1 Introduction

1.1 Overview

The *flipped classroom*, also known as the *inverted classroom*, is a *blended learning*[1] approach that advocates reversing the customary sequence of listening to a lecture in class followed by a homework assignment outside of class, to a model where students watch multimedia lectures on-line before class, followed by completing problem-solving and application exercises in class with the instructor acting as a coach or guide (Johnson & Renner, 2012; Lage, Platt, & Treglia, 2000). The basic premise of the flipped teaching method is to move most of the passive transmission of content out of the classroom so that more class time can be invested in active and collaborative learning activities (Gannod, Burge, & Helmick, 2008; Lage et al., 2000; Toto & Nguyen, 2009). There are at least five purported advantages of using the flipped teaching approach.

First, an effective balance can be achieved between the demands of an instructor having to cover and deliver a large volume of content and the need for students to construct meaning from interacting with content (Bishop, & Verleger, 2013a; Bishop, & Verleger, 2013b, Davis & Minifie, 2013; Gannod et al., 2008; Herreid & Schiller, 2013; Lage et al., 2000; Toto & Nguyen, 2009). Second, because students are actively applying content knowledge in the classroom, the flipped teaching approach can help make students'

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[1] Blended learning refers to a teaching model in which a portion of the instruction occurs in a face-to-face classroom environment and portion occurs online asynchronously (Staker & Horn, 2012).

misconceptions more visible to the instructor and provide the opportunity for the instructor to give guidance and feedback to the students immediately (Butt, 2014; Critz & Knight, 2013; Gannod, et al., 2008; Enfield, 2013; Herreid & Schiller, 2013; McGivney-Burelle & Xue, 2013; Yeung & O'Malley, 2014). Third, the flipped classroom approach can increase student engagement and motivation (Azemi, 2013; Critz & Knight, 2013; Enfield, 2013; Frydenberg, 2013; Gannod, et al., 2008; Gaughan, 2014; Herreid & Schiller, 2013; Hoffman, 2014; Lage et al., 2000; Lasry, et al., 2014; Lucke, et al., 2013; McLaughlin et al., 2013; McLaughlin et al., 2014; Ryan, 2013; Strayer, 2012). Forth, the flipped classroom approach can improve teacher-student and peer interactions (Gannod, et al., 2008; Gaughan, 2014; Lage, et al, 2000; Pierce & Fox, 2012; Slomanson, 2014; Van Veen, 2013). Finally, the flipped classroom approach may better serve a wide array of learning styles (Bishop, & Verleger, 2013a; Herold, et al., 2012; Roehl, Reddy, & Shannon, 2013; Schwartz, 2014; Kellogg, 2009; Lage, et al, 2000; Larson & Yamamoto, 2013; Toto & Nguyen, 2009).

Although an emphasis on active and collaborative learning strategies in the classroom is inherent in the flipped classroom approach (Gannod et al., 2008; Lage et al., 2000; Toto & Nguyen, 2009), flipped teaching is typically compared to lecture-based approaches in the literature. Studies comparing the flipped classroom approach to a teaching approach based on active/collaborative learning (e.g. Guerrero, Baumgartel, & Zobott, 2013) are rare, however, such comparisons may provide insight into the relative contributions of studying content videos ahead of time versus engaging in active/collaborative activities in the classroom. No known literature is available that shows that research into flipped teaching has been conducted at the community college level.

1.2 Research Goal

The goal of this study was to explore the flipped classroom approach in a community college setting and assess its impact on student learning experience and performance. To understand its unique contributions, the flipped classroom method was compared to lecture-based and active/collaborative teaching approaches. A first year computer programming course was selected as the specific context for this study. Compared to what one might expect of an introductory programming course in an undergraduate university program, this course featured a strong emphasis on developing applied problem solving and coding skills and relatively less focus on theoretical concepts.

1.3 Research Questions

Five specific research questions were addressed in this study:

RQ 1. How does the flipped classroom approach impact college students' overall perceptions of the learning experience in a computer programming course compared to an active/collaborative approach and a conventional lecture/assignment approach?

RQ 2. How does the flipped classroom approach impact college students' perceptions of cognitive presence[2] in a computer programming course compared to an active/collaborative approach and a conventional lecture/assignment approach?

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[2] Cognitive presence is the degree to which the learners are able to construct meaning and confirm understanding though rigorous reflection and discourse (Garrison, 2011).

RQ 3. How does the flipped classroom approach impact college students' perceptions of teaching presence[3] in a computer programming course compared to an active/collaborative approach and a conventional lecture/assignment approach?

RQ 4. How does the flipped classroom approach impact college students' perceptions of social presence[4] in a computer programming course compared to an active/collaborative approach and a conventional lecture/assignment approach?

RQ 5. How does the flipped classroom approach impact college students' learning performance in a computer programming course compared to an active/collaborative approach and a conventional lecture/assignment approach?

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[3] Teaching presence refers to the extent of purposeful design, facilitation and direction of cognitive and social processes towards meaningful learning objectives (Garrison, 2011).

[4] Social presence refers to the degree to which learners progressively identify with the larger group, communicate with purpose, and develop interpersonal relationships in the learning environment (Garrison, 2011; Garrison, et al., 2010).