

## **Student Experiences in a Problem-Centered Developmental Mathematics Class**

Community colleges serve an important role in providing access to college for students who may otherwise be unable to pursue post-secondary education. However, required pre-college level (or developmental) coursework often serves as a barrier to the college-level classes. Approximately 60% of community college students take at least one developmental class (Attewell, Lavin, Domina, & Levey, 2006; Bailey, Jeong, & Cho, 2010), with only around 30% of those who take developmental math actually completing their required developmental math classes (Bailey, 2009). The reasons for student attrition from developmental classes are complex (Cohen & Brawer, 2008), but unlike many of the challenges community college students face, the college teachers control both the curriculum and instruction of developmental classes. Thus, creating developmental classes that promote student success and empowerment has become an important goal in developmental math education.

A recent curriculum movement, often called *Mathematical Literacy*, uses group work and problem solving to 1) make the mathematical content more relevant, and 2) highlight the utility of mathematics. However, when classes like *Mathematical Literacy* were introduced in K-12 classrooms, some students resisted (Lubienski, 2000) which could limit the impact of the new curriculum on student outcomes.

Fields Community College (FCC; all names are pseudonyms) has offered *Mathematical Literacy* for about four years. For this study I investigate the *Mathematical Literacy* classroom of a course designer. The instructor's familiarity with the curriculum offers a window into the best case scenario of the *Mathematical Literacy* movement. In this context, I focus on student experiences because of the belief that mathematics instruction should be empowering: an important, but often overlooked outcome at the college level. Towards this end, I ask:

- 1) How do students in *Mathematical Literacy* experience the class, as taught by one of the course designers?
- 2) How does the student experience for students who did not successfully complete the course differ from those who did?

### **Population & Sample**

The main population under study consists of the students enrolled in *Mathematical Literacy* at FCC in the spring 2015 semester. FCC students were advised to take *Mathematical Literacy* if they needed developmental algebra but were not pursuing a degree in science or math. The class of one of *Mathematical Literacy*'s designers was observed. Eight of the sections' 22 students elected to be interviewed about their experiences in the class.

### **Methods**

#### **Data Sources**

Data in this study comes from the eight student interviews and audio recordings of these students in their groups during class. I observed and audio recorded 12 two-hour class periods over the course of the semester. Interviews with the eight students took place outside of class and lasted between 30 and 45 minutes. Individuals in the observed section took a pre- and post-survey that included an attitudes towards math inventory and open ended questions.

#### **Methods of Analysis**

**Survey data.** Both the pre- and post-survey contained data from the four attitude scales. Scores on each scale were computed so that the lowest value (1) corresponded to "Strongly disagree" and the highest value (5) corresponded to "Strongly agree." I report these scale scores without further analysis of the survey results.

**Student interviews.** The audio recordings of the interviews were transcribed and coded using the first phase of grounded theory (Corbin & Strauss, 2007; Strauss & Corbin, 1990), which uses several deliberate steps in developing codes rooted in the themes of the data. The themes ultimately used for this study revolve around doing group work, problem solving, experiences with the teacher, and emotions and feelings about mathematics. Given the research questions and the importance of the individual in those questions, it seemed important to explore individual’s experiences within each theme. As such, rather than performing a second round of grounded theory coding, for each interviewee I created a one- to two-page profile summarizing their data on the four identified themes.

### Preliminary Results

Six of the eight interviewees completed the course and two did not. Table 1 presents the pre- and post-survey scores for each interviewee on each of the four measured mathematical attitudes. Of note, Ross and Emelia, the two students who did not complete the course, had lower than average confidence scores. Review of the audio of them in their group demonstrates that they were behind from the first week of class. On the other attitude sub-scales Emelia tended to be in the top half and Ross tended to be around the median of the group. Carrie decreased her scores all around, while Craig increased them.

Table 1. Interviewee’s pre- and post-survey attitude scores by scale

	Motivation		Enjoyment		Value		Confidence	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Dave	3.78	3.56	3.50	3.38	4.38	4.63	3.40	3.40
Emelia <sup>a</sup>	3.44	-	3.25	-	3.63	-	2.60	-
Carrie	3.00	2.89	3.38	2.88	4.38	4.00	3.07	2.53
Vince	2.89	3.00	2.88	3.75	4.50	4.50	3.00	3.87
Ross <sup>a</sup>	2.78	-	3.00	-	3.75	-	1.60	-
Craig	2.67	3.00	2.25	3.13	3.00	3.63	2.13	3.20
Bea	2.56	2.00	2.63	2.75	3.13	4.25	1.80	1.60
Carley <sup>b</sup>	2.56	2.56	2.50	2.50	3.88	-	2.87	-

*Note:* The reported scales represent the scaled score on the pre- and post-survey, where a score of 1 corresponds to “Strongly disagree” and a 5 corresponds to “Strongly agree.”

<sup>a</sup> Student was not present for the post-survey.

<sup>b</sup> Some of student’s sub-scales were not complete.

The interview data highlight the fact that students’ group work experiences varied widely, but student temperament seemed to play a role in their feelings: Emelia and Dave preferred working alone, which partially informed their dislike of group work. Dave’s dislike was tempered when he thought his group mates were on the same level as him. Emelia, however, perhaps because she was dependent on her group to teacher her the content, found little about the group work enjoyable. Many of the students believed that individuals had some responsibility to ask for help if they were struggling, but only one, Carley, explicitly noted that individuals within the group had a responsibility to others in the group. Ultimately, how the individuals thought about their groups seemed to play the largest role in how students experienced the class.

### Significance

By answering these questions future iterations of this class can better structure the group work environment to facilitate learning for the students community colleges math classrooms most need most to help—those who struggle early in the class.

## References

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