Flipped Teaching Approach in College Algebra: Cognitive and Non-cognitive Gains

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This study looked into the cognitive and non-cognitive gains from using the flipped teaching approach (FTA) by comparing it with the traditional classroom approach (TCA) in the delivery of the following topics in college algebra: factoring, rational expressions, radicals, and solving applied problems. A quasi-experimental design with switching replication was utilized with 55 freshman students from two comparable intact classes of the College of Education, De La Salle University-Manila, during the first term of the 2014–2015 school year.

The two classes, designated as the experimental group and the control group, were exposed to FTA and TCA, respectively. A validated teacher-made pre-test and post-test on the topics under consideration were administered to the respondents to gauge and compare their achievements in each topic. They were also asked to answer a perceptions inventory and to write a journal about their experiences with FTA after the experiment.

With FTA, the students learned new content, prior to class and online, by watching video lectures, websites, and PowerPoint presentations, which were provided by the teacher. During the face-to-face class time, they were asked to answer what used to be the homework/assignment and some assessment materials, either individually or in groups to test their understanding of the lesson. Although the teacher did not impart the initial lesson in person, she tutored the students in the classroom, whenever necessary. The TCA was done with the teacher handling the class discussion on exactly the same topics, after which the students were given the assignment/homework for submission and discussion during the next meeting.

Findings revealed cognitive gains such as better critical thinking ability, improved achievement, and significant learning gains in each topic as seen from the result of the *t*-test for dependent and independent samples, generally in favor of FTA. Moreover, the use of FTA produced non-cognitive gains such as the

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improvement of students' attitudes toward mathematics and greater cooperation among them. They seemed to be more motivated, confident, relaxed, responsible, and active in learning when exposed to the flipped teaching approach. The majority indicated that they were happy to have control of their own learning, as they were able to explore more mathematical concepts through various modes and resources outside the classroom at a time convenient for them. The students appreciated the personalized guidance of their teacher, which kept them engaged in learning while having their misconceptions regarding the day's lesson clarified by the teacher.

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