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# Investigating Flipped Learning: Post-Secondary Student Self-Regulated Learning, Perceptions, And Achievement

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# INVESTIGATING FLIPPED LEARNING: POST-SECONDARY STUDENT SELF-REGULATED LEARNING, PERCEPTIONS, AND ACHIEVEMENT

by

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Sarah Rae Sletten
November 24, 2015

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To Connor and Colton.

May I never miss another

game because of class.

ABSTRACT

The flipped classroom is a current educational model that is gaining popularity at the post-secondary level. In a flipped classroom, content (i.e., lectures), which is normally delivered in-class, is assigned as homework in the form of video lectures, and assignments that were traditionally assigned as homework, are done as learning activities in class. It was hypothesized that the effectiveness of the flipped model hinges on a student's desire and ability to adopt a self-directed learning style. The purpose of this study was two-fold; it aimed examining the relationship between two variables—students' perceptions of the flipped model and their SRL behaviors—and the impact that these variables have on achievement in a flipped class, as well as exploring the effect of the flipped experience on SRL strategy use and achievement. To date, there is very little empirical data that supports this model of instruction, and so this study adds important details to a very limited body of knowledge on post-secondary flipped courses.

The study was divided into two sections: (a) Study 1 was a correlational study with 76 participants from a flipped introductory biology course, and (b) Study 2 was a quasi-experimental study with participants from two sections of an introductory psychology course, in which one section was taught traditionally ($n$ = 45) and the other section was flipped ($n$ = 27). Both studies utilized a cross-sectional survey asking them about their self-regulated learning (SRL) strategy use (all three groups) and perceptions of the flipped model (flipped biology group only). SRL strategy use was measured using modified versions of the Motivated Strategies for Learning Questionnaire (MSLQ; Wolters et al., 2005), an established SRL scale, while the

flipped perceptions survey was derived from a variety of previously published surveys. Student letter grades for their respective courses were also collected as a measure of achievement.

The results of Study 1 supported several hypothesized relationships among the study variables. Through regression analysis it was found that student perceptions of the flipped model positively predict students' use of several types of SRL strategies. However, the data did not indicate a relationship between student perceptions and achievement, neither directly nor indirectly, through SRL strategy use. In Study 2 the results of a series of independent samples *t*-tests failed to demonstrate any significant differences in SRL use or achievement between the two sections.

This study has implications for both research and practice. The limited body of empirical knowledge on flipped classrooms has been expanded to include a theoretical framework on which to build the flipped model. Results suggest that flipped classrooms demonstrate their successes in the active learning sessions where students are able to build 21st century skills by way of constructivist teaching methods. Video lectures hold an important role in flipped classes, however, students may need to practice SRL skills to become more self-directed and effectively learn from them. This may be possible through instructor coaching and modeling of SRL strategies.

# CHAPTER I

## INTRODUCTION

The *flipped classroom* is a current instructional model in education that is gaining popularity at the post-secondary level (Raths, 2014). In a flipped classroom, content (i.e., lectures), which is normally delivered in-class, is assigned as homework in the form of video lectures, and assignments that were traditionally assigned as homework are done as learning activities in class (See Figure 1; Bergmann & Sams, 2012). By moving the content delivery portion of a class out of the classroom, instructors have more time to devote to student-centered, active learning strategies in which learners can integrate and apply their knowledge (Hamdan, McKnight, McKnight, & Arfstrom, 2013).

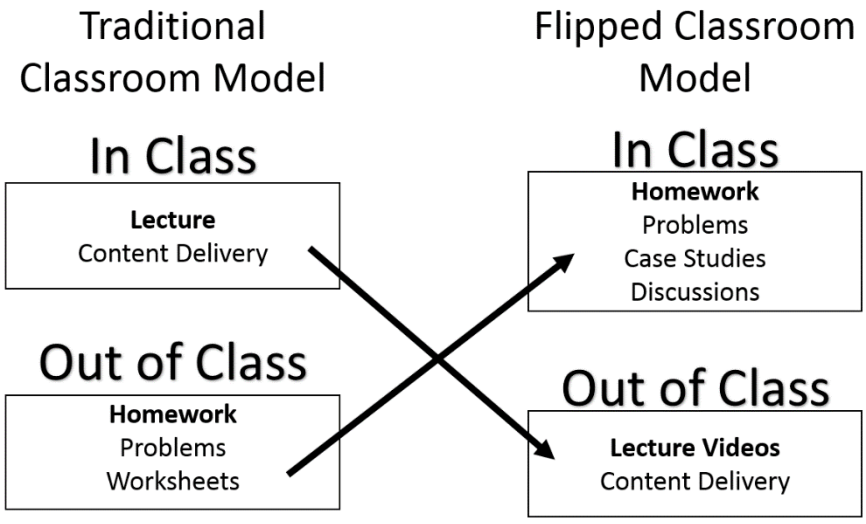


Figure 1. Traditional vs. Flipped Models of Instruction.

The Flipped Learning Network, a group of educators dedicated to advancing the flipped learning model, has developed the following *Four Pillars of Flipped Learning* (Hamdan et al., 2013):

1. Flipped learning creates flexible learning environments, allowing students to learn where they want to learn and when they want to learn.
2. Flipped learning creates "student-centered" classrooms in which students are actively involved in knowledge construction.
3. Flipped learning requires instructors to evaluate what material should be directly taught in video lectures outside of class in order to maximize in-class active learning time.
4. Flipped learning requires instructors to facilitate students in active learning environments, providing feedback and guidance as students construct knowledge.

It is easy to understand the appeal of a learning environment in which students are self-driven to fully prepare for class by watching, and taking notes from video lectures, as well as actively participate in the in-class activities. It is also apparent how the flipped model may fall short of an instructor's expectations; students may not adequately prepare for class on their own, or may fail to fully engage in learning activities while in class. The effectiveness of the flipped model appears, therefore, to hinge on a student's desire and ability to adopt the self-motivating behaviors a flipped class necessitates. The current studies examined the relationship between two variables—students' perceptions of the flipped model and their self-regulatory study behaviors—and the impact of these variables on achievement in a flipped class.

## Background

The flipped model has been identified by the New Media Consortium and EDUCAUSE as being a key emerging technology strategy in higher education (Johnson, Adams Becker, Estrada, & Freeman, 2014). Instructors on college campuses across the United States are shifting lectures out of large group settings into students' personal environments through the utilization of a plethora of available technologies (Hamdan et al., 2013). If the flipped model is to be most effective at the post-secondary level, students may have to take on a more self-directed role in their learning then they would in a traditionally taught lecture-based class. There is also evdence that suggests student perceptions play a role in the instructional model's effectiveness (Enfield, 2013).

In a flipped class, students are required to view lectures on their own time, and therefore may need to be aware of their interaction level with video lectures and regulate their motivation to learn in order to be successfully prepared for activities during class time. Self-regulated learning (SRL), as described by Zimmerman and Kitsantas (2007), involves student use of a variety of strategies to aid in optimal learning. SRL strategies can be divided into regulation of three academic dimensions—cognition, motivation, and behavior (Wolters, Pintrich, & Karabenick, 2005). Self-regulating students exhibit the use of any combination of strategies that work best for them in order to prepare for their classes. Therefore, understanding the role of SRL and promotion of its use in flipped classes may lead to higher student success in such classes.

Students state that flipped classes are less boring and provide for a more engaging environment because of the interactive nature of the in-class sessions (Smith, 2013). McLaughlin et al. (2013) found students believed the flipped model greatly enhanced their learning of course

material. They further identified classes based on the flipped model as engaging and efficient, which fostered development of critical thinking and problem solving skills. This suggests that learning activities in flipped classes at the college level may motivate students to participate in class, leading to a more effective course.

## Need for the Study

Despite the increased presence of the flipped model on college campuses, educational researchers point out that there is very little empirical data that supports this model of instruction, and that any peer review research that has been done to this point is mainly anecdotal in nature (Herreid & Schiller, 2013; Milman, 2012). Strayer (2014) highlights the gap in knowledge between the available "practice-based" support and the lack of "research-based" support in his work with flipped classes. In this light, it seems as if educators are moving to the flipped model based on its popularity alone (Straumsheim, 2013). Instructors are not the only ones who are encouraging the move to flipped instruction, approval of the new model among student populations has also been documented (Pierce & Fox, 2012; Roach, 2014), yet little to no research exists to gain insight into how students' academic cognition, motivation, and behaviors are regulated in a flipped class. Some data exists on student perceptions of flipped classes, but no study to date looks at how those perceptions predict student use of SRL strategies for class preparation and in-class participation, even though both may ultimately play a role in achievement.

## Theoretical Framework

The flipped model of instruction can be thought of as a two-armed process, centered on self-directed learning (SDL) theory. In a flipped class, SDL lays the foundation for knowledge

construction through out-of-class preparation and in-class learning activities (see Figure 2). The out-of-class preparation—the first "arm" of the flipped model— requires students to identify and utilize strategies that aid in content acquisition and understanding (i.e., SRL). In-class active learning exercises—the second "arm"—are the learning activities in which students participate to engage with and gain a deeper understanding of the content.

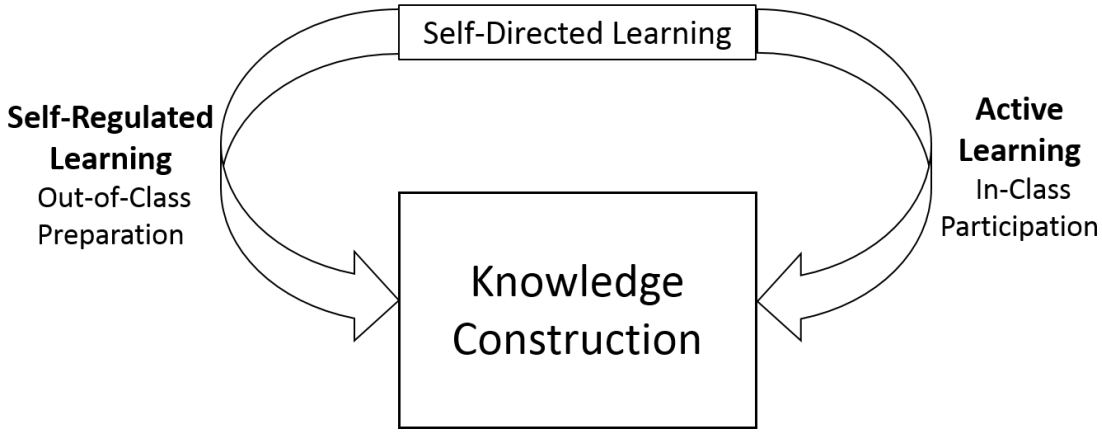


Figure 2. Theoretical Framework. Theoretical learning model for the self-directed learner in a flipped classroom relating self-regulated learning and active learning. Out-of-class preparation (e.g., watching video lectures) utilizes self-regulated learning skills coupled participation in in-class activities leads to knowledge construction.

**Self-Directed Learning**

SDL is founded on the premise that learners are capable of effectively controlling and monitoring what they learn and how they learn. Borich (2014) defines SDL as "an approach to both teaching and learning that actively engages student in the learning process to acquire higher order thinking skills" (p. 324). The most widely accepted description, provided by Knowles, identifies the process of SDL as one that is initiated and carried out by the individual in an attempt to reach self-imposed learning goals (Boyer, Edmondson, Artis, & Fleming, 2014). Brookfield (1986) states that self-directed learners are able to effectively place their learning into the context of different social settings and use alternative perspectives to transform their existing

frameworks. He further posits that SDL occurs when learners "take action to acquire skills and knowledge" (p. 58). In SDL, the teacher's role shifts from that of an instructor to more of a facilitator of learning (Borich, 2014; Brookfield, 1986; Merriam, Caffarella, & Baumgartner, 2007).

A learner can be driven by an instructor to become more self-directed when class materials and activities are designed to foster independent construction of understanding (Borich, 2014). Lectures, assignments, activities, and assessments for flipped classes can all be created using SDL models. For example, lectures are moved out of the classroom, requiring students to self-direct their content knowledge acquisition. Note-taking must be done independently, with limited outside motivation for accountability. In class, students are expected to locate and utilize resources for a variety of learning activities, which are facilitated but not dictated, by the instructor. These activities are aimed at engaging students in their own learning through collaborative exercises and multiple points of view (Meyer, 2014).

**Self-Regulated Learning**

The SRL model assumes that students are active participants in their own learning. This means that they are able to monitor and regulate the various aspects of their cognition, behavior, and study environments, and can effectively assess whether or not their learning process is working for them, or if changes need to be made (Pintrich, 2004). SDL and SRL are closely tied together in that SRL is a proactive process where students self-direct their learning (Zimmerman, 2008). Wolters (2003) classifies self-regulated learners as those students who understand their cognitive abilities and recognize what motivates them academically. He also states that these learners make use of a large number of strategies to assist them in their academic pursuits and in

managing the learning process. Winne (1995) adds that these students are aware of their affect in regards to motivation and the interaction between the two during an academic task.

Since success in a flipped class requires students to prepare for class by performing a task (e.g., watching a lecture) that is traditionally considered a passive event, students may need to be aware of their interaction level with the task and regulate their motivation in order to be successfully prepared for class. This self-assessment, and consequential regulation, aligns with the SRL model. Wolters, Pintrich, and Karabenick (2005) capture the potential relationship between SRL and the flipped model:

> The challenge to complete academic work at home without the structure of social pressures to continue working that are present in the classroom can be even more difficult. In light of these obstacles, students' ability to actively influence their own motivation is viewed as an important aspect of their self-regulated learning. (p. 254)

In a flipped class, students are responsible for watching pre-recorded lectures in prepartion for in-class activities; optimal preparation for a may occur through the utilization of SRL strategies.

**Active Learning**

Active learning is not an individual, concrete theory that can be attributed to a particular educational theorist, but rather an instructional approach that is firmly grounded in constructivism (Meyer, 2014). The work of renowned constructivists John Dewey, Lev Vygotsky, and Jean Piaget have greatly influenced current efforts to increase active learning in the classroom (Bonwell & Eison, 1991; Karpov, 2003; Kolb, 1984; Zuckerman, 2003). The flipped model relies heavily on learners constructing their understanding of content while engaged in learning activities. Within the constructivist orientation "teachers want students to

take responsibility for their own learning, to be autonomous thinkers, to develop integrated understandings of concepts, and to pose—and seek to answer—important questions" (Brooks & Brooks, 1993, p. 13). Meyer (2014) explains that learners who are actively engaged in a content-related task are able to construct knowledge through the interaction, and that learning is an active, rather than passive process. The major argument behind the use of the flipped model is to increase the time students have to actively engage in collaborative activities and decrease the time students passively listen to a didactic instructor.

Brooks and Brooks (1993) state that the constructivist framework calls for teachers to design a learning environment where student autonomy is encouraged. Under this framework, learning tasks are designed around the use of data and primary resources, which require students to think critically, and open dialog is promoted among students and with the instructor. Kaufman (2003) identified the critical distinction that teachers need to take on the role of a "guide" rather than "transmitter" as they design lessons to engage students in knowledge construction through learning activities. This builds on Vygotsky's premise that knowledge is not directly "taught" to students, but rather "discovered" by them though active participation in discussions and research along with guidance from teachers (Karpov, 2003). A collaborative environment in which students are encouraged to critically analyze resources, gaining knowledge through self-discovery and instructor guidance is the backbone of the in-class portion of the flipped model.

## Purpose of the Study

The purpose of this study was two-fold; it aimed examining the relationship between two variables—students' perceptions of the flipped model and their SRL behaviors—and the impact that these variables have on achievement in a flipped class, as well as exploring the effect of the

flipped experience on SRL strategy use and achievement. To identify relationships between the variables of student perceptions and their use of SRL strategies, detect effect of the flipped experience variable on SRL strategy use, and determine the impact of these variables on achievement, the study was divided into two separate studies.

**Study 1**

The purpose of Study 1 was to test the relationship between undergraduate students' perceptions of the flipped model, use of SRL strategies, and course achievement in an introductory course where the instructor utilized the flipped model for instruction.

**Study 2**

The purpose of Study 2 was to test the effect of the flipped model experience on SRL and achievement by comparing SRL strategy use and achievement in a flipped class to a traditional class for undergraduate students in an introductory course.

## Research Questions

**Study 1**

Question 1 – Are students' perceptions of a flipped class predictive of their SRL strategy use?

Question 2 – Does the use of SRL strategies in a flipped class predict student achievement?

**Study 2**

Question 3 – Do students in a flipped class utilize more SRL strategies than students in a traditional class?

Question 4 – Does the flipped classroom experience affect student achievement in an introductory college course?

## Significance of the Study

This set of studies examined the relationship between two variables—students' perceptions of the flipped model and their self-regulatory study behaviors—and the impact of these variables on achievement in a flipped class as well as explored the effect of the flipped experience on SRL strategy use and achievement. Based off of the research questions and available literature, four hypotheses were formed:

Hypothesis 1: Perceptions of the flipped model predict SRL strategy use. Liaw, Chen, and Huang (2008) proposed and tested a model of the relationship between the online learning environment and SRL in which learners' perceptions had definite effect on behavioral intentions. Liaw and Huang (2013) followed this study up with an additional model that showed SRL in online learning was predicted by both perceived satisfaction and perceived usefulness of the learning environment.

Hypothesis 2: SRL strategy use in a flipped environment predicts achievement. Mega Ronconi, and De Beni (2014) expand on the hypothesis that emotions towards a learning environment has an effect on behavior. In their model, they show that not only do emotions have a direct effect on SRL, but they also have a direct effect on motivation, and that both SRL and motivation have direct effects on achievement.

Hypothesis 3: Students in flipped classes utilize more SRL strategies than students in traditional classes. Dabbagh and Kitsantas (2004) explain the importance of SRL in

asynchronous learning environments, and Newman (2014) suggests flipped classes may contribute to the development of SRL skills.

Hypothesis 4: Student achievement in introductory college classes will be as good or greater in a flipped section vs. a traditional section. The available literature provides mixed results on comparison studies of achievement between flipped and traditional class sections, however, no literature reviewed demonstrated a negative effect on student achievement.

The rationale for each hypothesis will be further explained through the literature review in Chapter II and the discussion of results in Chapter V.

Together, these hypotheses suggest that perceptions affect SRL strategy use, and the use of SRL strategies affect achievement. Instructors who chose to flip their classes can address perceptions at the beginning of the course and can introduce these strategies early in a flipped class to help students succeed. Instructors may also be able to create an environment in which students can see the benefit of the flipped model and SRL. Additionally, the extremely limited empirical support base for the flipped model will be expanded for the introductory undergraduate demographic.

## Assumptions, Limitations, and Delimitations

This set of studies makes the assumption that students are accurately reporting their SRL behaviors and flipped model perceptions on a survey. There is also the assumption that the students' course grades are an accurate reflection of their understanding of the content of the course materials.

A significant limitation of this set of studies is that the majority of the data collected is self-reported behaviors and perceptions. Attitudinal measures, as defined by Creswell (2014) are

able to measure student feelings about a topic, but not indicate specific behaviors. It is possible that participants will not be truthful when responding to survey items and data may not accurately reflect the individual's honest actions and perceptions.

The samples of this study are comprised of undergraduate college students registered in two general education courses at two separate mid-sized, Midwestern universities. The generalizability of the study is limited to similar populations.

## Definitions

The following definitions are provided to help readers understand terms used throughout this study:

*Traditional Learning*: A learning model where "in class, the professor primarily lectures… Students mainly take notes, with minimal student-to-instructor dialog and no student-to-student interaction. Out of class, homework problems are assigned for students to complete on their own" (Wasserman, Norris, & Carr, 2013, p. 653).

*Flipped Learning*: A learning model in which "teachers shift direct learning out of the large group learning space and move it to the individual learning space" and "devote more time to opportunities for integrating and applying [student] knowledge, via a variety of student-centered, active learning strategies" (Hamdan et al., 2013, p. 4).

*Flipped Classroom*: A class or course in which the lecture content is assigned as homework in the form of videos or podcasts, and assignments are completed as learning activities in class (Bergmann & Sams, 2012).

*Video Lectures*: Recordings that instructors make of course content by utilizing available technologies. These include technologies such as recorded screen casts, videos of the instructors teaching, or existing video lessons published on Internet sites (Hamdan et al., 2013).

*Learning Activity*: Any educational practice guided by the instructor that induces cognitive actions within the student (Zuckerman, 2003).

*Active Learning*: A method of learning in which students are engaged in an activity that "involves students in doing things and thinking about what they are doing" (Bonwell & Eison, 1991, p. 2).

*Social Construction*: The process of students developing understanding "through coordinations among persons – negotiations, agreements, comparing views, and so on" (Gergen, 2009, p. 6)

*Self-Regulated Learning*: A "proactive process that students use to acquire academic skill, such as setting goals, selecting and deploying strategies, and self-monitoring one's effectiveness" (Zimmerman, 2008, p. 166).

*Regulation of Academic Cognition*: Regulation that "includes the types of cognitive and metacognitive activities that individuals engage in to adapt and change their cognition" and include rehearsal, elaboration, and organizational strategies (Wolters et al., 2005, pp. 251-252).

*Regulation of Academic Motivation*: Regulation that "encompasses those thoughts, actions, or behaviors through which students act to influence their choice, effort, or persistence for academic tasks" and include self-consequating, environmental structuring, self-talk, and interest enhancement strategies (Wolters et al., 2005, pp. 254-255).

*Regulation of Academic Behavior*: Regulation that "involves individuals' attempts to control their own overt behavior" and includes effort, study time, and study environment regulation strategies (Wolters et al., 2005, p. 258).

*Self-Directed Learning*: A "method of organizing teaching and learning in which the learning tasks are largely within the learners' control" lending to the "goal towards which learners strive so that they become empowered to accept personal responsibility for their own learning, personal autonomy, and individual choice" (Kaufman, 2003, p. 213).

*21st Century Skills:* The skills within (a) life and career; (b) learning and innovation; and (c) information, media, and technology domains learners need to be successful in the 21st century global economy (Partnership for 21st Century Skills, 2009).

## Chapter I Summary

The flipped classroom is an instructional model that is rapidly gaining popularity at the post-secondary level. In this instructional model, students watch video lectures outside of class and engage in learning activities during class; this is considered a "flip" of events from a traditional class. Despite the increase of flipped classes on college campuses, very little empirical research on the effectiveness of flipped model exists to support such a strong transition. Anecdotal evidence suggests that students' perceptions may play a role in student performance in flipped classes, and logically it is reasonable to assume that students in a flipped class must take on more responsibility for learning due to the independent nature of content delivery. Active learning through construction of knowledge and SRL align nicely to provide an encompassing theoretical platform on which to build a deeper understanding of the flipped model. The

proposed two-part study has been designed to explore the relationships between student perceptions and SRL, and how these factors are related to achievement in flipped classes.

Chapter I provided a background on the flipped model and identified a theoretical framework in which the study is grounded. It also identified the research questions, significance, limitations, and definitions for the proposed studies. A review of the literature relevant to this set of studies is presented in outline form in Chapter II. Chapter III contains the results of a pilot study, as well as an explanation of the methodology for the current studies.

## CHAPTER II

## LITERATURE REVIEW

The purpose of this set of studies was two-fold; it aimed examining the relationship between two variables—students' perceptions of the flipped model and their SRL behaviors—and the impact that these variables have on achievement in a flipped class, as well as exploring the effect of the flipped experience on SRL strategy use and achievement. Specifically, Study 1's purpose was to test the relationship between undergraduate students' perceptions of the flipped model, use of SRL strategies, and course achievement in an introductory course where the instructor utilized the flipped model for instruction. Two research questions were addressed in Study 1; first, are students' perceptions of a flipped class predictive of their SRL strategy use and second, does the use of SRL strategies in a flipped class predict student achievement? Study 2 was conducted to test the effect of the flipped model experience on SRL and achievement by comparing SRL strategy use and achievement in a flipped class to a traditional class for undergraduate students in an introductory course. Two research questions addressed in Study 2; first, do students in flipped class utilize more SRL strategies than students in a traditional class, and second, does the flipped classroom experience student achievement in an introductory college course? Existing literature relating to the theoretical framework and research questions of the current studies was reviewed and is presented in this chapter.

## Self-Directed Learning

SDL was described by Knowles in 1975 as a process initiated by a learner, with or without guidance from others, in which learning needs and goals are self-defined as are the resources, strategies, and assessment methods utilized in meeting those goals (Boyer et al., 2014). Simply stated, SDL occurs when learners take responsibility of their own education (Kaufman, 2003). Merriam et al. (2007) identify several models of self-directed learning, including linear and interactive stages. In linear stages, learners reach their goals by moving through a series of steps or stages. Under the model learners initially receive clear direction from instructors and outside motivators, but eventually progress to become internally motivated learners who are able to plan, implement, and assess their own learning processes. In interactive stages, two or more factors, which do not allow for a planned learning process are interacting. These factors include such things as environmental opportunities, previously acquired knowledge, chance occurrences, personality characteristics, and personal motivation.

### SDL Development

Boyer et al. (2014) highlight the individual characteristics described by Artis and Harris that tend to be prerequisites for SDL, including (a) general self-directedness, (b) confidence in ability to be self-directed, (c) understanding of the context, and (d) motivation to learn. Learners without these characteristics may still become self-directed if teachers organize learning tasks in a way that places them in the learners' control, and they are given the opportunity to practice SDL skills in their coursework (Kaufman, 2003). Boyer et al. (2014) goes on to identify Tough's guidelines for a project aimed to promote SDL development; it must be deliberate, must be

composed of related activities that take at least seven hours to complete in a six-month time frame, and must lead to specific knowledge, skills, and lasting change.

**Outcomes of SDL**

In their meta-analysis, Boyer et al. (2014) examined SDL readiness in the light of a variety of theoretically-linked constructs. First, examining internal locus of control, they found that SDL is positively related to aspiration and real-world application of knowledge. For example, students who feel their actions make an impact on things important to them, utilize SDL in their work. Next, they looked at self-efficacy and identified studies that showed SDL projects lead to increased confidence and SDL skills. Additionally, motivation and support emerged from the literature as vital factors in SDL, specifically they found that rewards, application, experience, and resources were all important factors. The last construct they examined was performance. Here they found that success was a constant theme among the reviewed studies; learners who completed SDL projects regularly reported stories of success in their work. Gureckis and Markant (2012) narrowed their focus of SDL to examine how consequences of learners' choice in knowledge acquisition affected the learning process and subsequent performance. They discovered that since learners are able to choose which information they want to learn and how they want to learn it, self-directed learners can optimize their experience and reach high levels of performance with reduced training.

## Self-Regulated Learning

SRL refers to a self-directed, proactive process in which learners regulate their behaviors, environment, and motivation to transform their mental abilities into academic performance (Zimmerman & Kitsantas, 2007; Zimmerman, 2008). Individuals who can self-regulate their

learning have been identified as being autonomous, reflective, efficient, self-directed, and able to understand their motivation and attitudes towards learning (Wolters, 2003). Winne (1995) describes how self-regulated learners approach a learning task:

> When they begin to study, self-regulated leaners set goals for extending knowledge and sustaining motivation. They are aware of what they know, what they believe, and what the differences between these kinds of information imply for approaching tasks. They have a grasp of their motivation, are aware of their affect, and plan how to manage the interplay between these as they engage with a task. (p. 173)

**Phases**

As self-regulated learners proceed through an academic task, they devote time and mental consideration to their actions by seeking out information, monitoring their engagement, revising plans and processes of task, adjusting goals, and assessing motivation (Winne, 1995). Zimmerman and Kitsantas (2007) describe SRL as a cyclic process through which learners progress through three self-regulatory stages. In the first phase, the *forethought* phase, learners go through two processes—analysis of a task and assessment of motivation. First, learners set goals and plan strategies prior to performance during task analysis. Then motivational beliefs are examined in respect to the learner's self-efficacy, expected outcomes of the task, orientation to the learning goal, and intrinsic value of the task. During the second phase, the *performance* phase, learners focus on self-control through the use of regulatory strategies and self-observation. The third phase, the *self-reflection* phase, occurs when learners evaluate their own performance and make judgments on their progress in relation to the goals they defined in the forethought phase. Self-judgments lead to causal attributions about the realized results of the learning efforts,

and reactions to outcomes guide learners back to the forethought phase to continue the SRL process.

**Strategies**

During the performance phase of SRL, learners utilize a variety of strategic processes in an effort to reach an academic goal, whether it be regulation of the learner's cognitive state, the learner's behavior, and/or the learning environment (Zimmerman & Kitsantas, 2007). Self-regulated learners "are viewed as having a large arsenal of cognitive strategies that they can readily and skillfully deploy to accomplish different academic tasks" (Wolters, 2003, p. 189).

Wolters, Pintrich, and Karabenick (2005) identify and describe a variety of self-regulatory strategies, which they organize into *cognitive*, *motivational*, and *behavioral* dimensions. They state that cognitive regulation "includes the types of cognitive and metacognitive activities that individuals engage in to adapt and change their cognition" (pp. 251-252). Cognitive regulation can occur through (a) rehearsal strategies—repeating things over and over again until committed to memory; (b) organizational strategies—organizing information into diagrams, concept maps, etc.; (c) elaboration strategies—summarizing material in one's own words; and (d) monitoring of metacognition—assessing comprehension and progress toward goals. They identify regulation of academic motivation as "thoughts, actions, or behaviors through which students act to influence their choice, effort, or persistence for the academic tasks" (p. 254). Four sets of strategies are classified as regulators of motivation in their schema: (a) self-consequating—extrinsic consequences for goal achievement or failure; (b) environmental structuring—arranging surroundings so academic work can be completed with few distractions; (c) self-talk—either intrinsic thoughts or extrinsic vocalization to convince the learner to

continue with the task; and (d) interest enhancement—increasing intrinsic motivation by identifying personal value of a task. Last, they recognize the regulation of behavior as "an aspect of self-regulation that involves individuals' attempts to control their own overt behavior" (p. 258), identifying management of effort, study time regulation, and help-seeking as related strategies.

Zimmerman and Kitsantas (2007) outline and describe a slightly different set of SRL strategies. Their list includes: (a) goal setting—defining a goal; (b) task strategies—analyzing tasks and deciding on methods; (c) imagery—using mental images for recall; (d) self-instruction—verbal or sub-verbal directions; (e) time management—estimating and using time wisely; (f) self-monitoring—watching and tracing performance; (g) self-evaluation—comparing performance against standards; (h) environmental structuring—creating a setting fit for learning; and (i) help-seeking—locating resources for assistance in learning. Although these strategies are described individually in their work, Zimmerman and Kitsantas ultimately classify them into *behavioral*, *environmental*, and *covert* regulation processes.

Congruence can be seen between the Zimmermann and Kitsantas (2007) classification model and that of Wolters, et al. (2005). Both groups define behavioral self-regulation similarly, indicating that students who regulate their behavior make changes in their actions based on self-observation of performance. Zimmerman and Kitsantas's environmental regulation strategies parallel what Wolters, et al. define as motivational regulation. Additionally, Zimmerman and Kitsantas describe covert regulation as "monitoring and adjusting cognitive and affective states" (p. 510), which is comparable to what Wolters, et al. term as "cognitive regulation".

**Online Environments**

Online environments provide different learning challenges than traditional classrooms due to their asynchronous, independent nature. Wolters et al. (2005) posit "the challenge to complete academic work at home without the structure or social pressures to continue working that are present in the classroom can be more difficult" (p. 254). Traditional courses, where learning is face-to-face and teacher led, demand less SRL than those courses with an online facet, where students need to set learning goals and plan strategies to meet those goals (Lee & Tsai, 2011). Flipped classrooms contain an online component, so it is important to review literature that examines SRL in online learning to better understand potential relationships between SRL and flipped learning environments.

The role of a learner in an online environment can be closely tied to SRL since online learners must be aware of their metacognition, motivation, and behaviors during the learning process (Shea & Bidjerano, 2010). Dabbagh and Kitsantas (2004) identify the SRL processes most beneficial in asynchronous, online environments as: (a) goal setting, (b) self-monitoring, (c) self-evaluation, (d) task strategies, (e) help seeking, and (f) time management. Azevedo and Cromley (2004) examined SRL in learners tasked with learning content asynchronously with hypermedia (i.e., text, graphics, animation, audio, and video). One group of students was provided with SRL training and the other was provided the hypermedia component with no SRL training. Utilizing a questionnaire, pretest, and posttest, it was found that learners in the SRL trained group gained a deeper understanding of the content than those who did not have SRL training. This supports the idea that SRL is beneficial in asynchronous learning environments and learners can be trained to successfully use SRL strategies.

The role of student perceptions is another important consideration when examining SRL in online learning environments. Lee and Tsai (2011) compared student perceptions of SRL in online and traditional learning environments and found that students were more interested in utilizing SRL strategies in online learning contexts than traditional learning contexts. This finding is supported by Liaw, Chen, and Huang's (2008) investigation of learners' attitudes towards online learning. They found that learners' attitudes can directly influence cognition, which in turn has a direct effect on behaviors. In a follow-up study, Liaw and Huang (2013) looked specifically at how student perceived satisfaction of online learning environments (i.e., acceptance of system and degree of comfort using system) affected SRL. Their findings indicated that SRL in online environments was predicted by perceived satisfaction; explicitly, student attitudes about online environments affected learning behaviors.

## Active Learning

Active learning involves learners constructing knowledge rather than adopting knowledge from an external source. This is not a new approach to learning, rather it has roots dating back to 19th century theorists, such as John Dewy (Wood, 2009). As described in the later work of Lev Vygotsky, activity can be defined as an interaction that occurs between an individual and his or her environment (Giest & Lompscher, 2003) and learning can be mediated through this interaction (Kozulin, 2003). Active learning as an approach to classroom instruction is explained by Bell and Kozlowski (2008):

> "…it goes beyond simply 'learning by doing' and focuses on using formal training design elements to systematically influence and support the cognitive, motivational, and

emotional processes that characterize how people focus their attention, direct their effort, and manage their affect during learning" (p. 297).

In their review of the literature on active learning, Bell and Kozowski (2008) found that compared to passive learning methods, active methods give learners more control over their learning and foster the "inductive" learning process of knowledge construction. They also extracted three central themes of active learning: (a) exploratory learning, (b) the encouragement of learning from errors, and (c) stress and anxiety reduction during activity. Wood (2009) claims an "active learning approach…maximizes teamwork and feedback among the teacher and students, who work together to apply scientific principles and reasoning to real-world problems" (p. 6). Learners in a classroom that supports active learning are involved in higher-order thinking skills, such as analysis, synthesis, and evaluation, and are thinking about what they are doing while they are doing things (Bonwell & Eison, 1991).

Moving out of the Industrial Age and into the Information Age has placed a different demand on education (Watson & Reigeluth, 2008); technology has made the learning task of memorizing facts nearly obsolete (Park & Choi, 2014). The National Survey of Student Engagement (NSSE), a very large, and well-known collegiate satisfaction survey, is built on five benchmarks. Notably, active and collaborative learning is one of them (Meyer, 2014). Specially designed active learning classrooms (ALC) are being developed on college campuses to facilitate new instructional methods where learners can better interact and communicate about course content. Park and Choi (2014) identify and describe several different types of ALC including (a) Student-Centered Active Learning Environment for Undergraduate Programs (SCALE-UP), (b) Technology Enabled Active Learning (TEAL), (c) Teaching and Learning Spaces Working

Group (TLSWG), and (d) Transform, Integrate, Learn, and Engage (TILE). All of these ALC are aimed at increasing active learning opportunities where students can share knowledge and develop collaborative ideas. Large granting agencies, like the National Science Foundation (NSF), are supporting ALC with funds provided to institutions to decrease the amount of lectures, and increase active learning in introductory courses (Mervis, 2009). Many groups have shown that the investment in increasing active learning is paying off, with significant growth of academic performance being observed in courses where passive teaching methods have been replaced with more active methods (Freeman et al., 2007; Lord, 1997; Mervis, 2010). Results have been particularly encouraging among disadvantaged students (Carini, Kuh, & Klein, 2006; Haak, HilleRisLambers, Pitre, & Freeman, 2011).

**Constructivism**

The idea of Constructivism has evolved over the last 200 years through the work of many educational theorists, notably, John Dewey, Jean Piaget, and Lev Vygotsky (Brooks & Brooks, 1993; Kolb, 1984; Wood, 2009; Zuckerman, 2003). In constructive classrooms, teachers recognize learners as autonomous thinkers and support them to develop, reshape, and transform their understanding of the content through active learning experiences (Brooks & Brooks, 1993). Kolb (1993) describes learning construction as a cycle in which learners begin with active experimentation which subsequently leads to examples and information; the learner then reflects on the newly identified information to conceptualize an understanding. Giest and Lompscher (2003) expand on Vygotsky's work with constructivism and his view on different developmental zones of instruction. In the *Zone of Actual Performance* the teacher sets the stage for self-direction, discovery learning, and goal setting. In the *Zone of Proximal Development*, the teacher

guides the learners through instruction and stimulates them to reach their learning goals. It is during this time, through interactions with other learners and the environment, that learners develop their understanding of the content (Kolb, 1984).

Vygotsky was a strong proponent of the idea that knowledge is constructed both through individual processes and in social contexts (Kozulin, 2003; Zuckerman, 2003). Glaser (1991) explains that new knowledge is constructed on current knowledge and the concept of peoples' inherent social nature is an important consideration when discussing cognition. He claims that cognitive activity, both while in the classroom and outside, cannot be removed from cultural contexts, and that conceptual development often occurs during social events, extending available knowledge. Groups of learners rethinking what they "know" about the world around them in the form of problem-solving is the basic idea behind social construction (Gergen, 2009). Support for the use of social construction, in the form of cooperative learning or team-based learning where individuals actively engage with each other to address real-world problems, has been shown to substantially increase achievement and benefit learners (Hrynchak & Batty, 2012; Stockdale & Williams, 2004).

**Learning Activities**

Consistent with constructivist theories, a "learning activity" can be described as any instructor guided educational practice that induces cognitive actions within the learner (Zuckerman, 2003). These activities require learners to be actively involved in information processing and authentic problem solving (Wieman, 2014). Giest and Lompscher (2003) emphasize that during an activity, the application of prior knowledge, interest, and available resources govern the learning process and outcomes that will be realized by a student. Two types

of commonly used learning activities in post-secondary classrooms are problem-based learning (PBL) and case studies.

**Problem-based learning.** Wood (2009) explains PBL as using "complex, real-world problems to motivate students to identify and research concepts and principles needed for possible solutions" (p. 102). PBL as an instructional tactic dates back to medical education in the mid-1900's (Barrows, 1996) and is based on constructive learning theories (Gijselaers, 1996). PBL provides opportunity for learners to collaborate with peers to integrate new knowledge with their existing understanding through challenges aligned with course learning goals (Allen, Donham, & Bernhardt, 2011). Barrows (1996) identifies four main characteristics of PBL: (a) students are responsible for their own learning, (b) learning is collaborative, (c) teachers act as guides and do not lecture on content, and (d) a central problem serves as stimulus for learning. In PBL, Allen, Duch, and Groh (1996) state that learners construct knowledge in an authentic context, increasing the likelihood of retaining the information.

**Case studies.** Case studies are specific problems or situations that exemplify a particular topic (Davis, 2009) and are a widely used method of promoting active learning among learners (Bonwell & Eison, 1991). Having their educational debut in medical and law courses, cases actively involve students in authentic experiences by exemplifying concepts and making facilitating easy fluency and transfer (Svinicki, 2004). Wood (2009) posits that case studies promote cooperative learning, and encourage higher-order thinking levels, like analysis, synthesis, and evaluation, as learners work together to address real-world relevant questions within a case.

## Flipped Model of Instruction

The flipped model of instruction derives its name from the reversal of traditional in-class and out-of-class tasks. In a flipped class, content delivery, which is normally the main feature of class meeting times, is moved to the online, independent learning space in the form of video lectures, and assignments that were traditionally assigned as homework, are completed collaboratively as learning activities in class (Bergmann & Sams, 2012). Therefore, students in a flipped classroom watch pre-recorded videos containing lectures on the course concepts prior to coming to class, and then participate in learning activities during class time. The learning activities help integrate the content in the video lectures with authentic problems and issues, aligning the flipped model with constructivist approaches (Ray & Powell, 2014).

The flipped classroom is currently gaining popularity among college instructors across the United States (Hamdan et al., 2013). The primary driving force behind this shift is instructors' desire to provide their students with better learrning opportunities (Sonic Foundry & Center for Digital Education, 2013). Anecdotal evidence identifys several justifications for the move to the flipped model of instruction, including (a) an increase in student engagement, (b) stronger collaboration skills, (c) differentiated instruction, (d) deeper discussion of content, and (e) creative freedom for faculty (Millard, 2012). Although many college instructors show favor for the move toward the active learning structure of the flipped model, there remains opposition to the switch by instructors who feel the didactic lecture should be preserved, calling for more emperical support of the model (Straumsheim, 2013). Strayer and Hanson (2014) explain that even though little emperical data is available in support of the flipped model directly, instructors

who want to flip their courses can find ways to integrate flipped strategies with proven effective instructional strategies.

**Comparisons to the Traditional Model**

Alongside the increased presence of the flipped model in college classrooms, research comparing different aspects of the flipped model to traditional methods of instruction is showing up more often in the literature. Hussey, Fleck, and Richmond (2014) found that the flipped model in a psychology stats course increased the number of learning opportunities over the traditional model and led to significantly improved learning. In an upper-division engineering course, Mason, Shuman, and Cook (2013) also found improved learning where students in a flipped course out-performed students in a traditional course on problem sets. They also learned that students in the flipped course studied less, covered more material, and had better perceptions of course effectiveness. Notably, however, these positive outcomes were not realized until well into the semester. Students indicated that, they were initially frustrated with the flipped format and needed a few weeks to adjust to the new teaching and learning style. In a study on learners autonomy in a flipped statistics course, Marchionda, Bateiha, and Autin (2014) learned that flipped courses contribute to the development of autonomy of learners, but this independence did not result in higher course grades. Interestingly, they found that the increase in autonomy resulted in learners crediting themselves for successes in class, but blamed the instructor or the course structure when they failed to learn the material.

Studies focused on comparing student achievement in flipped and traditional courses have produced mixed results. Wilson (2013) examined course grades in a statistics course both before and after the flipped model was implemented, and found that grades increased after the

instructor flipped the course. Pierce and Fox (2012) also showed that the flipped model positively impacted student performance in a pharmacy course, citing the increase of active learning strategies as the major reason. In their study, McLaughlin et al. (2013) also examined a flipped pharmacy course. They found no difference in students' academic performance between the flipped and traditional models, but did find significant increases in student engagement and autonomy. No studies reviewed were found to show that the flipped model resulted in a decrease in student academic achievement.

**Student Perceptions**

The available literature on the flipped learning model suggests that student perceptions of the model are an important factor to consider. Nearly all studies reviewed included constructs exploring student attitudes toward outside-of-class lecture viewing, in-class active learning strategies, and/or the overall structure of the flipped learning model. Roach (2014) explains that to best understand how the model works in practice, it is important to consider student attitudes about flipped learning alongside of the models efficacy.

**Video lecture perceptions.** Holbrook and Dupont (2011) investigated how helpful students thought online video lectures were to their learning experience in post-secondary science classes. Their results showed that students in both introductory and advanced courses found the online lectures to be helpful for learning the course content. Enfield's (2013) work in a 300-level undergraduate multimedia course, found that students valued the ability to view lectures at their own pace. Students indicated that note taking while watching lectures and answering instructor-provided questions for each video were helpful in their understanding of the lecture content. Additionally, it was found that in-class quizzes served as strong motivators to get

students to watch the lectures before class meetings. He also discovered that low performing students tended to feel the amount of video lectures assigned was too much out-of-class work. This is an interesting finding because Francis (2014) found in an upper-level business class that although all students viewed lectures an average of two times each, higher-achieving students had higher viewing frequencies than lower-achieving students; those getting A letter grades spent more time watching lectures than those getting D or F letter grades. Smith's (2013) study provides support to these findings. When he asked general chemistry students about their attitudes toward the flipped model, he uncovered that students generally perceive lectures outside of class as an added burden, but students recognize their usefulness in learning course content. His participants also indicated that they preferred lectures that were short and engaging, and provided an easy to locate specific content.

**In-class perceptions.** The learning activities that occur during the in-class portion of a flipped course has theoretical grounding in active learning and constructivism. Student perceptions of these activities are of interest because how they can affect their overall attitudes of the flipped model. Many studies on student perceptions of the flipped model indicate that students have positive attitudes towards the in-class learning activities (McLaughlin et al., 2013; Pierce & Fox, 2012; Smith, 2013; Wilson, 2013). Students value the student-centered classroom atmosphere and increased collaboration realized in a flipped classroom (Newman et al., 2014).

**Structure perceptions.** The overall structure of the flipped model also affects students' opinions. Although students have indicated that it promotes self-efficacy (Enfield, 2013; Pierce & Fox, 2012), some students feel this increased individual responsibility for learning is unreasonable for undergraduate courses (Wilson, 2013). Wilson (2013) suggests that students'

individual personalities might predict how students perceive a flipped class. Experience with the flipped model may also play a role in student attitudes. Herreid and Schiller (2013) propose that perceptions may change as familiarity with the model increases. Newman et al. (2014) support this idea. Their study found that students were more comfortable and appreciative of working collaboratively with others if they had prior experience with the flipped model. They suggest that when students are initially exposed to the flipped model, they are not prepared to learn independently (via videos) and constructively during class; it is only with practice that most students can realize the benefits of a flipped class.

## Chapter II Summary

Chapter II provides an overview of the literature pertinent to the flipped classroom model. The literature reviewed begins with a broad overview of SDL to provide a basis for understanding how SRL and active learning work together in the flipped classroom. SRL and active learning are well-known constructs in education so the literature was presented to highlight various means by which they can be transferred into the flipped model. The available literature on the flipped model was outlined so as to further identify its characteristics, to describe any findings regarding how the experience in flipped classrooms affect student achievement, and to examine how students perceive the model. Chapter III describes a pilot study and presents the methodology for this study on the flipped learning model.

# CHAPTER III

# METHOD

The purpose of this study was two-fold; it aimed examining the relationship between two variables—students' perceptions of the flipped model and their SRL behaviors—and the impact that these variables have on achievement in a flipped class, as well as exploring the effect of the flipped experience on SRL strategy use and achievement. The study was divided into two separate studies; Study 1 tested the relationship between undergraduate students' perceptions of the flipped model, use of SRL strategies, and course achievement in an introductory flipped class, while Study 2 tested the flipped model by comparing SRL strategy use and achievement in a flipped class to a traditional class for undergraduate students in an introductory course. The two studies collectively addressed four quantitative research questions.

1. Are students' perceptions of a flipped class predictive of their SRL strategy use?
2. Does the use of SRL strategies in a flipped class predict student achievement?
3. Do students in a flipped class utilize more SRL strategies than students in a traditional class?
4. Does the flipped classroom experience affect student achievement in introductory college courses?

This study follows an earlier pilot study carried out by the author, which allowed for refinement of the protocols and measurement tools. This chapter provides an overview of the

pilot study, and describes the participants, procedures, and measures utilized in the current study. Additionally, it provides an explanation of statistical analyses performed on the data.

## Pilot Study

The pilot study was conducted in the spring of 2014, and explored the relationship between SRL and the flipped model by addressing two main research questions: (1) does the use of SRL strategies in a flipped class relate to student achievement? And (2) are students' perceptions of the flipped model related to their success in the class?

### Methods

Students were recruited from undergraduate courses identified as flipped from two, mid-western universities: one was a large, undergraduate and graduate research institution; and the other was a small, undergraduate four-year institution. The participants included 151 students (53.0% males, 46.4% females, 0.7% unspecified) in statistics, physics, biology, history, and educational assessment flipped courses. Three components of SRL— academic cognition, academic motivation, and academic behavior— were assessed using 38 items adapted from the Motivated Strategies for Learning Questionnaire (MSLQ; Wolters et al., 2005). All items were assessed on a 7-point scale (1 = *Not at all true of me,* 7 = *Very true of me*). Five sub-scales were extracted through factor analysis: (a) elaboration/metacognitive, (b) organization/rehearsal, (c) self-consequating, (d) environmental structuring, and (e) effort. Student perceptions of the flipped model were measured using 12 newly created items assessed on a 7-point scale (1 = *Not at all true of me*, 7 = *Very true of me*). Factor analysis and reliability analysis indicated that the scale contained two distinct constructs; they were labeled flipped preference and flipped learning

benefits. Participants self-identified their grade in the flipped course (1 = *F*, 2 = *D*, 3 = *C*, 4 = *B*, 5 = *A* (*M* = 4.09, *SD* = .82).

**Findings**

Several significant correlations among the SRL and flipped model perception scales were found and presented in as a brief paper at the 2015 SITE conference in Las Vegas, NV (Sletten, 2015). Notably, both of the perceived benefit of flipped model scales correlated positively with all of the SRL scales. These results indicate that those who perceive benefits from the flipped model tend to utilize SRL strategies. Grades only weakly correlated with elaboration/metacognition and effort (.18 and .19, respectively, $p$ <.05).

Simultaneous multiple regression analyses were performed to test the predictive effect of SRL strategies and flipped perceptions on course achievement and to identify the most relevant of the predictors. The overall model, containing the five SRL strategies and two flipped perception scales, although small, significantly predicted course grade ($R^2$ = .09, $p$ < .05). Specifically, environmental structuring and perceived learning benefits showed to be significant predictors of course grade ($\beta$ = .28 and .24, respectively, $p$ < .05) while study time was identified as a negative predictor ($\beta$ = -.32, $p$ < .05). The later result is perplexing because the items included in the study time scale directly reflect time spent on viewing lectures.

The pilot study explored the relationship of a thoroughly researched and understood dimension of student motivation—SRL—in relation to the relatively new and rapidly expanding flipped model. Additionally, the pilot study took into account student perceptions of the flipped model. Overall, results indicated that SRL strategies and student perceptions may play a role in student achievement in flipped classes.

**Limitations**

Several limitations of the pilot study were identified. First, student achievement was the dependent variable for much of the analysis completed, however, this variable may not have exhibited strong validity since it was based on student' self-reported grades. Second, the 38 SRL scale items were selected from the MSLQ (Wolters, Pintrich, & Karabenick, 2005), which is made up of 97 items in its original form. Using so few of the items may have decreased the measure's ability to fully capture students' SRL behaviors. Additionally, the items used to measure student perceptions of the flipped model were created for the study, and although analysis demonstrated acceptable reliability coefficients, items derived from a thorough review of available research on student perceptions of the flipped model may increase the measure's validity. The sample for this study may also have provided inconsistent data since participants came from several different courses, each with its own instructor and flipping practices.

Despite the number of limitations, the pilot study produced promising results that would be benificial to educators and educational researchers if further explored. The following two studies address the limitations apparent in the pilot study, and aim for a more valid and reliable investigation of SRL and student perceptions of the flipped model, and their relationship to student achievement.

## Study 1

The first study utilized a correlational design aimed at exploring the relationship between SRL strategy use, perceptions of the flipped model, and student achievement in the flipped, post-secondary class. Study 1 addressed two main research questions. First, are students' perceptions

of the flipped model predictive of their SRL strategy use? Second, does the use of SRL strategies in a flipped class predict student achievement?

**Participants and Procedures**

Participants were 76 undergraduate students (18 years or older) recruited from Biology (BIOL) 111 at a large, mid-western public research institution. BIOL 111 is an introductory, non-majors biology course in which the instructor had been teaching using the flipped model for several semesters. A majority of participants (82.9%) indicated that this was their first flipped course while 17.1% indicated that they had taken at least one flipped course at some point in the past. Table 1 displays all demographic information collected on participants (see Appendix A for demographics codebook).

The study utilized a cross-sectional survey design and was approved by the Institutional Review Board (IRB) of the university with which the author is affiliated (see Appendix B). Data was collected at a single time point during the 13$^{th}$ week of a 16-week semester via a paper survey administered by the author. On the day of the survey, the author was introduced to the class by the instructor along with a brief overview of purpose of the study. Informed consent forms (see Appendix C) were distributed to all students in the class with an explanation of the study by the author; signed consent forms were collected from those students volunteering to participate. Participation in the study was incentivized by entering the students who completed the survey in a drawing for a $25 Target gift card (financed by the author).

Each survey had a coversheet that contained a numerical survey code and a line for students to identify themselves with their name and student ID number. The survey code was also written on the first page of the survey. When participants turned in their completed survey,

Table 1. Demographic Characteristics for Participants in Study 1.

| Variable | Subcategory | BIOL 111 N = 76 Valid *n* | % |
|---|---|---|---|
| Gender | Female | 52 | 68.4 |
| | Male | 24 | 31.6 |
| Age in Years[a] | 18 | 14 | 18.4 |
| | 19 | 29 | 38.2 |
| | 20 | 20 | 26.3 |
| | 21 or older | 13 | 17.1 |
| Ethnicity | White | 72 | 94.7 |
| | Black | 1 | 1.3 |
| | Amer Indian | 1 | 1.3 |
| | Asian | 1 | 1.3 |
| | Other | 1 | 1.3 |
| Year in College | Freshman | 33 | 43.4 |
| | Sophomore | 32 | 42.1 |
| | Junior | 6 | 7.9 |
| | Senior | 5 | 6.6 |

*Note.* Totals of percentages are not 100% for every characteristic because of rounding.
[a] 1 = 18, 2 = 19, 3 = 20, 4 = 21 or older ($M$ = 2.42, $SD$ = .98)

they tore off the coversheet to separate their identity from the survey results. The coversheets were placed in an envelope and given to the instructor; the surveys were collected by the researcher. This prevented the instructor from seeing any of the individual survey results, and the researcher from seeing any identifying information. The instructor then used the coversheets to fill out a spreadsheet with the survey codes and corresponding course letter grades at that point in the semester (see Appendix D).

**Measures**

**SRL strategies.** To address the limitations of the survey used in the pilot study, the MSLQ was again revised in an effort to better assess SRL. The authors of the MSLQ offer flexibility in the use of their measure:

> These scales do not need to be used as a complete set. Individual scales, or sets of scales, can be used as indicators of students' tendency to regulate these different aspects of their academic functioning. Slight modifications in wording have been used…without a substantial change in reliability…It is possible to tailor them to the particular course or subject areas of interest. (Wolters et al., 2005, p. 262)

Based on this flexibility, a few complete scales not central to the current study were removed, along with some individual items displaying redundancy. Eleven of the items (acog_3, 6, 12, amot_5, 11, 17, 18, 23, abehv_8, and 11) were also re-worded so that they better aligned with the flipped model. The newly modified MSLQ contained 52 items that assessed three dimensions of SRL— academic cognition, academic motivation, and academic behavior (see Appendix E). Items were grouped on a theoretical basis to create sub-scales within each dimension and tested by the calculation of Cronbach's alpha as a measure of internal consistency among the items. Creswell (2014) states that internal consistency is a way to test reliability, especially in a cross-sectional survey, and a calculated Cronbach's alpha should be larger than .70 for most studies (Warner, 2013). Academic cognition included two subs-scales, *study strategies* (10 items; $\alpha$ = .78) and *regulation of metacognition* (5 items; $\alpha$ = .82) One item (acog_12) was removed from the regulation of metacognition sub-scale to improve the reliability coefficient. Academic motivation was comprised of four sub-scales: (a) *self-talk* (8 items; $\alpha$ = .84), (b) *interest*

*enhancement* (8 items; α = .92), (c) *environmental structuring* (3 items; α = .84), and (d) *self-consequating* (3 items; α = .93). The environmental structuring and self-consequating sub-scales each had one item removed (amot_14 and amot_11, respectfully) to improve their reliability coefficients. Academic behavior was measured using two sub-scales, *effort* (6 items; α = .64) and *help-seeking* (3 items; α = .93). One item (abehv_8) was removed from the effort regulation sub-scale to improve reliability the coefficient. All items were assessed on a 7-point scale (1 = *Not at all true of me*, 7 = *Very true of me*). Scores on negatively worded items were reversed, and items in respective sub-scales were averaged before any analyses were conducted. The descriptive statistics demonstrate normal distributions of each sub-scale for individual sub-scales and are provided in Table 2.

**Perceptions of the flipped model.** Items aimed at measuring student perceptions of the flipped model were identified in previously published surveys (McLaughlin et al., 2013; Newman et al., 2014; Pierce & Fox, 2012; Roach, 2014; Smith, 2013) and compiled into a 32-item survey by the author (see Appendix F). This collection of items aimed to assess the two dimensions of the flipped model—the online video lectures and in-class active learning. Since the referenced items were not part of a validated scale, exploratory factor analysis was conducted to assess the validity of any sub-constructs within the two dimensions.

Initial exploratory factor analysis called for the extraction of four factors from the video lectures dimension. However, upon review of the content of each items, it was decided to remove items not central to the research questions of the study (technical aspects of accessing videos (flipvid_13-16) and question asking (flipvid_11-12). Exploratory factor analysis was again

Table 2. Study 1: Self-Regulated Learning Measure Items and Averaged Descriptive Statistics.

| Dimension | Sub-scale | Items | Descriptive Statistics | | | |
|---|---|---|---|---|---|---|
| | | | *M* | *SD* | Skewness | Kurtosis |
| Academic Cognition | Study Strategies | acog_1, 2, 3, 5, 9, 10, 11, 13, 14, 15 | 4.27 | .93 | .20 | - .24 |
| | Metacognition | acog_4, 8, 16, 6, 7 | 4.41 | 1.25 | - .37 | - .47 |
| Academic Motivation | Self-Talk | amot_1, 2, 6, 7, 8, 13, 19, 20 | 5.12 | .97 | - .20 | - .90 |
| | Interest Enhancement | amot_3, 4, 9, 10, 15, 16, 21, 22 | 3.34 | 1.34 | - .11 | - .92 |
| | Environmental Structuring | amot_12, 18, 24 | 4.86 | 1.41 | - .43 | - .36 |
| | Self-Consequating | amot_5, 17, 23 | 4.31 | 1.84 | - .32 | - 1.17 |
| Academic Behavior | Effort Regulation | abehv_1, 2, 4, 5, 7, 10 | 5.05 | .94 | - .33 | - .05 |
| | Help-Seeking | abehv_3, 6, 9 | 5.33 | 1.46 | - .93 | .80 |

*Note.* Descriptive statistics were calculated using the averaged vales of each individual scale. Range for all subscales was 1 (not at all true of me) to 7 (very true of me)

.

conducted, this time leading to the extraction of three sub-scales. Table 3 displays exploratory factor analysis results both before and after the removal of non-central items.

Items within each factor were evaluated for content validity, leading to the movement of two of the items from factor two (flipvid_4 and 5) into factor one, and one item from factor one (flipvid_20) into factor three. Reliability analysis was conducted on the items within each factor, and results indicated the three sub-scales had strong internal consistencies: (a) *preference of video* (3 items; $\alpha = .79$), (b) *value of video* (7 items; $\alpha = .92$), and (c) *viewing frequency* (3 items; $\alpha = .84$). The preference of video and viewing frequency sub-scales each had one item removed (flipvid_4 and flipvid_20, respectfully) to improve their reliability coefficients. The viewing

Table 3. Eigenvalues, Percentages of Variance, and Factor Loadings for Exploratory Factor Analysis of Flipped Video Perceptions Scale.

| Data Characteristics | Factor 1 | Factor 2 | Factor 3 | Factor 4 |
|---|---|---|---|---|
| Initial EFA | | | | |
| Number of Items | 11 | 3 | 3 | 3 |
| Eigenvalue | 8.18 | 2.32 | 1.61 | 1.49 |
| % of variance | 40.89 | 11.62 | 8.06 | 7.43 |
| Cumulative % | 40.89 | 52.51 | 60.57 | 68.00 |
| Factor Loadings | .63 - .80 | .56 - .86 | .51 - .65 | .47 - .87 |
| EFA After Removal of Items | | | | |
| Number of Items | 6 | 5 | 3 | N/A |
| Eigenvalue | 6.64 | 2.01 | 1.30 | N/A |
| % of variance | 47.43 | 14.35 | 9.28 | N/A |
| Cumulative % | 47.43 | 61.78 | 71.06 | N/A |
| Factor Loadings | .50 - 90 | .50 - .87 | .65 - .88 | N/A |

*Note*. EFA = Exploratory Factor Analysis.
The original scale included 20 items. The revised scale consisted of 14 items.

frequency items address specific lecture viewing behaviors rather than attitudes, yet was included in this construct because of its relationship to video lectures, which have been shown to positively influence achievement (Francis, 2014).

Exploratory factor analysis of the second set of items concerned with in-class active learning proposed that three factors be extracted from the video lectures dimension. Table 4 displays the results from the exploratory factor analysis.

Table 4. Eigenvalues, Percentages of Variance, and Factor Loadings for Exploratory Factor Analysis of Flipped Class Perceptions Scale.

| Data Characteristics | Factor 1 | Factor 2 | Factor 3 |
|---|---|---|---|
| EFA | | | |
| Number of Items | 4 | 6 | 2 |
| Eigenvalue | 6.74 | 1.54 | 1.10 |
| % of variance | 56.13 | 12.84 | 9.13 |
| Cumulative % | 56.13 | 68.97 | 78.10 |
| Factor Loadings | .74 - .90 | .67 - .82 | .64 - .88 |

*Note*. EFA = Exploratory Factor Analysis.

Items in each factor were evaluated for content validity, which led to the movement of the two items in factor three (flipact_2 and 3) into factor two, creating a division of the flipped class scale into two sub-scales with strong internal consistencies: *learning enhancement* (4 items; $\alpha = .93$) and *value of active learning* (7 items; $\alpha = .87$). The value of active learning sub-scale had one item removed (flipact_2) to improve the reliability coefficients.

All flipped model perception items were assessed on a 7-point scale (1 = *Not at all true of me*, 7 = *Very true of me*). Scores on negatively worded items were reversed, and items in respective sub-scales were averaged before any analyses were conducted. The descriptive

statistics for each sub-scale and are provided in Table 5. All sub-scales demonstrated normal tendencies except for *learning enhancement*, which shows a peaked distribution around the high levels of agreement.

Table 5. Study 1: Flipped Perception Measure Items and Averaged Descriptive Statistics.

| Dimension | Sub-scale | Items | Descriptive Statistics | | | |
|---|---|---|---|---|---|---|
| | | | *M* | *SD* | Skewness | Kurtosis |
| Flipped Video Perceptions | *Preference of Video* | flipvid_1, 2, 3 | 2.57 | 1.37 | .74 | - .15 |
| | *Value of Video* | flipvid_4, 5, 6, 7, 8, 9, 10 | 3.96 | 1.50 | - .35 | - .54 |
| | *Viewing Frequency* | flipvid_17, 18, 19 | 3.17 | 1.66 | .29 | - .85 |
| Active Learning Perceptions | *Learning Enhancement* | flipact_4, 5, 6, 7 | 5.76 | 1.36 | - 1.59 | - 2.26 |
| | *Value of Active Learning* | flipact_1, 3, 8, 9, 10, 11, 12 | 5.19 | 1.32 | - .86 | - .10 |

*Note.* Descriptive statistics were calculated using the averaged vales of each individual scale. Range for all subscales was 1 (not at all true of me) to 7 (very true of me).

**Course grades.** Course grades were collected from the instructor of BIOL 111 at the same time that the survey was completed (during the 13th week of a 16 week semester). Grades obtained from the instructor reflected the students' achievement in the course at that point in the semester (1 = *F*, 2 = *D*, 3 = *C*, 4 = *B*, 5 = *A*; *M* = 3.82, *SD* = 1.029).

**Data Analysis**

Data analysis (using computer software SPSS 23) aimed at addressing the two research questions was completed using the sub-scale averages:

1. Are students' perceptions of a flipped class predictive of their SRL strategy use?
2. Does the use of SRL strategies in a flipped class predict student achievement?

**Correlations.** Correlational analyses described by Pearson's *r* (Warner, 2013) were used to identify relationships between SRL, flipped perceptions, and achievement variables.

**Multiple regression.** Because of previously published models describing direct effects of perceptions on SRL behaviors in online environments (Liaw et al., 2008; Liaw & Huang, 2013), and direct effects of perceptions on SRL and then SRL on achievement (Mega et al., 2014), multiple regression was carried out to determine if SRL and flipped perceptions predict student achievement and also if flipped perceptions predict SRL. In the first set of regressions, all of the SRL strategies and flipped perceptions sub-scales collectively served as the predictor variables, while course grades was the criterion variable. In the second set of regressions, the SRL strategies and flipped perceptions sub-scales were individually tested as predictors of the dependent variable of course grades. A hierarchical regressions was also completed with flipped perceptions sub scales as the first level predictor and SRL strategies as the second level predictor of course grades.

## Study 2

The second part of the current study was a quasi-experimental (post-test only) design aimed at comparing students' use of SRL strategies and student achievement in flipped and non-flipped class sections of the same course by addressing two main research questions. First, do students in flipped classes utilize more SRL strategies than students in traditional classes? Second, does the flipped classroom experience affect student achievement in introductory college classes?

**Participants and Procedures**

Participants were undergraduate students (18 years or older) recruited from two Psychology (PSYC) 220 class sections from a moderate-sized, mid-western public university. PSYC 220 is an introductory course designed for both psychology majors and non-majors. Both sections were and taught by the same instructor; one was taught as a traditional course (PSYC Trad; 45 participants) and the other was taught using the flipped model (PSYC Flip; 27 participants). The course content and assessments were identical in the two sections. An independent samples *t*-test was performed on course grades after the first exam to verify that there was not a difference in achievement between the two sections early in the course (PSYC Trad $M = 4.74$, PSYC Flip $M = 4.70$: $t(68) = .75$, $p > .05$). One-third of the participants in the flipped section stated they had previously taken a flipped course either in high school or college. Table 6 displays all demographic information collected on participants (see Appendix A for demographics codebook).

The study utilized a quasi-experimental (post-test only; IRB approved; see Appendix B) identical to the design of Study 1. Data was collected at one time point during the 13$^{th}$ week of a 16-week semester via a paper survey administered by the author in the exact same manner as described in Study 1. Consent was obtained, and anonymity was maintained through the use of a coversheet, survey codes, and grade spreadsheets as described in Study 1 (see Appendices C and D).

**Measures**

**SRL Strategies.** SRL strategy use was measured using the same modified MSLQ utilized in Study 1 (see Appendix E). Items assessed three dimensions of SRL— academic cognition,

Table 6. Demographic Characteristics for Participants in Study 2.

| Variable | Subcategory | PSYC Trad N = 45 | | PSYC Flip N = 27 | |
|---|---|---|---|---|---|
| | | Valid *n* | % | Valid *n* | % |
| Gender | Female | 29 | 64.4 | 17 | 63.0 |
| | Male | 16 | 35.6 | 10 | 37.0 |
| Age in Years[a] | 18 | 3 | 6.7 | 3 | 11.1 |
| | 19 | 10 | 22.2 | 7 | 25.9 |
| | 20 | 14 | 31.1 | 4 | 14.8 |
| | 21 or older | 18 | 40 | 13 | 48.1 |
| Ethnicity | White | 37 | 82.2 | 20 | 74.1 |
| | Black | 4 | 8.9 | 3 | 11.1 |
| | Amer Indian | 2 | 4.4 | 1 | 3.7 |
| | Mexican | 1 | 2.2 | 0 | 0 |
| | Asian | 1 | 2.2 | 3 | 11.1 |
| Year in College | Freshman | 11 | 24.4 | 7 | 25.9 |
| | Sophomore | 20 | 44.4 | 8 | 29.6 |
| | Junior | 10 | 22.2 | 8 | 29.6 |
| | Senior | 3 | 6.7 | 4 | 14.8 |
| | Other | 1 | 2.2 | 0 | 0 |

*Note.* Totals of percentages are not 100% for every characteristic because of rounding.
[a] Both classes 1 = 18, 2 = 19, 3 = 20, 4 = 21 or older; PSYC 220 Trad (*M* = 3.04, *SD* = .95); PSYC 220 Flip (*M* = 3.00, *SD* = 1.11).

academic motivation, and academic behavior—but slightly different dimension subscales and internal consistencies were found with this data set than that used in Study 1.

After removing one item (acog_12) because of its reference to watching lectures, exploratory factor analysis, followed by reliability analysis, divided academic cognition into two subs-scales, *study strategies* (8 items with factor loadings ranging from .44 to .75; α = .78) and *regulation of metacognition* (7 items with factor loadings ranging from .37 to .71; α = .71), which explained 40.3% of the total variance. Academic motivation was comprised of three sub-

scales: (a) *self-talk* (8 items with factor loadings from .61 to .81; α = .90), (b) *interest enhancement* (7 items with factor loadings from .56 to .78; α = .88), and (c) *environmental structuring* (3 items with factor loadings .79 to .85; α = .84). These three sub-scales explained 64.5% of the total variance. Items measuring self-consequating strategies (amot_5, 17, and 23) used in Study 1, as well as three additional items (amot_11, 14, and 18) were removed because of their direct relatedness to watching online lectures outside of class, and this was not required of students in the traditional section. Academic behavior was measured using two sub-scales, *effort* (5 items with factor loadings ranging from .42 to .92; α = .72) and *help-seeking* (3 items with factor loadings ranging from .89 to .92; α = .92), which explained 59.3% of the total variance. One item (abehv_7) was removed from the help-seeking sub-scale to improve the reliability coefficient.

All items were assessed on a 7-point scale (1 = *Not at all true of me,* 7 = *Very true of me*). Scores on negatively worded items were reversed, and items in respective sub-scales were averaged before any analyses were conducted. The descriptive statistics demonstrate normal distributions for individual sub-scales, and are provided in Table 7.

**Course grades.** Course grades were collected from the instructor of the flipped class at the same time that the survey was completed (during the 13$^{th}$ week of a 16 week semester). Grades obtained from the instructor reflected the students' achievement in the course at that point in the semester (1 = *F*, 2 = *D*, 3 = *C*, 4 = *B*, 5 = *A*; *M* = 4.27, *SD* = .83 for PSYC Trad; *M* = 4.44, *SD* = .64 for PSYC Flip).

Table 7. Study 2: Self-Regulated Learning Measure Items and Averaged Descriptive Statistics.

| | | | PSYC Trad $N = 45$[b] | | | | PSYC Flip $N = 27$[c] | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Dimension | Sub-scale | Items | *M* | *SD* | Skew | Kurt | *M* | *SD* | Skew | Kurt |
| Academic Cognition | Study Strategies | acog_1, 2, 3, 5, 11, 13, 15, 16 | 3.82 | 1.17 | - .25 | - .14 | 3.59 | 1.27 | - .36 | - .96 |
| | Metacognition | acog_4, 8, 16, 6, 7 | 5.06 | .98 | - .19 | - .12 | 4.98 | 1.06 | - .07 | - .73 |
| Academic Motivation | Self-Talk | amot_1, 2, 6, 7, 8, 13, 19, 20 | 4.77 | 1.21 | - .31 | - .42 | 4.83 | 1.27 | - .37 | - .83 |
| | Interest Enhancement | amot_3, 4, 9, 10, 15, 16, 21, 22 | 3.77 | 1.20 | .25 | .53 | 3.76 | 1.35 | - .30 | - .68 |
| | Environmental Structuring | amot_12, 18, 24 | 4.79 | 1.45 | - .34 | - 1.04 | 5.02 | 1.72 | - .70 | - .11 |
| Academic Behavior | Effort Regulation | abehv_1, 2, 4, 5, 7, 10 | 4.97 | 1.11 | .06 | - 1.05 | 4.97 | 1.24 | - .73 | - .40 |
| | Help-Seeking | abehv_3, 6, 9 | 4.84 | 1.69 | - .62 | - .23 | 5.45 | 1.65 | - 1.04 | .44 |

*Note.* Descriptive statistics were calculated using the averaged vales of each individual scale; Skewness (Skew); Kurtosis (Kurt).
[a] Study strategies, interest enhancement, and effort was calculated with $N = 71$; help-seeking was calculated with $N = 70$.
[b] Interest enhancement, effort regulation, and help-seeking was calculated with $N = 44$.
[c] Study strategies and help-seeking was calculated with $N = 26$
Range for all subscales was 1 (not at all true of me) to 7 (very true of me).

**Data Analysis**

Data analysis (using computer software SPSS 23) aimed at addressing the two research questions was completed using the sub-scale averages:

1. Do students in a flipped class utilize more SRL strategies than students in a traditional class?
2. Does the flipped classroom experience affect student achievement in introductory college courses?

Data displayed normal distributions (see Table 7), therefore independent *t*-tests were utilized to test for differences in student SRL use and achievement between the flipped and traditional sections. The first set of *t*-tests were used to address the first research question; the means of SRL strategy use sub-scales (dependent variables) will be compared between the two PSYC sections (independent variable). The second research question was investigated through a final *t*-test comparing grades (dependent variable) between the two PSYC sections (independent variable).

## Chapter III Summary

This chapter began with an overview of the current study and the research questions it aimed to address. It described a pilot study conducted by the researcher in the spring of 2014, which aimed at examining relationships between student perceptions of the flipped model and their SRL strategy use, and how these variables might be related to achievement. Several significant correlations were noted among perceptions and SRL use, and a predictive relationship was found in the overall model of perceptions and SRL use on student achievement. Limitations realized with the pilot study were highlighted, which guided the design of the current study.

A detailed explanation of the current two-part study was provided. Study 1 was a correlational study aimed at exploring the relationship between SRL strategy use, perceptions of the flipped model, and student achievement in the flipped, post-secondary class. Participants from a flipped introductory biology course were recruited to complete a survey asking them about their SRL strategy use and perceptions of the flipped model. Study 2 was a quasi-experimental study aimed at comparing students' use of SRL strategies and student achievement in flipped and non-flipped class sections of the same course. Participants were recruited from two sections of an introductory psychology course, in which one section was taught traditionally and the other section was flipped, and asked to complete a survey about their SRL strategy use. Both SRL strategy use surveys were modified versions of the MSLQ (Wolters et al, 2005), while the flipped perceptions survey was derived from a variety of previously published surveys. The measures and procedure, along with the data analysis approach were fully described. Results obtained from the analysis of the data are provided in Chapter IV.

# CHAPTER IV

## RESULTS

The purpose of this study was to examine the relationship between two variables—students' perceptions of the flipped model and their SRL behaviors—and the impact that these variables have on achievement in a flipped class. The theoretical framework for the study was comprised of two arms, SRL and active learning, centered on SDL. The study was divided into two separate studies. Study 1, a cross-sectional survey of 76 students in a flipped introductory biology course, tested the relationship between undergraduate students' perceptions of the flipped model, use of SRL strategies, and course achievement. Study 2, a quasi-experimental (post-test only) survey of 45 students in a traditional section and 27 students in a flipped section of an introductory psychology course, tested the flipped model by comparing SRL strategy use and achievement. Data analysis consisted of quantitative tests—correlations, regressions, and *t*-tests—to address the four research questions listed below.

1. Are students' perceptions of a flipped class predictive of their SRL strategy use?
2. Does the use of SRL strategies in a flipped class predict student achievement?
3. Do students in flipped class utilize more SRL strategies than students in a traditional class?
4. Does the flipped classroom experience student achievement in introductory college courses?

This chapter reports the results of the quantitated tests noted above. The results of descriptive, validity, and reliability analyses was provided in Chapter III. An interpretation of the results in relation to the research questions follows in Chapter V.

## Study 1

### Correlations

Analysis for Study 1 began with a Pearson correlational analysis to identify the magnitude and direction of relationships among the study variables. Warner (2013) states that Pearson *r* values around .10 indicate a small effect, around .3 indicate a medium effect, around .4 indicate a large effect, and anything greater than .60 indicates an extremely large effect. SRL and flipped perceptions averaged sub-scales, along with course grade and previous experience with the flipped model were all included in the analysis. Table 8 presents several significant, positive intercorrelations of sub-scales within the SRL construct. Notably, study strategies had strong (>.50) bivariate relationships with metacognition, self-talk, and effort. Also, self-talk was strongly correlated with metacognition and effort. Many significant, positive intercorrelations were also realized among the flipped perception construct sub-scales. Strong bivariate relationships were found to exist between value of video and viewing frequency, as well as between active value and learning enhancement.

Table 8 also shows that several significant, positive relationships existed between the SRL flipped perception sub-scales. However, video preference was the only flipped perception sub-scale to not significantly correlate with any of the SRL sub-scales. Students' previous experience with the flipped model also showed no significant correlation with any of the sub-scales from either construct. Students' course grade only weakly correlated at a level of

Table 8. Correlations among SRL, Flipped Perceptions, Grades, and Flipped Experience.

| Scales | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Study Strat | — | | | | | | | | | | | | | | |
| 2. Metacognition | .62** | — | | | | | | | | | | | | | |
| 3. Self-talk | .63** | .68** | — | | | | | | | | | | | | |
| 4. Interest Enhance | .29* | .35** | .40** | — | | | | | | | | | | | |
| 5. Environ Struct | .28* | .37** | .48** | .45** | — | | | | | | | | | | |
| 6. Self-conseq | .22 | .42** | .31** | .37** | .45** | — | | | | | | | | | |
| 7. Effort | .53** | .46** | .61** | .33** | .43** | .13 | — | | | | | | | | |
| 8. Help-seeking | .20 | .34** | .22 | -.05 | .13 | .07 | .18 | — | | | | | | | |
| 9. Pref of Video | .18 | .11 | -.07 | .16 | .10 | .12 | .03 | .16 | — | | | | | | |
| 10. Value of Video | .37** | .39** | .34** | .33** | .30** | .29* | .44** | .12 | .30** | — | | | | | |
| 11. Viewing Freq | .41** | .38** | .29* | .29* | .29* | .27* | .39** | .07 | .36** | .68** | — | | | | |
| 12. Learn Enhance | .26* | .34** | .35** | .34** | .14 | .15 | .18 | .37** | .25* | .46** | .16 | — | | | |
| 13. Value of Active | .34** | .40** | .25* | .37** | .13 | .16 | .27* | .49** | .44** | .54** | .38** | .74** | — | | |
| 14. Grade | .12 | -.00 | .17 | -.20 | .12 | -.04 | .23* | .07 | .02 | -.01 | -.03 | -.08 | -.06 | — | |
| 15. Prev Flip Exp | -.09 | .07 | -.04 | -.12 | -.08 | .12 | -.01 | -.14 | -.12 | .00 | .07 | -.06 | -.18 | .11 | — |

* $p < .05$ (2-tailed), ** $p < .01$ (2-tailed)

significance with effort within the academic behavior dimension of SRL, and did not correlate with any of the flipped perception sub-scales.

Overall, the correlational analysis identified that positive bivariate relationships not only existed among sub-scales within each individual construct, which was anticipated, but also between constructs, which suggests that students' perceptions about the flipped model may be related to their SRL strategy use. This idea was further examined through regression analysis specifically addressing the two research questions in Study 1.

**Multiple Regression**

**Question 1.** The first research question of Study 1 asked if students' perceptions of a flipped class were predictive of their SRL strategy use. To address this question, a set of simultaneous multiple regressions were conducted with the sub-scales of flipped perceptions serving as the predictor variables of the individual SRL strategy sub-scales. The results of these regressions are displayed in Table 9. The overall flipped perceptions model significantly predicted six of the eight SRL strategy sub-scales, including study strategies, metacognition, self-talk, interest enhancement, effort, and help-seeking. Only environmental structuring and self-consequating, both part of the academic motivation dimension of SRL were not predicted by the overall flipped perceptions model. When looking at specific perceptions of the flipped model, only a few significant predictors were realized. Study strategies were predicted by viewing frequency, self-talk strategies were predicted by learning enhancement, and help-seeking strategies were predicted by value of active learning.

Table 9. Flipped Perceptions as Predictors of SRL Strategy Use.

| SRL Sub-scale | Flipped Perceptions | Overall Model $R^2$ | Individual β | *p* |
|---|---|---|---|---|
| Study Strategies | Overall | .22** | | .00 |
| | Preference of Video | | - .02 | .87 |
| | Value of Video | | .05 | .77 |
| | Viewing Frequency | | .33* | .04 |
| | Learn Enhancement | | .11 | .51 |
| | Value of Active | | .11 | .53 |
| Metacognition | Overall | .25** | | .00 |
| | Preference of Video | | - .13 | .28 |
| | Value of Video | | .03 | .88 |
| | Viewing Frequency | | .30† | .06 |
| | Learn Enhancement | | .14 | .41 |
| | Value of Active | | .23 | .20 |
| Self-talk | Overall | .24** | | .00 |
| | Preference of Video | | - .24† | .05 |
| | Value of Video | | .09 | .60 |
| | Viewing Frequency | | .29† | .07 |
| | Learn Enhancement | | .39* | .02 |
| Interest Enhance | Overall | .18* | | .02 |
| | Preference of Video | | - .02 | .86 |
| | Value of Video | | .06 | .72 |
| | Viewing Frequency | | .17 | .31 |
| | Learn Enhancement | | .18 | .31 |
| | Value of Active | | .15 | .42 |
| Environ Struct | Overall[a] | .10 | | .18 |
| Self-consequating | Overall[a] | .09 | | .27 |
| Effort | Overall | .24** | | .00 |
| | Preference of Video | | - .17 | .17 |
| | Value of Video | | .31† | .07 |
| | Viewing Frequency | | .20 | .21 |
| | Learn Enhancement | | - .04 | .79 |
| | Value of Active | | .13 | .46 |
| Help-seeking | Overall | .28** | | .00 |
| | Preference of Video | | - .05 | .69 |
| | Value of Video | | - .22 | .20 |
| | Viewing Frequency | | .01 | .96 |
| | Learn Enhancement | | .04 | .80 |
| | Value of Active | | .59** | .00 |

*Note.* [a]Individual sub-scale results not provided due to lack of statistical significance of overall model.
* $p < .05$, ** $p < .01$
† Results may be statistically significant with a larger sample size.

**Question 2.** The second question of Study 1 asked if the use of SRL strategies in a flipped class predicts student achievement. To address this question, a simultaneous multiple regression analysis was conducted with the sub-scales of SRL strategies predicting student grades. Results of the regression analysis did not indicate that the overall SRL model significantly predicted grades ($R^2 = .19$, $p > .05$).

Hierarchical multiple regression analysis was also conducted in an effort to uncover any predictive relationships that might exist between SRL and flipped perceptions on student grades. Aligning with the two research questions of Study 1, flipped perceptions were selected for the first level of predictors while SRL was selected as the second level. No significant results were generated from this analysis.

**Mediation**

Pintrich (2004) states that an assumption of SRL is "that self-regulatory activities are mediators between personal and contextual characteristics and actual achievement" (p. 388). It has also been shown that student perceptions of the learning environment can both directly, and indirectly (mediated through approaches), influence academic achievement (Lizzio, Wilson, & Simons, 2002). For Study 1, it was anticipated that flipped perceptions and/or SRL strategy use would significantly predict student grades, and that mediation analysis could be carried out. However, a simultaneous multiple regression analysis with the data collected for Study 1 (flipped perceptions and SRL strategies overall model as predictor variables, and letter grades as the dependent variable) failed to produce results indicating significant predictive relationships. Because of this, the complete mediation analysis was not conducted.

## Study 2

### Question 1

The first research question of Study 2 asked if students in flipped courses utilize more SRL strategies than students in a traditional courses. A series of independent samples *t*-tests were completed to address this question. The results are presented in Table 10. The comparison results indicated that SRL strategy use was not significantly different between traditional and flipped sections.

### Question 2

The second research question of Study 2 asked if the flipped classroom experience had an effect on student achievement in introductory college courses. To address this question, student achievement between the two PSYC sections was compared. An independent samples *t*-test comparing grade mean scores (PSYC Trad $N = 45$, $M = 4.27$, $SD = .84$; PSYC Flip $N = 27$, $M = 4.44$, $SD = .64$) did not yield a significant difference between the traditional and flipped PSYC sections ($t(70) = -.95$, $p > .05$).

Table 10. Group Differences of SRL Strategy Use between PSYC Trad and PSYC Flip Students.

| Dependent Variable | PSYC Trad | | | PSYC Flip | | | Mean Difference | *t* | *df* | *p* |
|---|---|---|---|---|---|---|---|---|---|---|
| | *N* | *M* | *SD* | *N* | *M* | *SD* | | | | |
| Study Strategies | 45 | 3.82 | 1.17 | 26 | 3.59 | 1.27 | .23 | .78 | 69 | .44 |
| Metacognition | 45 | 5.07 | .98 | 27 | 4.98 | 1.06 | .09 | .36 | 70 | .72 |
| Self-Talk | 45 | 4.77 | 1.21 | 27 | 4.83 | 1.27 | - .06 | - .12 | 70 | .85 |
| Interest Enhancement | 44 | 3.78 | 1.20 | 27 | 3.76 | 1.27 | .02 | .06 | 69 | .96 |
| Environmental Structuring | 45 | 4.79 | 1.45 | 27 | 5.02 | 1.72 | - .23 | - .61 | 70 | .54 |
| Effort Regulation | 44 | 4.97 | 1.11 | 27 | 4.97 | 1.24 | .00 | .01 | 69 | .99 |
| Help-Seeking | 44 | 4.84 | 1.69 | 26 | 5.45 | 1.65 | - .61 | -1.47 | 68 | .15 |

*Note*. $p > .05$ for Levene's test for homogeneity of variances for all dependent variables.

## Chapter IV Summary

This chapter reported the results of the statistical analyses performed to address the four research questions of this two-part study. Study 1 was concerned with the relationships that exist among student perceptions of the flipped model and SRL strategy use in flipped courses; the results indicated that several relationships do exist. Through regression analysis it was found that student perceptions of the flipped model positively predict students' use of study strategies, metacognitive regulation, self-talk, interest enhancement, effort, and help-seeking. However, the data did not indicate a relationship between student perceptions and achievement, neither directly nor indirectly through SRL strategy use. Study 2 investigated the possibility of any differences between traditional and flipped sections and students' use of SRL strategies and achievement. The results of a series of independent samples *t*-tests did not yield any significant differences for any of the tested variables.

The next chapter further interprets the results, and provides insight to what they mean in the light of previous published literature and implications for practice.

# CHAPTER V

# DISCUSSION

The purpose of this study was to examine the relationship between two variables—students' perceptions of the flipped model and their SRL behaviors—and the impact that these variables have on achievement in a flipped class. The flipped model of teaching is a rapidly expanding approach to instruction in higher education, however very little empirical research exists to support this shift of educational practices. This study aimed at adding to the literature base of the flipped model by placing it within a theoretical framework comprised of two arms, self-regulated and active learning, centered on SDL. The study was divided into two separate studies. Study 1 tested the relationship between undergraduate students' perceptions of the flipped model, use of SRL strategies, and course achievement. Study 2 tested the flipped model by comparing SRL strategy use and achievement.

This chapter opens with a summary of previous chapters, continues with an interpretation of the findings, relating them to existing literature, and provides classroom implications based on the conclusions. Recommendations for future studies are identified along with limitations realized in the current study. The dissertation closes with the author's final thoughts on the flipped model based on her five years of personal experience.

## Dissertation Summary

The flipped model of instruction was introduced and described in Chapter I. As was explained therein, use of the flipped model has become more prevalent on college campuses

across the U.S. despite the fact that there is very little literature available to support the increase in usage by instructors. A relationship between SRL, active learning, and SDL was identified as a theoretical framework to contextualize the current study's research questions. A list of working definitions relevant to the current study was also provided.

Chapter II was comprised of a thorough review of the literature pertinent to the current study. It began with an overview of SDL, SRL, and active learning, the three components of the current study's theoretical framework. SRL was further examined in the context of online learning in an effort to identify possible relationships to the online portion of a flipped course. Constructivism, explicitly social construction, was explored in relation to the in-class portion of a flipped course. Finally, several studies examining students' perceptions of both the video lectures and in-class active learning sessions, and effectiveness of flipped courses were presented.

The methodology of the current study, and its division into two separate sub-studies was described in Chapter III. Details were provided on participants, including descriptive statistics for each demographic measured. Overall, this study was concerned with students SRL strategy use, perceptions, and achievement in flipped courses. Data on these constructs were collected via a cross-sectional survey. Correlational, regression, and comparison analyses were conducted on the data as a means to describe relationships among the variables and impact on student achievement.

Chapter IV contained the results of the data analysis for the current study in relation to the specific research questions they addressed. Study 1 utilized correlational and regression analyses to identify several relationships among the study variables. Notably, several positive

intercorrelations existed among SRL variables and flipped perception variables, and between constructs as well. Results also indicated that students who find value in videos tend to have higher viewing frequencies, and that students who find value in active learning indicate that in-class activities enhance learning. Interestingly, the mean sub-scale average score for video preference was relatively low ($M$ = 3.17), and failed to significantly correlate with any other sub-scale in the study. Student achievement only weakly correlated with effort, a sub-scale within the academic behavior dimension of SRL. Study 2 was concerned with any differences that may exist between traditional and flipped courses in rearguards to SRL and achievement. Independent samples *t*-tests comparing SRL strategy use and student achievement did not yield any differences between the two sections sampled for the current study.

This chapter provides an interpretation of the results presented in Chapter IV, and ties those results to the available literature. It also includes a discussion of the implications of the study, identifies limitations of the study, and offers recommendations for future research. The chapter ends with final remarks by the author based on her personal experience with the flipped model of instruction.

## Interpretation of Results

The interpretation of results are presented in a way that follows the progression of analyses discussed in Chapter IV. It begins with an overview of the correlational analysis in Study I, followed by a discussion the regression analyses in relation to the research questions and corresponding hypotheses. Next, the results from Study 2 are discussed in context of the research questions and their respective hypotheses.

**Study 1**

**Relationships among variables.** Several significant positive intercorrelations were found among the SRL sub-scales. Study strategies, a sub-scale of the academic cognition dimension of SRL had strong positive bivariate correlations with subscales in the other two dimensions of academic motivation and behavior. This suggests that SRL strategies, regardless of which dimension they fall into, are all interrelated and demonstrate students' ability to be mindful of how they best learn. One assumption of SRL as a whole is that learners are able to regulate aspects of cognition, motivation, and behavior (Pintrich, 2004), and so it is logical that intercorrelations among SRL variables exist. Although the correlations were high among SRL variables, and multicollinearity can be interpreted to mean that the variables were not individually predictable from each other, no correlation values in this study were extremely large; Warner (2013) says values in excess of .9 may be problematic for regression analysis.

Likewise, many flipped perception variables positively correlated with each other. Strong positive relationships between students' perceived value of the video and how often they watched the videos before coming to class were found. This result makes clear sense, and although other studies show student positive attitudes towards video lectures (Enfield, 2013; Holbrook & Dupont, 2011; Newman et al., 2014; Pierce & Fox, 2012; Roach, 2014; Smith, 2013). This direct linkage between value and viewing frequency was not found in the literature.

Waldrop (2016) found in her graduate nursing course that even though students reported benefits of video lectures, only around half of the students reported watching them before coming to class. This may be an indication of poor class preparation, an instance where students could benefit if SRL strategies were employed. An additional strong relationship was also found

to exist between the value placed on active learning and learning enhancement; students who value active learning strategies indicate that in-class activities enhance their learning. In regards to learning enhancement, Svinicki (2004) states that "during the learning of content, learners are picking out key features that define the concepts and making connections between that new information and their existing world views" (p. 14). This aligns with active learning and constructivist teaching where there is a stronger emphasis on understanding concepts than on memorizing facts (Lord, 1997).

Correlational analysis also pointed out positive relationships between many of the SRL and flipped perception sub-scales. Study strategies had a moderately strong relationship to viewing frequency. This may mean that students who are able to regulate their study behaviors are more likely to view the assigned lectures. Lecture value and viewing frequency were also shown to correlate with effort. Again, this relationship is understandable because those students who put forth greater effort in the course will prepare by watching the videos and understand what value comes from doing so. Additionally, metacognition regulation correlated with value of active learning, indicating that students who perceive the in-class activities as valuable to learning the content utilize metacognitive strategies. Pelech (2010) makes this relationship clear by saying "…metacognition is more than just thinking about thinking. It is the process of creating a new mental location or a new mental construct" (p. 172).

A result gleaned from the initial correlational analysis of the data was that students' course grades were found to correlate with just one other variable—effort—and weakly at that. This can be restated to say that students who put in more effort earned high course grades, yet students who utilized all other types of SRL strategies showed no relationship to grade

attainment. The lack of correlations between course grades and SRL strategies are inconsistent with the widely accepted research on SRL by Zimmerman and Kitsantas (2007). They posit that high academic achievement not only comes from "high-quality instruction", but also requires learners are involved in self-regulatory processes.

Overall, several positive bivariate relationships were found among SRL and flipped perception variables suggesting that students' perceptions of the flipped model may influence their SRL strategy use. The two research questions for Study 1 yielded two separate hypotheses about predictive relationships that may exist between student perceptions and SRL, and between SRL and student achievement. These hypotheses were tested through simultaneous multiple regression analysis.

**Hypothesis 1: Perceptions of the flipped model predict SRL strategy use.** Based on Liaw and Huang's (2013) work that demonstrated SRL in online environments was predicted by student perceptions of usefulness and satisfaction, it was anticipated for the current study that students who have positive perceptions of the flipped model would utilize SRL strategies in a flipped course. A set of simultaneous multiple regressions showed that the overall flipped perceptions model significantly predicted study strategies, metacognition, self-talk, interest enhancement, effort, and help-seeking. Only two sub-scales within the academic motivation dimension—environmental structuring and self-consequating—were not predicted by flipped perceptions. Although sub-scale means cannot be used to rationalize correlation results, it is of note that students indicated low agreement with preference of video ($M$ = 2.57) and viewing frequency ($M$ = 3.17) items. Out-of-class videos could be involved with structuring a study

environment and motivating oneself to watch the videos before class, possibly by setting consequences.

Of the remaining six subscales, only three significant predictors of SRL were found when specific perceptions of the flipped model were examined. First, study strategies were significantly predicted by viewing frequency. It is logical to think that students who take the time to view the lectures are likely to regulate their study time. The use of study strategies in flipped classes is highlighted by Talbert (2016) when he posits that students must utilize SRL strategies, especially for video lectures because of the "emphasis on individual responsibility for learning basic material prior to class" (p. 31). Pigg and Morison (2016) add that "the ability to make appropriate choices about when and under what conditions to view the content" (p. 141) is important in retaining information from video lectures. Second, self-talk strategies were predicted by students' perception of enhanced learning. This relationship can be restated to say that students who feel their learning of course content is enhanced through in-class activities are more likely to speak words of encouragement to themselves as they study, whether it be via internal thoughts or actual vocalization. Active learning was indicated by several studies in Chapter II to enhance learning of content, but Pigg and Morison (2016) say that students also "need to draw on their own attention, persistence, and endurance" (p. 140), relating active learning to self-talk SRL strategies. Finally, help-seeking behaviors were predicted by student perceptions regarding the value of active learning. Perhaps this relationships is a bit easier to explain because it is logical that those students who perceive value from active learning will seek out help if content is unclear to them. Interestingly, in active learning situations, students are typically constructing knowledge in small groups through some sort of inquiry-based activity.

However, it has been found that in large college class settings, students are more likely to seek help from teachers rather than other students (Karabenick, 2003). This practice may change over time as the role of the instructor more clearly shifts to a facilitator of learning with the increased prominence of active learning classrooms on college campuses.

**Hypothesis 2: SRL strategy use in a flipped environment predicts achievement.**

Zimmerman (2008) states SRL is a proactive process and Bergmann and Sams (2012) posit the flipped model requires students to take an active role in learning, so for the current study it was anticipated that students who utilized SRL strategies in the flipped classroom would have higher course grades than those students who do not utilize SRL strategies, and specific SRL strategies that had the most influence on success in the flipped model would be exposed. Simultaneous multiple regression failed to indicate any impact of the overall SRL model on course grades. Course letter grades were the dependent variable, and only consisted of five different possible options—A, B, C, D, and F—leaving little room for variability among the participants. Even though the grade data for the current study was normally distributed according to skewness and kurtosis values, the sample size may not have been large enough for statistical analyses to have enough power to detect significance (Warner, 2013). Additionally, bias in grading may come into play in flipped classrooms, resulting in grades that are not truly reflective of the students' actual understanding of the content. Malouff (2008) identifies a variety of types of bias that are possible in grading, many of which may come about in a flipped classroom because of the increased student-teacher exchanges. Murphree (2016) explicitly says this happens in his flipped history class:

> …flipping allowed me to interact with students in ways that were different from my traditional courses. Due to the number of writing assignments required (and graded), I gained a familiarity with most students' writing abilities and ongoing challenges, despite the large number enrolled in both sections (compared to my standard course size). By the end of the semester, I could often identify students' work without seeing their names on the papers. (p. 67)

**Study 2**

**Hypothesis 3: Students in flipped classes utilize more SRL strategies than students in traditional classes.** Wolters et al. (2005) make the following claim: "the challenge to complete academic work at home without the structure or social pressures to continue working that are present in the classroom can be…difficult" (p. 254). Newman (2014) suggests flipped classes may contribute to the development of SRL skills. Based on these ideas, it was anticipated that there would be more SRL strategies used in a flipped course than in a course that is taught in the traditional method. However, a series of independent samples *t*-tests found that there was no difference in SRL strategy use between the two PSYC sections. Students in the flipped section appeared to utilize SRL strategies just as much as those in the traditional section. It was disappointing to find that students in the flipped section were not utilizing more SRL strategies, but literature on the development of SDL and SRL may help explain why no difference was found. For students to be self-directed learners, they must take on the responsibility of their learning by developing and practicing skills such as questioning, critical appraisal, identification of knowledge gaps, and reflection (Kaufman, 2003). SRL also takes training in self-monitoring and practice with a wide range of strategies to identify what works for each student (Zimmerman

& Kitsantas, 2007). For two-thirds of the students in the flipped section, this was their first exposure to this format of teaching. Haidet (2004) found that when class structure was shifted from the traditional lecture to include more active learning sessions, students had a difficult time seeing the value of the change, and suggests that students need time to adapt to new teaching methods. Similarly, Ray and Powell (2014) warn that when students are first exposed to flipped courses, they may not appreciate the independent nature of the video lectures, may become frustrated with them, and may not even attempt to prepare for class. The lack of distinction between the flipped section and the traditional section in respect to SRL strategy use may simply suggest students in the flipped section have not had enough exposure to this style of teaching and learning.

**Hypothesis 4: Student achievement in introductory college classes will be as good or greater in a flipped section vs. a traditional section.** The available literature provides mixed results on comparison studies of achievement between flipped and traditional class sections. For example, in a comparison of two college statistics sections, there was no statistical difference found between final grades or final exam scores (Marchionda et al., 2014); Wilson (2013), on the other hand did find a statistical difference in final grades between two sections of her statistics course, with the flipped section outperforming the traditional one. No literature reviewed demonstrated a negative effect on student achievement, and so it was anticipated that students in the flipped section would do as well or better than students in the traditional section in respect to achievement. Consistent with several previous studies, an independent samples *t*-test did not show a difference in letter grades between the two sections. It is important to note, that even

though students in the flipped section did not achieve any higher grades than the traditional section, they did not do any worse.

An increase in achievement, although highly desirable, is not the only outcome aimed for with the shift from lecture-centered to active learning classrooms. Along with a minimal decrease in the percentage of D/F rates, Rutledge, Bonner, and Lampley (2015) found that students indicated the active learning exercises to be motivating and effective at meeting course goals. Lage, Platt, and Treglia (2010) also highlight the fact that flipped courses are able to reach a wide range of learners by allowing "students of all learning styles to use a method or methods that are best for them" (p. 39). Furthermore, moving lecturers out the classroom to make more time for active learning has shown to have a significant impact on the achievement gap (Haak et al., 2011). So although there is not a large body of support for the proposition that the flipped model will increase student achievement, there is evidence that a greater number of learners can be successful in flipped courses.

## Implications for Flipped Courses

Student perceptions identified in this study displayed a large acceptance and preference of active learning practices, but a low perception of the utility of video lectures. The findings suggests students desire the in-class activities, but not the out-of-class preparation for them. This may be a result of not knowing how to effectively interact with a video lecture. This is where SRL strategies can be a vital aspect of learning in a flipped course. Winne (1995) claims that SRL is inherent in learners; in academically poor students it might be less complex, yet strategy use can be fostered by environmental influences. Instructors of flipped courses may have to

spend time with students at the start of a flipped course, showing them ways to develop their SRL skills.

Change can be difficult for people, including college students. Talbert (2016) points out that "many students come from educational backgrounds in which 'teaching' and 'lecturing' are synonymous and therefore anything that is not lecture is a failure to teach" (p. 41). Students may perceive the out-of-class lecturers in flipped courses as non-effective and consequently they may do little to regulate their cognition, motivation, and behaviors when first exposed to the new teaching style. Zimmerman and Kitsantas (2007) posit that four levels have to be met by a student as he or she becomes proficient with SRL. At the *observational* level, students watch someone else model SRL strategies, identifying key situations for the various strategies. Next, in the *emulation* level, students duplicate strategies that they have observed, with guidance from their model. Moving into the *self-controlled* level, students practice strategies individually while interacting with course content. Finally, students can reach the *self-regulated* level and utilize a variety of strategies based on their academic goals. Movement through these levels takes discipline and effort, both of which students new to the flipped model may need time to adapt to. When students enter their first flipped course, the instructor may need to take time to model SRL strategies when interacting with lecturers; the first few lectures could be viewed together in class with the instructor guiding students in SRL techniques.

Education in the 21st century is changing to better prepare students for the work they are going to encounter upon graduation. Manual routine work is being replaced by technological advances, and jobs that require collaborative problem solving and applied complex skills are rapidly increasing (Trilling & Fadel, 2009). The active learning that occurs in the flipped

classroom allows for the perfect environment for students to build 21st century 4C skills (i.e., collaboration, communication, creativity, and critical thinking; Newman et al., 2014). When team-based learning in a medical education situation was employed, researches did not find an increase in mastery of the course objectives, rather they found a statistically significant growth in the students' understanding of collaborative work (Davidson, 2011). Employers are not interested in a student's ability to passively listen to information, they demanding a workforce that can demonstrate the 4Cs along with social competence.

The descriptive statistics in Study 1 show that students prefer the active learning aspect of the flipped model, but have less positive perceptions about the online lecture component. Data analysis in Study 1 found that these perceptions do have some impact on SRL strategy use, although limited. Data analysis in Study 2 found that SRL strategies were not utilized any more in the flipped section than in the traditional section, nor were grades any different. Taken together, and incorporating the available literature, these results suggest that flipped classrooms have their successes in the active learning sessions. Video lectures hold an important role for those self-directed learners who are able to self-regulate their academic cognition, motivation, and behaviors, giving them the ability to watch, and re-watch if they wish. However, the active learning exercises engage a larger range of students, not only getting them to interact with the content, but also fostering 21st century skills through constructivist teaching methods.

## Limitations

The findings of this set of studies need to be interpreted in light of the limitations. First, this study makes the assumption that students are accurately reporting their SRL behaviors and flipped model perceptions on a survey. There is also the assumption that the students' course

grades are an accurate reflection of their understanding of the content of the course materials. Second, a limitation of this study is that the majority of the data collected is self-reported behaviors and perceptions. Attitudinal measures, as defined by Creswell (2014), are able to measure student feelings about a topic, but not indicate specific behaviors. It is possible that participants were not always truthful when responding to survey items and that data may not accurately reflect the individual's honest actions and perceptions.

There were also limitations realized in the study design. The sample size was small for all groups surveyed; a larger sample size would have given more power to the statistical analyses that were conducted. The use of course letter grades as a measure of achievement, although provided by the respective instructors, may not have been the most reliable and precise method of measurement. Many instructors provide students a variety of ways to earn a course grade, including things such as participation and behavior-based points, neither of which accurately reflect understanding of content. The cross-sectional survey design utilized in Study 1 also limits the findings due to its single time-point data collection. A longitudinal design, utilizing two or three surveys throughout a course would provide for a more reliable data set, even showing changes in SRL over the course.

Additionally, the samples of this study are comprised of undergraduate college students registered in general education courses at two separate Midwestern universities, one large and one mid-sized. The generalizability of the study is limited to similar populations.

## Future Research

The findings of this study add to the growing body of empirical research on the flipped model of teaching, however, Student perceptions have been a common theme across many

studies, but the investigation of what role SRL plays has not. Future studies should further investigate how important SRL skills are for students to adequately prepare for active learning during the in-class sessions. A mixed-method study offers an approach at gaining a better understanding of how, and if, students are actually interacting with video lectures. A study with this focus may help assess whether or not the videos are worth the time and technological resources that must be invested in their creation.

Although the intent of the current study was to identify perceptions of the flipped model, to determine if students were utilizing more SRL strategies, and to find out if there were greater levels of achievement than in traditional courses, a study designed to better detect effects of mediation would be a great addition. A much larger sample size (>200) would allow for structural equation modeling to be conducted. The model that perceptions of a course can impact achievement, mediated through behaviors (SRL strategy use) could be tested for significance, and lead to a better understanding of SRL in flipped courses.

**Final Remarks by the Author**

The findings presented in this dissertation indicate that student perceptions do have an impact on student behaviors in flipped classrooms. I have been flipping my General Biology course for the last five years, and have had a first-hand look at how student perceptions toward the flipped model influence their actions. Flipping the course occurred slowly, with a couple additional lessons flipped each semester. Each semester, many students would state that they did not like when the lessons were flipped. They would rather listen to a lecture in class because they said they learned best that way. This was confusing, because the few times there was a lecture during class, the majority of students did not pay any attention. Instead, they were distracted with

technology (i.e., phones and laptops) during the lectures. It quickly became apparent that they wanted to passively sit in class because it was "easy" for them. It was not because they wanted to learn from a lecture; lecture viewing stats collected via the learning management system and YouTube showed that many of my students did not watch the lectures when the lessons were flipped.

Making the effort (and it is a large effort) to flip a course has typically focused around the production and dissemination of the video lectures. Results from this study introduce the idea that maybe the videos should not be the utmost concern. Active learning in the classroom is where knowledge construction occurs, both socially and through independent research. The videos are an excellent resource for students, as is the text, and the endless repositories of information available on the Internet. It is impossible for an instructor in the 21st century to provide students with all the knowledge relevant to each respective course, but rather it is the duty of instructors to ensure that students have the tools necessary to effectively research, critically evaluate content, and collaboratively solve problems relative to real-world situations. The flipped model of instruction, and/or other active learning environments, allows time for the development of these 21st century skills.

APPENDICES

## Appendix A
## Demographics Codebook

This survey codebook contains information about the demographics variables used in the current study. Only students that were 18 or older were allowed to participate. Any survey that indicated "younger than 18" was not entered into the data set.

**Demographic Questions**

| Name | Item |
|---|---|
| gender | **What is your gender?**<br>(1) Male<br>(2) Female |
| age | **What is your age in years?**<br>(1) younger than 18<br>(2) 18<br>(3) 19<br>(4) 20<br>(5) 21 or older |
| ethnic | **I am…**<br>(1) White/Caucasian<br>(2) African American/Black<br>(3) American Indian<br>(4) Mexican American/Chicano<br>(5) Asian American/Asian<br>(6) Puerto Rican American<br>(7) Other |
| year | **What is your current status as a university student?**<br>(1) Freshman<br>(2) Sophomore<br>(3) Junior<br>(4) Senior<br>(5) Other |
| prevflip | **Besides this course, have you taken any other courses that have been flipped?**<br>(1) No, this is the first flipped course I have taken<br>(2) Yes, I have taken other flipped courses in college and/or high school |

**Appendix B**
**Institutional Review Board Approval**

UNIVERSITY OF NORTH DAKOTA

UND.edu

DIVISION OF RESEARCH & ECONOMIC DEVELOPMENT

**Institutional Review Board**
Twamley Hall, Room 106
264 Centennial Dr Stop 7134
Grand Forks, ND 58202-7134
Phone: 701.777.4279
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March 27, 2015

| | |
|---|---|
| **Principal Investigator:** | Sarah Sletten |
| **Project Title:** | Investigating Self-Regulated Learning, Perceptions, and Achievement in Post-Secondary Flipped Learning Environments |
| **IRB Project Number:** | IRB-201503-299 |
| **Project Review Level:** | Expedited 5, 7 |
| **Date of IRB Approval:** | 03/25/2015 |
| **Expiration Date of This Approval:** | 03/24/2016 |
| **Consent Form Approval Date:** | 03/25/2015 |

**Appendix C**
**Informed Consent**

## THE UNIVERSITY OF NORTH DAKOTA
## CONSENT TO PARTICIPATE IN RESEARCH

| | |
|---|---|
| **TITLE:** | *Investigating Self-Regulated Learning, Perceptions, and Achievement in Post-Secondary Flipped Learning Environments* |
| **PROJECT DIRECTOR:** | *Sarah Sletten* |
| **PHONE #** | *701-788-4733 (dial 3-4733 on campus)* |
| **DEPARTMENT:** | *Teaching and Learning* |
| **PROJECT ADVISOR:** | *Dr. Kathy Smart* |
| **PHONE #** | *701-777-2120* |
| **DEPARTMENT:** | *Teaching and Learning* |

**STATEMENT OF RESEARCH**

A person who is to participate in the research must give his or her informed consent to such participation. This consent must be based on an understanding of the nature and risks of the research. This document provides information that is important for this understanding. Research projects include only participants who choose to take part. Please take your time in making your decision as to whether to participate. If you have questions at any time, please ask.

**WHAT IS THE PURPOSE OF THIS STUDY?**

You are invited to be in a research study on behaviors and student perceptions in flipped classes because you are either enrolled in a flipped class now or are in a traditional class that has a corresponding flipped class section. A flipped class is one in which lectures are assigned as homework to be viewed before coming to class and the "homework" is done in class as a learning activity.

The purpose of this research study is to explore the importance of the use of self-regulated learning strategies and student perceptions in a flipped course. Self-regulated learning strategies are behaviors or actions that a student does as he/she studies for a class. Perceptions are thoughts or ideas a student has about a particular topic.

**HOW MANY PEOPLE WILL PARTICIPATE?**

Approximately 80-100 people will take part in this study at the University of North Dakota. Approximately 50-90 people will take part in this study at University of Minnesota Moorhead.

**HOW LONG WILL I BE IN THIS STUDY?**

Your participation in the study will last approximately 30 to 45 minutes.

**WHAT WILL HAPPEN DURING THIS STUDY?**

This study uses a one-time survey to collect data. On the coversheet of the survey, you will be asked to indicate your name and student ID number. This information will be used to collect your grade at this time point in the course. This coversheet also has a numerical code on it that corresponds to a code on the survey. Once you have indicated your name and student ID, you will remove the coversheet and place it in an envelope. Once all the coversheets have been placed in the envelope, the envelope will be sealed. Next you will be asked to complete the survey. You will be asked a few demographic questions followed by a series of questions that ask you to identify how well different statements describe you and your behaviors in this course. Please circle the number that best describes you for each question. Although, it is beneficial to the study if all questions are answered, and answered honestly, you are free to skip any questions that you prefer not to answer. When you have completed the survey, you will turn them into the investigator at the front of the room. All information will be kept confidential; your instructor will not see your survey responses, and the investigator will not see your name or student ID. The sealed envelope containing your name and student ID number will be given to your instructor and he/she will use the information on it to identify your grade. Your instructor will provide me with a spreadsheet that only contains your survey code and your grade.

**WHAT ARE THE RISKS OF THE STUDY?**

There are no risks in participating in this research beyond those experienced in everyday life.

**WHAT ARE THE BENEFITS OF THIS STUDY?**

By participating in this study you may benefit personally in terms of reflecting on the factors that affect your success and failure in a flipped course. Ultimately, we hope that the knowledge gained through your participation will assist us in understanding how students' self-regulation of learning is related to success in flipped courses and what strategies are most beneficial in courses that utilize the flipped model of instruction.

**ALTERNATIVES TO PARTICIPATING IN THIS STUDY**

If you choose not to participate in this study, you have the option of leaving the classroom or remaining in your seat until the class time is over.

**WILL IT COST ME ANYTHING TO BE IN THIS STUDY?**

You will not have any costs for being in this research study.

**WILL I BE PAID FOR PARTICIPATING?**

You will not be paid for participating in this research study. However, all participants who complete the survey will be entered into a drawing for a $25.00 Target gift card.

**WHO IS FUNDING THE STUDY?**

The University of North Dakota and the researcher are receiving no payments from other agencies, organizations, or companies to conduct this research study.

**CONFIDENTIALITY**

The records of this study will be kept private to the extent permitted by law. In any report about this study that might be published, you will not be identified. Your study record may be reviewed by Government agencies, the UND Research Development and Compliance office, and the University of North Dakota Institutional Review Board.

Confidentiality will be maintained by means of using a coding system to tie your grade to your survey results. The survey and its coversheet have corresponding numerical codes. You will indicate your name and student ID number **ONLY** on the coversheet and then remove the coversheet from your survey and place it in an envelope. That envelope will be sealed and the contents will only be seen by your instructor. Your instructor will use your name and student ID number to indicate your grade on a spreadsheet with the survey codes. He/she will shred the coversheets once grades have been assigned to survey codes. The surveys will not be shared with your instructors. All survey data will be entered into an electronic data analysis system by the investigator. Your surveys will be shredded once they have been entered into the electronic data system. Your instructor will give the spreadsheet with grades and survey codes to the investigator to be entered in to the electronic data system along with your survey data. This process ensures that your name is in no way linked to your responses. All electronic data will be stored on a password-protected computer.

If we write a report or article about this study, we will describe the study results in a summarized manner so that you cannot be identified.

**IS THIS STUDY VOLUNTARY?**

Your participation is voluntary. You may choose not to participate or you may discontinue your participation at any time without penalty or loss of benefits to which you are otherwise entitled. Your decision whether or not to participate will not affect your current or future relations with the University of North Dakota.

**CONTACTS AND QUESTIONS?**

The researcher conducting this study is Sarah Sletten. You may ask any questions you have now. If you later have questions, concerns, or complaints about the research please contact Sarah at (701) 788-4733 during the day. You may also contact her doctoral advisor, Dr. Kathy Smart at (701) 777-2120.

If you have questions regarding your rights as a research subject, you may contact The

University of North Dakota Institutional Review Board at **(701) 777-4279**.

- You may also call this number about any problems, complaints, or concerns you have about this research study.
- You may also call this number if you cannot reach research staff, or you wish to talk with someone who is independent of the research team.
- General information about being a research subject can be found by clicking "Information for Research Participants" on the web site: http://und.edu/research/resources/human-subjects/research-participants.cfm

Your signature indicates that this research study has been explained to you, that your questions have been answered, and that you agree to take part in this study. You will receive a copy of this form.

Subjects Name: _____

_____ _____

Signature of Subject Date

**Appendix D**
**Survey Code and Grade Spreadsheet**

INVESTIGATING SELF-REGULATED LEARNING, PERCEPTIONS, AND ACHIEVEMENT IN POST-SECONDARY FLIPPED LEARNING ENVIRONMENTS

Survey Code/Grade Spreadsheet

**Instructor:** Please fill in the survey code and associated grade in the table below. Do not include any student identifying information. Please shed all coversheets once survey codes and associated grades have been recorded.

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## Appendix E
## Self-Regulated Learning Codebook

This survey codebook contains information on the SRL variables used in the current study. Participants were asked to rate each item based on their behaviors in the class in which the survey was provided. All items were measured on a 7 point scale where 1 (not at all true of me) to 7 (very true of me).

**Academic Cognition**

| Name | Item |
|---|---|
| acog_1 | When I study for this class, I practice saying the material to myself over and over. |
| acog_2 | When I study for this class, I pull together information from different sources, such as lectures, readings, and class activities. |
| acog_3 | When I watch the lectures for this course, I outline the material to help me organize my thoughts. |
| acog_4 | If course materials are difficult to understand, I change the way I study the material. |
| acog_5 | When I study for this class, I read my class notes over and over again. |
| acog_6 | When watching the lectures for this class, I try to relate the material to what I already know. |
| acog_7 | When I study for this course, I go through the lectures and my class notes to try to find the most important ideas. |
| acog_8 | I try to change the way I study in order to fit the course requirements and instructor's teaching style. |
| acog_9 | I memorize key words to remind me of important concepts in this class. |
| acog_10 | I try to understand the material in this class by making connections between the class activities and the concepts from the lectures. |
| acog_11 | I make simple charts, diagrams, or tables to help me organize course material. |
| acog_12 | I try to think through a topic and decide what I am supposed to learn from it rather than just watching the lecture when studying. |
| acog_13 | I make lists of important terms for this course and memorize the lists. |
| acog_14 | I try to apply ideas from lectures in class activities and discussion. |
| acog_15 | When I study for this course, I go over my notes and make an outline of important concepts. |
| acog_16 | When studying for this course I try to determine which concepts I don't understand well. |

**Academic Motivation**

| Name | Item |
|---|---|
| amot_1 | I tell myself that I should keep working just to learn as much as I can. |
| amot_2 | I tell myself that I need to keep studying to do well in this course. |
| amot_3 | I tell myself that it is important to learn the material because I will need it later in life. |
| amot_4 | I make studying more enjoyable by turning it into a game. |
| amot_5 | I promise myself I can do something I want later if I finish watching the assigned lectures now. |
| amot_6 | I try to study at a time when I can be more focused. |
| amot_7 | I challenge myself to complete the work and learn as much as possible. |
| amot_8 | I convince myself to keep working by thinking about getting good grades. |
| amot_9 | I try to connect the material with something I like doing or find interesting. |
| amot_10 | I try to make a game out of learning the material or completing the assignment. |
| amot_11 | I make a deal with myself that if I get my assigned lectures watched I can do something fun afterwards. |
| amot_12 | I change my surrounding so that it is easy to concentrate on the lectures. |
| amot_13 | I tell myself that I should study just to learn as much as I can. |
| amot_14 | I think about how my grade will be affected if I don't watch the lectures or do my studying. |
| amot_15 | I think up situations where it would be helpful for me to know the material. |
| amot_16 | I make doing the work enjoyable by focusing on something about it that is fun. |
| amot_17 | I promise myself some kind of a reward if I get my assigned lectures watched. |
| amot_18 | I make sure I have as few distractions as possible when I watch the lectures. |
| amot_19 | I think about trying to become good at what we are learning or doing. |
| amot_20 | I remind myself how important it is to do well on tests and assignments in this course. |
| amot_21 | I make an effort to relate what we're learning to my personal interests. |
| amot_22 | I think of a way to make the work seem enjoyable to complete. |
| amot_23 | I tell myself I can do something I like later if right now I watch the assigned lectures for class. |
| amot_24 | I try to get rid of any distractions that are around me. |

**Academic Behavior**

| Name | Item |
|---|---|
| abehv_1 | I often feel so lazy or bored when I study for this class that I quit before I finish what I planned to do. (REVERSED) |
| abehv_2 | I usually study in a place where I can concentrate on my course work. |
| abehv_3 | If I needed help understanding the lectures in this class I would ask for help. |
| abehv_4 | I work hard to do well in this class even if I don't like what we are doing. |
| abehv_5 | I have a regular place set aside for studying. |
| abehv_6 | If I needed help with the activities in this class I would ask for help. |
| abehv_7 | When course material is difficult, I give up or only study the easy parts. (REVERSED) |
| abehv_8 | I make sure to keep up with viewing assigned lectures for this course. |
| abehv_9 | If I were to seek help in this class I would ask the teacher. |
| abehv_10 | Even when the course materials are dull and uninteresting, I manage to keep working until I finish. |
| abehv_11 | I rarely find time to watch the lectures before class. (REVERSED) |
| abehv_12 | If I were to seek help in this class I would ask another student. |

## Appendix F
## Flipped Model Perceptions Codebook

This survey codebook contains information on the flipped perception variables used in the current study. Participants were asked to rate each item based on their attitudes in the class in which the survey was provided. All items were measured on a 7 point scale where 1 (not at all true of me) to 7 (very true of me).

**Flipped Video Perceptions**

| Name | Item |
|---|---|
| flipvid_1 | I prefer watching lectures on my own time over having lectures during class time. |
| flipvid_2 | I find watching lectures on my own is a better way to learn material than if lectures are during class time. |
| flipvid_3 | I often wish lectures were during class time so I could better understand the material. (REVERSED) |
| flipvid_4 | I enjoy being able to view the lecture prior to class as opposed to live in-class lectures. |
| flipvid_5 | I find that individual access to lectures has increased my desire to learn the material. |
| flipvid_6 | Video lectures greatly enhance my learning. |
| flipvid_7 | I like the fact that I can re-watch lectures any time so I can gain a deeper understanding of the material. |
| flipvid_8 | The ability to rewind the video lecture helps me learn. |
| flipvid_9 | I find it easy to take notes while I watch the video lectures. |
| flipvid_10 | The ability to rewind the video lecture helps me take notes on the material. |
| flipvid_11 | I am able to ask questions on the assigned lecture during class time. |
| flipvid_12 | There are opportunities to ask questions on the assigned lecture if I need clarification on the material. |
| flipvid_13 | I am comfortable using video lectures for learning. |
| flipvid_14 | The video lectures for this course are easy to access. |
| flipvid_15 | The video lecture for this course are easy to use. |
| flipvid_16 | I encounter technical difficulties when trying to watch the video lectures for this course. (REVERSED) |
| flipvid_17 | I do not view the lectures before class although I am supposed to. (REVERSED) |
| flipvid_18 | I always watch the assigned lectures. |
| flipvid_19 | I usually rewind and re-watch parts (or entire) lecture to study for this course. |
| flipvid_20 | I usually only watched parts of the video lectures. |

**Flipped Class Perceptions**

| | |
|---|---|
| flipact_1 | I participate and engage in in-class discussions. |
| flipact_2 | I regularly attend class. |
| flipact_3 | I participate and engage in in-class activities. |
| flipact_4 | I find that in-class activities make class less boring. |
| flipact_5 | I find that in-class activities make class more useful. |
| flipact_6 | Discussing with classmates helps me learn. |
| flipact_7 | Interactive, applied in-class activities greatly enhance my learning. |
| flipact_8 | The instructor makes meaningful connections between the topics in the lecture videos and the in-class activity. |
| flipact_9 | This course as a whole has been a valuable learning experience. |
| flipact_10 | I would take another flipped course. |
| flipact_11 | I feel this class increases my engagement in collaborative decision-making. |
| flipact_12 | I find this class engages me in critical thinking and problem solving. |

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