study suggest, from a Habermasian perspective, student metaphors were inconsistent across teaching roles. When faced with the realities of teaching, the idealism and theory of the methods class may be called into question as students' hermeneutical tendencies are conflicted with controlling paradigms for teaching.

Because only one in three students was able to critically examine and assess personal metaphors, providing a root metaphor to explain 'what teaching is all about' and systematize the metaphors for teaching, it does not appear opportunities for critical personal reflection are sufficient for students to become aware of their own systematicity of thought, a prerequisite for critical consciousness which may lead to emancipatory transformation. Furthermore, that almost half of the students who were able to express the roles of the mathematics teacher using a root metaphor implying an authority or controlling relationship is distressing since it conveys the Factory model of education (Fry, in press). The Factory model of education, with the implicit role of students as raw products to be molded by the teachers, is precisely the technocratic model most teacher preparation programs

are trying to eliminate. As an essential component of praxis, methods class reflections need an emancipatory stance most of these students could not adopt on their own. In order for experiences in methods classes to have meaning for preservice teachers, that is, in order for students to be able to critically examine their own thinking and the function or purpose of schooling, methods instructors must provide more opportunities for examining ideas about teaching from a critical perspective. Actualizing visions of mathematics teaching and learning consistent with constructivist pedagogy will require teachers and pre-teachers to reconcile beliefs with regard to what teaching is about.

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