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Flipping the Classroom in Higher Education: A Design-Based Research Study to Develop a Flipped Classroom Framework

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Abstract: Over the past 20 years some higher education instructors have increased their technology use as a way to extend and enhance students' understanding and move away from the traditional lecture approach. One recent strategy is to use a flipped classroom approach and have students use technology to access the lecture and other instructional resources outside the classroom; this leaves the in-class time to engage in active learning. However, at this time there are no empirically-based flipped classroom frameworks. The purpose of this study is to fill this gap in the academic literature and develop a framework. This will provide a springboard for other scholars and practitioners to further examine the efficacy of this specific blended approach to learning and effective approaches that can be adapted to meet the needs of their students.

Background

Researchers have identified the traditional lecture style as the most common teaching approach used in higher education (HE) classes (Mulryan-Kyne, 2010; Cuseo, 2007). The traditional lecture style of teaching can often place students in a passive role (Cooper, 1995) which typically involves students retaining isolated facts with can later be forgotten (Ramsden, 2003). Over the past 20 years some instructors have increased their technology use as a way to extend and enhance students' understanding (Strayer, 2012) and move away from the traditional lecture approach. One recent strategy is to use a flipped classroom approach and have students use technology to access the lecture and other instructional resources outside the classroom; this leaves the in-class time to engage in active learning (Baker, 2000; Collins Noer, & van der Veen. 2001; Gannod, Burge, & Helmick, 2008; Strayer, 2009).

The flipped classroom is a specific type of blended learning design that restructures the traditional lesson. The lesson format where students are introduced to the content of the lesson in class and has them engaged in working with that new knowledge to complete activities as homework is swapped around to be the classroom flip (Baker, 2000), or the inverted classroom (Lange, Platt, & Treglia, 2000). Technology is a tool typically used to present the students with the lecture and/or instruction. For example, a video lecture can be used by students and they can watch the video as often as they wish. For the flipped classroom to be successful, the technology instruction and the face-to-face class must both align to achieve the same goals (Ginns & Ellis, 2007). The flipped classroom has been used in a number of higher education studies. However, the process they used to flip the classroom is typically not described. Furthermore, at the time this paper was submitted, there have been no empirically-based flipped classroom frameworks developed.

The purpose of this study is to fill this gap in the academic literature and develop an empirically-based flipped classroom framework. This will provide a springboard for other scholars and practitioners to further examine the

efficacy of this specific blended approach to learning and for those interested in using the flipped classroom approach, it is a framework that can be used and adapted to meet the needs of their students.

Methodology

Participants

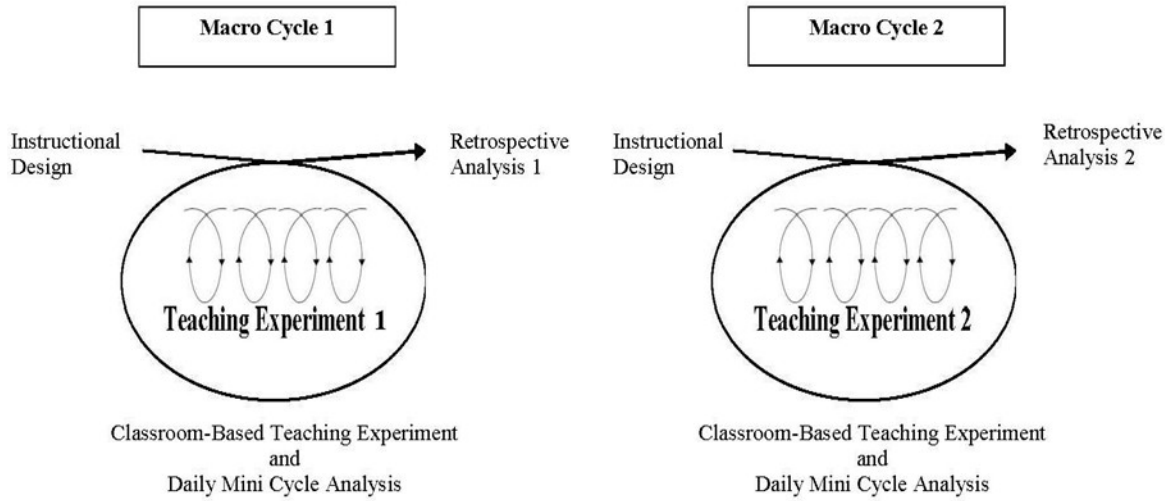
Two classes of graduate students are involved in this study from a university in the southeastern United States. Both classes are in the education department; one is an instructional technology class and the other is a English/Language Arts pK-6 class. There are approximately 50 students in total across the two classes and approximately 75% of those students were female. Students are not given extra credit for participating in the study as this is part of normal class activity.

Design-based research protocol

To develop the flipped classroom framework, a design-based research will be used which utilizes an iterative cyclical process of design, implementation, analysis, and revision. The specific DBR selected for this study was developed by Gravemeijer and colleagues (Gravemeijer, 1994; Gravemeijer & Cobb, 2006; Gravemeijer & van Eerde, 2009) to connect directly with mathematics education. This form of DBR has been used in mathematical research methodologies within the K-12 environment (e.g., Markworth, 2010). The study involved two macro cycles with one teaching experiment occurring in each macro cycle. The teaching experiments consisted of half a semester of mini cycles of thought and instruction experiments to serve the development of the local instruction theory.

The design will be the development of an initial flipped classroom framework that is built from good practices for digital age students, compiled from an in-depth review of the literature. During this time, videos and other course materials will be developed as an embodiment of that framework. Next, the teaching experiment is when the framework is implemented. The analysis occurs at the end of every class session as part of the micro cycle and at the end of a complete macro cycle. The revisions occur as they are required during the mini cycle and in a more in-depth process at the end of each macro cycle. This can be seen in the diagrammatic representation of the study in Figure 1. The first teaching experiment lasts for half a semester, a total of seven weeks.

Figure 1. A Diagrammatic Representation of the Study



Data Collection

One of the distinct characteristics of a DBR methodology is that the researchers develop a deeper understanding of the phenomenon while the research is in progress. Therefore, it is crucial that the research team generated a comprehensive record of the entire process (Cobb et al., 2003). There were several sources of data that were used in this DBR process.

- Student opinion survey
- co-researcher and witness classroom observations
- Mini cycle reflection audio-recording with research team
- artifact collection of student classwork
- Student class grades
- researcher's lesson reflection journal
- retrospective analysis at the end of a macro-cycle

Data will be gathered from the instructor reflection journals, audio recorded twice monthly instructor meetings, student brief weekly survey, and students' assignment grades. Student learning outcomes will be evaluated after every class; in Figure 1, these are the small coils that represent the reflection and analysis after every lesson. Student discussions, student questions and responses, and individual weekly assignments will be evaluated to determine how well the flipped classroom framework supported the students in the two classes and if any changes need to be made to the framework. These changes are implemented immediately and evaluated in the next mini cycle. At the end of the semester, the information gathered from the first half of the semester will be reviewed to determine how well the flipped classroom framework supported the students in the two classes and if any changes need to be made to the framework. This is the retrospective analysis from macro cycle one. This process is repeated for the second macro cycle. At the end of the second macro cycle, the final retrospective analysis will determine the final flipped classroom framework developed from this study. Table 1 illustrates the points at which the information from these data was used.

Table 1
Data Sources and when these Data were Analyzed

	Weekly Mini Cycle Analysis	Retrospective Analysis 1 Macro Cycle 1	Retrospective Analysis 2 Macro Cycle 2
Student opinion survey			⎫
Co-Researcher and Witness Classroom Observations	⎫	⎫	⎫
Mini Cycle Reflection Audio Recording	⎫	⎫	⎫
Artifact Collection		⎫	⎫
Student Assignment Grades			

Findings and Conclusion

At the time of submission, this study is in the initial framework design and literature review as part of macro cycle one. The majority of this study will be complete at the time of the conference and all findings and the conclusion will be shared at that time.

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