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Development and Initial Validation of a Flipped Classroom Adoption Inventory in Higher Education

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To the Graduate Council:

I am submitting herewith a dissertation written by Taotao Long entitled "Development and Initial Validation of a Flipped Classroom Adoption Inventory in Higher Education." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.

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Abstract

The purpose of this study is to develop and initially validate an inventory to learn about the critical variables involved in a higher education instructor's decision to adopt a flipped classroom instructional model. A flipped classroom is an instructional model in which students' learning is divided into two phases, the self-directed pre-class learning phase and the in-class student-centered active learning phase. Both phases are typically technology-enhanced. This study addresses a gap in the recent research regarding the identification and assessment of the critical variables that are related to a higher education instructor's decision to adopt a flipped classroom instructional model.

This study proposed a six-factor model reflected in a six-scale, 43-item inventory on higher education instructors' adoption decision of a flipped classroom instructional model. After pilot study, this inventory was released to instructors at UTK through a web-based survey software tool and received more than 200 valid responses. A validated and refined inventory was generated after an Exploratory Factor Analysis (EFA), which was used to identify the factor structure and the relationship between items and the factors. This validated inventory includes 24 items in three subscales, which represent three factors that might influence a higher education instructor's adoption decision of a flipped classroom instructional model. Then, the three factors were used as independent variables in a multiple regression to examine their ability to predict a higher education instructor's adoption decision. The results revealed that performance expectancy and technology self-efficacy are strong predictors of a higher education instructor's decision to adopt a flipped classroom instructional model.

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Chapter 1

Introduction

Overview

The purpose of this study was to develop and initially validate an inventory to learn about the critical variables involved in a higher education instructor's decision to adopt a Flipped Classroom Instructional Model (FCIM). At the current time, the majority of the students pursuing higher education degrees are members of the millennial generation (born between 1982 to 2000). They are also described as digital natives (Arum & Roska, 2010; Prensky, 2001). Active learning, of which the core elements are the introduction of student-centered activities into classroom instruction and the promotion of students' active engagement in the learning process (Kim, Kim, Khera, & Getman, 2014; Prince, 2004), is considered by many scholars to be a better instructional model for the students pursuing degrees in higher education, especially millennial students, than instructor-centered, lecture-based instructional model (Alvarez, 2012; Autry & Berge, 2011; Gaston, 2006; Prince, 2004). Instructor-centered, lecture-based instructional models, in which learning content is typically delivered through an instructor's lecture to a large group of students during the in-class time. As one of the active learning instructional models supported by active learning theory, the FCIM is an instructional model in which the subject matter content is not presented as the focus of in-class instructional time, but rather as students' self-directed learning prior to the classroom sessions. Thus, in-class instructional time becomes available for student-centered, active learning experiences (Bergmann & Sams, 2012; Foertsch, Moses, Strikwerda, & Litzkow, 2002; Lage, Platt, & Treglia, 2000; Strayer, 2007; Strayer, 2012; Touchton,

2015). The FCIM is not a single, rigid instructional design, but rather is found in many variations across K-12 and Higher Education classrooms. (Addy, Leprevose, & Stevenson, 2014; Albert & Beatty, 2014; Critz & Wright, 2013; Fautch, 2015; Ferreri & O'Connor, 2013; Kim et al., 2014; Sams & Bergmann, 2013).

A FCIM can be adapted for instructional delivery in diverse academic disciplines (Albert & Beatty, 2014; Benedict & Ford, 2014; Chapnick, 2014; Critz &Wright, 2013; Findlay-Thompson & Mombourquette, 2014) and a wide variety of media, technology, and learning activities can be employed (Baepler, Walker & Driessen, 2014; Benedict & Ford, 2014; Harvey, 2014; McCurry & Martins, 2010; Stayer, 2012). The learning activities can be enhanced by Internet-based, multimedia, and mobile technologies (Herreid & Schiller, 2013; Kim et al., 2014; McLaughlin & Rhoney, 2015). Students typically learn the basic subject matter knowledge by watching instructor-provided video lectures on computers, laptops, or mobile devices on their own time (Baepler et al., 2014; Benedict & Ford, 2014; Harvey, 2014). However, there are many variations in the types of pre-class learning activities required of students. Also, the in-class active learning activities are typically enhanced by the use of instructional technologies to support students' exploration and collaboration (Albert & Beatty, 2014; Mason, Shuman, & Cook, 2013; McCurry & Martins, 2010; McLaughlin & Rhoney, 2015).

A FCIM can free up valuable in-class time for students' active participation in some types of authentic practice, and improve students' learning motivation, practical skills, problem solving skills, higher-order thinking skills, and collaboration skills (Moffett & Mill, 2014; Moran & Milsom, 2014; Sams & Bergmann, 2013; See & Cory, 2014; Simpson & Richards, 2014; Sinouvassane & Nalini, 2015; Strayer, 2012; Stuntz,

2013; Touchton, 2015). Several studies showed that students demonstrated positive attitudes towards their learning experiences regarding the flipped classroom (Moffett & Mill, 2014; Moran & Milsom, 2014; Sams & Bergmann, 2013; See & Cory, 2014; Simpson & Richards, 2014; Sinouvassane & Nalini, 2015; Stuntz, 2013; Touchton, 2015). While these and other studies have focused on student benefits associated with their experiences using FCIMs, no research has been reported that specifically examined university instructors' experiences and perceptions associated with using FCIMs.

Statement of the Problem

Instructor-centered, lecture-based instructional models, in which learning content is typically delivered through an instructor's lecture to a group of students during the in-class time, followed by students completing homework based upon the content material learned during class, have been used as an instructional model for imparting knowledge for a long time (Hartley & Cameron, 1967; MacManaway, 1970; Prince, 2004). However, as several researchers have reported, a typical student's attention declines after the first 10 minutes of class, and most students can only remember 20% of the learning materials during a 45-minute lecture (Hartley & Cameron, 1967; MacManaway, 1970; Schwerdt & Wupperman, 2010). When a traditional instructor-centered, lecture-based instructional model is used as the sole modality for a course, the type of learning that most often occurs is passive in nature, as students are only expected to receive or absorb the knowledge being transmitted by the instructor. When students are positioned as passive learners, in-class time is taken away from challenging students to think deeply, solve problems (Autry & Berge, 2011), and apply and adapt their developing knowledge and skills (Schwerdt & Wupperman, 2010).

Students in the millennial generation (born between 1982 to 2000) who are currently pursuing higher education degrees are frequently described as digital natives (Arum & Roska, 2010; Prensky, 2001). Millennial students have grown up with technology and are very comfortable with using digital communications devices and digital information services (Gaston, 2006; Prensky, 2001). These students need to be taught in a way that is interesting, purpose-driven, with instant and constant feedback acknowledging their efforts, and providing them with information to affirm how their work relates to course achievement. (Arum & Roska, 2010; Autry & Berge, 2011; Gaston, 2006). A traditional instructor-centered, lecture-based instructional model, which has been the basic way of imparting knowledge in higher education, seems to be more and more inappropriate for the students of today's era (Prince, 2004).

Recently, *higher education* has come under intense scrutiny with regard its need to do a better job in demonstrating of students' learning. This scrutiny has focused on promoting alternative ways to deliver instruction to meet the demands of the increasing amount of knowledge and skills which students are expected to gain and apply upon graduation (Arum & Roska, 2010). According to active learning proponents Hattie (2008), King (1993), and Schwerdt and Wupperman (2010), the role of higher education instructors is to facilitate students in taking an active role in acquiring new knowledge independently or as members of collaborative groups. King (1993) also recommended that a successful higher education instructor should move from being a "sage on the stage" to more of a "guide on the side" (p. 30).

Many higher education instructors reported numerous benefits associated with the use of active learning models (Ajjan & Hartshorne, 2008; Alvarez, 2012; Ertmer &

Ottenbreit-Leftwich, 2013; Keengwe, Onchwari, & Oigara, 2014; Michael, 2006; Prashar, 2015; Prince, 2004). Active learning models can better suit the needs of all the students, especially current generations of students, actively engage students in learning, and promote students' critical thinking and problem solving skills (Ajjan & Hartshorne, 2008; Alvarez, 2012; Autry & Berge, 2011; Ertmer & Ottenbreit-Leftwich, 2013; Keengwe et al., 2014; Michael, 2006; Prashar, 2015; Prince, 2004; Schwerdt & Wupperman, 2010).

As an innovative, student-centered, active learning instructional model, a FCIM can have a positive impact on students' learning in higher education by improving students' learning motivation (Benedict & Ford, 2014; Frydenberg, 2013; Lage et al., 2000), improving students' higher-order thinking skills such as analyzing, evaluating, and creating (Gilboy, Heinerichs, & Pazzaglia, 2015; Iru, Ljkhu, Gundylqdvk, Pdlo, & Frp, 2015), improving students' problem solving skills (Albert & Beatty, 2014; Chapnick, 2014; Critz &Wright, 2013; Martins, 2010), and collaboration skills (Findlay-Thompson & Mombourquette, 2014; Herreid & Schiller, 2013; Mason et al., 2013; McLaughlin & Rhoney, 2015).

Much of the recent research on the FCIM in higher education is based on students' self-reported data regarding their experiences, attitudes, and perceptions during the flipped classroom courses (Chapnick, 2014; Frydenberg, 2013; McLaughlin & Rhoney, 2015; Prashar, 2015; Strayer, 2012). Additionally, these recent studies typically focus on a specific and single course in which a FCIM is used (Albert & Beatty, 2014; Benedict & Ford, 2014; Chapnick, 2014; Critz &Wright, 2013; Findlay-Thompson &

Mombourquette, 2014; Prasha, 2015). Research focused on the higher education instructor's perceptions and experience of using a FCIM is still lacking.

Many researchers have reported that an instructor's decision to adopt a pedagogical or technological innovation is influenced by a series of factors, such as perceived usefulness and perceived ease-of-use of the pedagogical innovation (Ajjan & Hartshorne, 2008; Callum, Jeffrey, & Kinshuk, 2014; Davis, 1989; Kopcha, 2012; Park, Lee, & Cheong, 2008; Venkatesh & Davis, 1996). These studies used the Technology Acceptance Model (TAM) and its evolved models, including the Unified Theory Acceptance and Use of Technology (UTAUT) Model, help us to understand an instructor's willingness to reform his/her teaching by adopting technologies and the factors which are directly related with his/her decision to adopt these technologies (Ajjan & Hartshorne, 2008; Callum et al., 2014; Kopcha, 2012; Park et al., 2008). Over time, teachers and instructors continually adapt and change their content and methods to reflect changes in their content field and to address the needs of their students. In recent years, such curricular adaptations have involved the adoption of new instructional technologies and the integration of these new technologies into the teaching process. The studies about instructors' decision to adopt technologies may be relevant and can help to understand instructors' decisions to adopt new instructional models, including a flipped classroom.

This study addresses a gap in the current literature by designing a data collection instrument and providing information about the factors associated with an instructor's decision to adopt a FCIM. This inventory can also help educational administrators and policy makers to understand a series of key factors that could influence a higher education instructor's decision to adopt a FCIM. The results from this study can provide

information to help higher education instructors use a FCIM in a more effective and more efficient way, and can also help educational administrators and policy makers develop the support for instructors to improve the instructional effectiveness through using a FCIM.

Research Questions

The purpose of this study was to develop and initially validate an inventory to learn about the critical variables involved in a higher education instructor's decision to adopt a FCIM.

The following research questions will be addressed in the proposed study:

(1) Is the Instructor's Flipped Classroom Adoption Inventory (IFCAI) valid and reliable?

(2) Are the IFCAI subscales, which are Technology self-efficacy, Openness to change, Performance expectancy, Effort expectancy, Facilitation condition, and Peer support, predictive of a post-secondary instructor's perceived likelihood of adopting a flipped classroom instructional approach?

Significance of the Proposed Study

This study addresses a gap in the recent research regarding the identification and assessment of the critical variables that are related to a higher education instructor's decision to adopt a FCIM. No study focuses on the instructors' experiences or perceptions of using a FCIM. This study specifically addresses the perceptions and value judgments of higher education instructors regarding the factors they consider critical to the adoption of a FCIM. The outcome of this study may be able to provide instructors and administrators in higher education a tool to improve their support to instructors' adoption of a FCIM. It is important to know more about what factors can influence instructors in

the adoption of a flipped model in order to be able to influence the adoption of such models, and to provide today's college students a better instruction. With a better understanding of these factors, institutions can provide instructors more appropriate support to help them use a FCIM in a more effective and more efficient way, and to improve instructional performance.

Limitations

A potential limitation of this proposed study is that the participants were from a same university, so the sample might not be representative of the population of higher education instructors. An additional potential limitation is that the data are being gathered from voluntary instructor-respondents, and these respondents might, for unknown reasons, might fail to give honest or accurate answers (Bordens & Abbott, 2004). As a result, these data might not reflect the true relationship between the factors being examined and the instructors' decision to adopt a FCIM. The sample pool for this study was the set of university teaching faculty who participate as members of at least one of three listservs organized to share information about selected teaching and learning issues on the University of Tennessee at Knoxville (UTK) campus. Because this pool does not fully represent the entire range of teaching faculty at UTK, the findings from the study will be limited in their generalizability to other contexts.

Definition of Terms

Active Learning: A form of learning involving students' active engagement in the learning process. Students are typically required to take more responsibility for identifying, analyzing and integrating the content of the lesson.

Authentic: Real, or genuine, or very similar to reality.

Effort expectancy: The extent to which a user believes that using a technology, or a technological innovation, will help to free his/her effort in working.

Facilitation condition: The degree to which a user believes that support exists for his/her use of a technology, or a technical innovation.

Flipped Classroom / Flipped Classroom Instructional Model (FCIM): An instructional model in which instruction is divided into two phases, the pre-class learning phase and the in-class learning phase. Students' self-directed learning on the basic learning content forms the pre-class learning phase.

Flipped Classroom Acceptance Model (FAM): A model proposed in this study to examine an instructor's decision to adopt a FCIM.

Higher-order thinking: Thinking on a level higher than memorizing or reciting, usually requires people to understand, infer, connect to other facts and concepts, categorize, synthesize, and apply to seek new solutions to new problems.

Instructor's Flipped Classroom Adoption Inventory (IFCAI): An inventory developed and validated by this study to investigate an instructor's decision to adopt a FCIM.

Lecture-based instruction: Teaching and learning approaches which are characterized and dominated by an instructor providing information to students.

Millennial generation: People who were born between 1982 and 2000.

Multimedia: Instructional materials in which use a variety of forms, including a combination of text, audio, images, animation, video, and interactive forms.

Openness to change: An instructor's predisposition for trying new instructional innovations, and the belief that he or she can take the risks in instruction.

Performance expectancy: The extent to which a user believes that using a technology, or a technological innovation, will help to improve his/her job performance in expectance.

Problem-solving: A process of working through the contexts and details of a problem, with the aim of solving it.

Real-world: The environment in which people actually must live and work.

Self-directed Learning: A form of learning in which the individual student takes the initiative and the responsibility for his/her own learning. The individual student is independent in setting goals, defining what is worthwhile to learn, selecting, managing, and assessing his/her own learning.

Self-efficacy: People's judgments of their ability to organize and execute action required to attain designated types of performances.

Social influence: The degree to which a user believes that others around him/her believe he/she should use the technology, or technological innovation

Student-centered learning: Teaching and learning approaches in which shift the focus from the instructor to the students.

Technology Acceptance Model (TAM): A frequently used model to examine an individual's adoption decision of a technology.

Technology self-efficacy: An instructor's belief that s/he can use instructional technology to improve students' learning experiences.

Unified Theory of Acceptance and Use of Technology (UTAUT) Model: An evolved TAM.

Chapter 2

Literature Review

Active learning theory provides the theoretical support for this study. Active learning theory focuses on learners' active participation in meaningful learning activities, which may enhance students' capabilities to apply what they have learned (Edelson & Reiser, 2006; Kim, Sharma, Land & Furlong, 2012) and help students to reflect on their learning process (Bonwell & Eison, 1991), rather than passively receiving information from the instructor during the in-class time in a traditional instructor-centered, lecture-based instructional approach (Lord, Prince, Stefanou, Stolk & Chen, 2012). Active learning theory is a theoretical framework in which student-centered active learning instructional models may be successful. According to active learning theory, giving students more opportunities to be engaged in an active learning process will likely lead to better learning as compared to having them passively receive the knowledge delivered by the instructor (Prince, 2004). As an example of an instructional model that adheres to active learning theory, a Flipped Classroom Instructional Model (FCIM) may promote a student's active learning by enabling the student to learn the basic subject knowledge typically through self-directed learning prior to class and come to class for student-centered, meaningful learning activities (Strayer, 2012).

Theoretical Framework: Active Learning

A broad definition of active learning is "any instructional method that engages students in the learning process" (Prince, 2004, p. 223). Active learning is often viewed in contrast to the traditional instructor-centered, lecture-based instructional method in which passive learners receive information from the instructor in class (Lord et al., 2012).

Active learning requires students to get engaged in meaningful learning activities that can enhance students' capabilities to apply and reflect on what they have learned (Bonwell & Eison, 1991; Edelson & Reiser, 2006; Kim, Sharma, Land & Furlong, 2012).

Core elements of active learning include the introduction of activities into classroom instruction and the promotion of students' active engagement in the learning process (Kim et al., 2012; Prince, 2004). In the lowest level of active learning, lectures are broken up by activities that are introduced into the classroom (Bean, 1996; Bonwell & Eison, 1991; Hake, 1998; Linton, Pangle, Wyatt, Powell, & Sherwood, 2014; Wankat, 2002). However, simply introducing activities into lecture-based classroom learning fails to capture an important component of active learning, which is students' engagement (Linton et al., 2014; Prince, 2004). Active learning may improve students' learning effectiveness by providing students opportunities to start a fresh and interesting learning experience when their minds start to wander during lectures (Linton et al., 2014; Wankat, 2002). Students' thoughtful engagement in learning, in-depth understanding of knowledge, critical thinking, and communication skills, and interaction among students and the instructor, can be promoted in active learning (Bonwell & Eison, 1991; Linton et al., 2014; Lord et al., 2012; Wiggins & McTighe, 2011).

FCIMs are viewed as an example of an instructional model that adheres to active learning theory because in-class active learning activities form a key element of this model (Bergmann & Sams, 2012; Sams & Bergmann, 2013; Strayer, 2012), and the fundamental idea behind flipped classroom is more in-class time should be devoted to active learning experience with the immediate feedback provided by the instructor (Brame, 2013; Sams & Bergmann, 2013). A FCIM can promote students' engagement,

have a positive impact on students' learning, and meet the new requirements in higher education (Albert & Beatty, 2014; Benedict & Ford, 2014; Chapnick, 2014; Critz &Wright, 2013; Findlay-Thompson & Mombourquette, 2014; Gilboy et al., 2015; Herreid & Schiller, 2013; Iru et al., 2015; Martins, 2010; McLaughlin & Rhoney, 2015).

Flipped Classroom

In this section, the definition of FCIM, how it works in higher education, and the obstacles to using it in higher education, will be discussed. Bergmann and Sams (2012) defined *flipped classroom*, or *flipping the classroom*, as a strategy for empowering students to acquire the information of subject matter knowledge outside of class and demonstrate understanding of the knowledge in various ways during in-class meetings. Lage, Platt and Treglia (2000) offered a simple definition of FCIM, "inverting the classroom means that events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa" (p. 32).

According to Brame (2013), FCIM is an ideology, or an idea, that the in-class time should be devoted to students' active and authentic experiences, for which the pre-class learning prepares students through the exposure to learning content. Chapnick (2014) defined FCIM as an educational technique that consists of students' typically self-directed, computer-based learning outside the classroom followed by the interactive group learning activities inside the classroom.

A FCIM has also been defined as a teaching and learning model in which the learning content is presented to students prior to the classroom meeting in some multimedia format, such as podcast and image, while the in-class time is freed up for active learning experiences, such as problem solving activities, field trips, hands-on

work, designs and demonstrations, and collaborative projects (Albert & Beatty, 2014; Benedict & Ford, 2014; Findlay-Thompson & Mombourquette, 2014; Foertsch, Moses, Lage, et al, 2000; Strayer, 2007; McLaughlin & Rhoney, 2015; Strikwerda & Litzkow, 2002).

For the purposes of this study, FCIM is defined as an instructional model in which instruction is divided into two phases, the self-directed pre-class learning phase and the in-class student-centered active learning phase (Bergmann & Sams, 2012; Brame, 2013; Sams & Bergmann, 2013). Both phases are typically technology-enhanced.

How FCIM works in higher education.

In a traditional instructor-centered, lecture-based instructional model, the first phase is the in-class learning phase in which the learning content is presented in class, passively distributed from the instructor to the students, and the second phase is the post-class learning phase in which students memorize, practice, and apply the knowledge by doing homework alone at home (Sams & Bergmann, 2013). Conversely, in a FCIM, the two phases are flipped, or inverted (Bergmann & Sams, 2012; Strayer, 2012). The first phase is the pre-class learning phase, during which the students are exposed to the learning content through a variety of media formats, such as text, video, still images, and animation (Albert & Beatty, 2014; Bergmann & Sams, 2012; Kim et al., 2014; Strayer, 2007; Strayer, 2012). The second phase is the in-class learning phase, in which students have various types of student-centered, active learning activities, such as interactive lectures, problem solving, laboratory experiments, collaborative designing, and creating projects during the in-class time (Albert & Beatty, 2014; Chapnick, 2014; Gerstein, 2011; McLaughlin & Rhoney, 2015; Prashar, 2015; Strayer, 2012; Touchton, 2015). For

example, Albert and Beatty (2014) adopted a FCIM in a core-course required for business undergraduates. In this course, the instructor provided the students with a series of video segments that summarize the week-by-week lecture materials. The students viewed the videos and completed the assigned reading before each classroom meeting. During the classroom meetings, the students had discussions on key course concepts.

Key characteristics of FCIM.

The FCIM presents unique characteristics. The first key characteristic of a FCIM is that students are transformed from passive learners to active learners (Albert & Beatty, 2014; James, Chin & Williams, 2014). In a FCIM, the classroom learning is student-centered in that students have more responsibilities for their own learning (Bergmann & Sams, 2012; Gerstein, 2011; Jensen, Kummer, & Godoy, 2015; Moffett & Mill, 2014; Moran & Milsom, 2015; See & Conry, 2014). The instructor's work is no longer delivering learning content, but meeting the needs of each individual student (Flipped Learning Network, 2014; Moffett & Mill, 2014; Moran & Milsom, 2015; Strayer, 2012). For example, Moran and Milsom (2015) explained that in a Master's level course in School Counseling that used a FCIM, the students responded that they had generated more thoughtful questions through the pre-class learning for the in-class discussions.

Higher education students exhibited high levels of engagement in flipped classroom learning (Mason, Shuman, & Cook, 2013; McGivney-Burelle & Xue, 2013; ; Moraros, Islam, Yu, Banow, & Schindelka, 2015). Moreover, the college students who were taught using a flipped classroom approach, earned higher grades than those who were taught in a traditional instructor-center lecture-based format (Albert & Beatty, 2014; Frydenberg, 2012; Papadopoulos & Roman, 2010). Albert and Beatty (2014) reported

that the undergraduate students in the business major, who were taught in a FCIM, performed significantly better in solving problems and understanding business concepts, than the students who were taught in a lecture-based approach.

The second key characteristic of a FCIM is students control learning. Students can control their learning pace, mastery of content, and responsibility for coming to the class prepared (Alvarez, 2011; Fulton, 2012; Kadry & Hami, 2014; Kim et al., 2014; McLaughlin & Rhoney, 2015; Moraros et al., 2015). McLaughlin and Rhoney (2015) stated that students can develop the ability to identify connections between different sources of information and recognize meaningful patterns among the information on their own through learning at their own pace and getting engaged in student-centered active learning. Additionally, the in-class time takes on a fluid structure to support students' personalized instruction (Bergmann, Overmyer, & Wilie, 2012; McLaughlin & Rhoney, 2015).

The third key characteristic of a FCIM is that students' in-class learning can happen in a real-world context (Sams & Bergmann, 2013). During the in-class session of a FCIM, students learn through getting involved in a variety of student-centered, authentic learning activities that are always driven by real-world topics and implemented in relatively more authentic learning settings (Albert & Beatty, 2014; Baepler, Walker & Driessen, 2014; Benedict & Ford, 2014; Frydenberg, 2012; Harvey, 2014; McCurry & Martins, 2010; Prasha, 2015; Stayer, 2012). A FCIM could provide students a workplace environment, in which students can rehearse subject knowledge and practice working skills in class, then helps students to be work-ready graduates (Findlay-Ferreri & O'Connor, 2013; James et al., 2014; Kadry & Hami, 2014; Mate & Salinas, 2014;

Prashar, 2015). For example, Ferreri and O'Connor (2013) also found that the pharmacy students had significantly higher grades in the redesigned, flipped classroom course than students in the same course which was taught in a traditional lecture based instructional model because they spent more in-class time gathering and applying patient information to self-care scenarios in the flipped classroom instruction.

The fourth key characteristic of a FCIM is that students' 21st century skills can be improved. With the development of new instructional technologies and the development of new pedagogical theories, educators seek to achieve new educational goals of improving students' communication skills, improving students' ability to collaborate, and improving students' problem solving skills and independent thinking skills (Davies, Dean, & Ball, 2013; Lage et al., 2000). These skills are also labeled as "21st century skills," which is generally used to refer to certain core competencies such as collaboration, digital literacy, critical thinking, and problem-solving that educators believe schools need to teach to help students thrive in the 21st century world (Metiri Group, 2006; Trilling & Fadel, 2009).

Through engaging in the in-class active learning activities in a FCIM, students can construct or re-construct newly learned knowledge by trying to make sense of new knowledge in terms of what they have already learned (Bonk & Cunningham, 1998; Chapnick, 2014; Findlay-Thompson & Mombourquette, 2014; Schuh, 2003). Moreover, these activities require more complex thinking and reasoning skills (Strayer, 2012; Sinouvassane & Nalini, 2015; Touchton, 2015). These activities can engage students in higher-order thinking and problem solving experiences, and improve students' problem solving skills (Albert & Beaty, 2014; Bergmann & Sams, 2012; Berrett, 2012; Critz &

Kight, 2013; Moffett & Mill, 2014; Prashar, 2015). For example, Moffett and Mills (2014) found that in a veterinary professional skills course, the students responded that the FCIM sharpened their analytic skills, and helped them to build their confidence in tacking unfamiliar problems (Moffett & Mill, 2014).

In a FCIM, not only students' learning effectiveness, but also their collaborative skills, capacities in conflict management, time management, and team building, were improved in the peer-to-peer centered learning activities (Fautch, 2015; Gilboy et al., 2015; James et al., 2014; Madden, Leslie & Martinez, 2015; Moffett & Mill, 2014; Strayer, 2012; Stuntz, 2013). For example, Critz and Wright (2013) found that a FCIM improved students' application skills, critical thinking skills, and analyzing skills in the case analysis scenarios, real life cases explorations, and clinical challenge discussions in a nursing course. Stuntz (2013) also found that the undergraduates responded that the real-world work in a flipped classroom foreign language course had improved their writing skills.

The fifth key characteristic of a FCIM is that it can be flexibly used. The effectiveness of a FCIM has been reported by scholars in various disciplines using a wide range of technical approaches to present and deliver learning content (Davies et al., 2013; Harvey, 2014; James et al., 2014; McLaughlin & Rhoney, 2015; Pierce & Fox, 2012; Stray, 2012). Various media, technology, and designs of learning activities can be selected, combined, and used when instructors adopt a FCIM in various disciplines, and in various settings (Chapnick, 2014; Kardy & Hami, 2014; Jensen et al., 2015; Lage et al., 2000; Long et al., 2015; Strayer, 2012).

Obstacles to using a FCIM in higher education.

Although a FCIM has been shown to have positive influences on students' learning in higher education, two obstacles have been identified that can have an effect on an instructor's decision to use it in higher education.

The first obstacle to using a FCIM in higher education is students' possible resistance (Long et al., 2015). Research has shown that students who are new to a flipped classroom approach, or other active learning approaches, might resist, because a FCIM increases students' responsibility for their own learning (Herreid & Schiller, 2013; McLaughlin & Rhoney, 2015; See & Conry, 2014). Non-digital native students may resist due to their lack of comfort with technology (Long et al., 2015; See & Conry, 2014). Regardless of whether or not the students are digital natives, some students may resist due to their lack of self-motivation to view the instructor-provided pre-class learning materials, or lack of Internet access to the pre-class learning materials (Long et al., 2015).

The second obstacle to using a FCIM in higher education is instructors' time and effort investment (Chapnick, 2014; Long et al., 2015; Moffett & Mill, 2014). It is a challenge for instructors to design the pre-class learning materials and the in-class activities to meet students' needs (Bergmann & Sams, 2012; Herreid & Schiller, 2012; Long et al., 2015). That instructors have to invest extra effort on the flipped classroom instruction is viewed as a key challenge to an instructor's decision to adopt a flipped classroom approach in instruction (Kim et al., 2014; Pike, Stobbs, Mushtaq, & Lodge, 2015; See & Conry, 2014). Although the whole time spent on teaching may be saved over multiple years when using a FCIM (Sams & Bergman, 2013), technology evolves

quickly, so learning materials and learning activity designs still require updating. Additionally, in many universities, teaching is under-rewarded when instructors are getting promoted, tenured, and merit raises (Wang & Wang, 2009). The reward system of universities, especially the large research universities, typically does not reward teaching and the time instructors spend on preparing for innovations in teaching, therefore decreasing instructors' willingness to spend time and effort on exploring the option for a FCIM.

What We Still Need to Know

A FCIM may have positive impacts on students' learning in higher education (Albert & Beatty, 2014; Benedict & Ford, 2014; Chapnick, 2014; Critz &Wright, 2013; Findlay-Thompson & Mombourquette, 2014; Frydenberg, 2012; Herreid & Schiller, 2013; James et al., 2014; Kadry & Hami, 2014; Kim et al., 2014; Mate & Salinas, 2014; Moffett & Mill, 2014; Moran & Milsom, 2014; Prashar, 2015; Sams & Bergmann, 2013; Sinouvassane & Nalini, 2015; Strayer, 2012; Stuntz, 2013; See & Cory, 2014; Simpson & Richards, 2014; Touchton, 2015). However, much of the recent research on FCIMs is based on students' self-reported data regarding their attitudes and perceptions during their learning experiences in a particular single course in which a FCIM is used (Albert & Beatty, 2014; Benedict & Ford, 2014; Chapnick, 2014; Findlay-Thompson & Mombourquette, 2014; Critz &Wright, 2013; Frydenberg, 2013; McLaughlin & Rhoney, 2015; Prashar, 2015; Strayer, 2012). Research focused on higher education instructors' perceptions and value judgments regarding the factors critical to their adoption of a FCIM is still lacking.

Although it is a mistake to conceptualize a FCIM based on the presence or absence of technology (Brame, 2013), a FCIM is typically technology-enhanced and intends to address the needs of students who are digital natives (Gaston, 2006; Arum & Roska, 2010; Autry & Berge, 2011; Pierce & Fox, 2012 Strayer, 2012; Chapnik, 2014; Kim et al., 2014; Touchton, 2015). In the digital age, instructors change their classroom instruction typically by adopting technological innovations and student-centered, technology-enhanced, active learning instructional models, such as the flipped classroom. Therefore, research findings about an instructor's decision to adopt new technologies may be relevant to his/her decision to adopt a FCIM.

Studies focused on an instructor's decision to adopt technological innovations (Ajjan & Hartshorne, 2008; Callum et al., 2014; Kopcha, 2012; Park et al., 2008) helped the author to understand an instructor's decision to adopt a FCIM. Among these studies, the Technology Acceptance Model (TAM) and its evolved model, the Unified Theory of Acceptance and Use of Technology (UTAUT) Model, are two frequently used theoretical models to measure a user's acceptance of an innovative technology (Davis, 1989; Venkatesh & Davis, 1996; Venkatesh, Morris, Davis & Davis, 2003; Venkatesh, Thong, & Xu, 2012), and to organize the factors instructors consider critical to their adoption of technological innovations. Based upon the literature review, six factors were identified to as potential predictors of an instructor's decision to adopt a FCIM. Among these six factors, two factors, technology self-efficacy and openness to change, were summarized from the studies about instructors' decision to adopt technological innovations. The other four factors were from existing technology acceptance models.

Technology self-efficacy. Self-efficacy is defined as "people's judgments of their capability to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). Self-efficacy is grounded in Bandura's social cognitive theory. Social cognitive theory explains individuals are change agents. Thus, people are in charge of their actions, deliberately choosing and pursuing actions (Bandura, 2001), and creating their own experiences as a result (Bandura, 2006). The change agent is affected by people's efficacy, so people's beliefs about their efficacy can influence and determine their choices, efforts, determinations, and emotions (Henson, 2002). Self-efficacy affects people's goals and behaviors (Schunk & Meece, 2006), and has a great impact on people's motivations and accomplishments (Gorozidis & Papaioannou, 2011). Yet, one's sense of efficacy is "based on self-perception of competence rather than actual level of competence" (Tschannen-Moran & Hoy, 2007, p. 946).

Previous studies identified computer self-efficacy as a factor that significantly influenced an instructor's decision to integrate technologies into his/her classrooms (Ajjan & Hartshorne, 2008; Callum et al., 2014; Compeau & Higgins, 1995; Teo, 2009; Motaghian, Hassanzadeh, & Moghadam, 2013; Wang, Ertmer, & Newby, 2004). Computer self-efficacy has been defined as an individual's belief of his or her capability accomplish a task with computers (Compeau & Higins, 1995). In this study, technology self-efficacy is defined as an instructor's belief that s/he can use instructional technology to improve students' learning experiences. Computer self-efficacy could strongly influence an instructor's expectations of the outcomes when s/he used computers as well as his/her emotional responses to computers and actual use of computers (Compeau &

Higgins, 1995; Littrell, Zagumny, & Zagumny, 2005; Palak & Walls, 2009; Teo, 2009). An instructor's lack of using instructional technology was even due to his/her low level of computer self-efficacy (Littrell et al., 2005). When teachers' computer self-efficacy is high, they are more confident about integrating technologies successfully in instruction (Koh & Frick, 2009; Milman & Molebash, 2008). An instructor's computer or technology self-efficacy was a strong predictor of his/her decision to use some specific instructional technologies, such as Web 2.0 technologies (Ajjan & Hartshorne, 2008), web-based learning systems (Motaghian et al., 2013), and ICT tools (Compeau & Higgins, 1995; Wang et al., 2004; Teo, 2009; Callum et al., 2014).

At present, no research has been conducted to investigate the influence of instructors' technology self-efficacy, which is their sense of efficacy for using technologies to bring about positive student learning outcomes (Compeau & Higgins, 1995), on an instructor's decision to adopt a FCIM. However, an instructor's willingness to using a technological innovation may be an important factor in both his/her decision to adopt a new technology in teaching and his/her decision to adopt a FCIM. Internet-based, multimedia, and mobile technologies, were typically and widely used in flipped classroom courses to enhance students' pre-class self-directed subject matter knowledge learning and in-class practice (Albert &Beatty, 2014; Baepler et al., 2014; Benedict & ford, 2014; Harvey, 2014; Herreid & Schiller, 2013; Kim et al., 2014; McCurry & Martins, 2010; McLaughlin & Rhoney, 2015). Therefore, an instructor's technology self-efficacy would potentially influence his/her decision to adopt a FCIM. In this study, technology self-efficacy includes instructors' judgments of their capabilities to integrate technologies into classroom to enhance students' pre-class and in-class learning,

including creating multimedia presentations, locating online resources, facilitating students' use of online tools, and communicating with students with online tools.

Openness to change. An instructor's openness to change was defined as an instructor's predisposition for trying new instructional innovations, and the belief that s/he can take the risks in instruction (Baylor & Ritchie, 2002). Teachers' openness to change influenced their willingness to integrate instructional technologies into the classroom (Baylor & Ritchie, 2002; Shamir-Inbal, Dayan, & Kali, 2009). Instructors' willingness to make adjustment on instruction in order to adopt student-centered learning approaches was also influenced by instructors' openness to change (Blau & Peled, 2012; Park et al., 2008). For example, Park et al. (2008) found that university instructors' motivation to adjust their current instructional approaches was a predictor of their decision to adopt students' technology-enhanced collaborative learning approaches.

No prior studies were found that examined how higher education instructors' openness to change might influence their decisions to adopt a FCIM. However, recent studies on flipped classroom showed that higher education instructors who had adopted a FCIM were usually the ones with higher level of openness to change (Jensen et al., 2015; Simpson & Richards, 2014; Towle & Breda, 2014). They were more willing to predispose the traditional instructor-centered, lecture-based instructional model and in order to try the innovative, student-centered instructional approaches (Iru et al., 2015; McCurry & Martins, 2010; Towle & Breda, 2014; Winquist, 2014). They were also more open to the learning styles of digital natives (Jensen et al., 2015). In this study, the author defined openness to change as a higher education instructor's perspectives to predispose a

traditional instructor-centered, lecture-based instructional model for trying student-centered instructional approaches.

The other four factors might have a predictive influence on an instructor's decision to adopt technological innovations are summarized from the TAM model and the UTAUT Model.

Technology Acceptance Model (TAM)

The TAM model (Figure 1) is an influential socio-technical model that is used to explain user acceptance of an informational system, or a specific technology (Davis, 1989). A user's intention to use a technology is determined by his/her perceived usefulness of this technology and his/her perceived ease of use of this technology (Davis, 1989; Venkatesh & Davis, 1996).

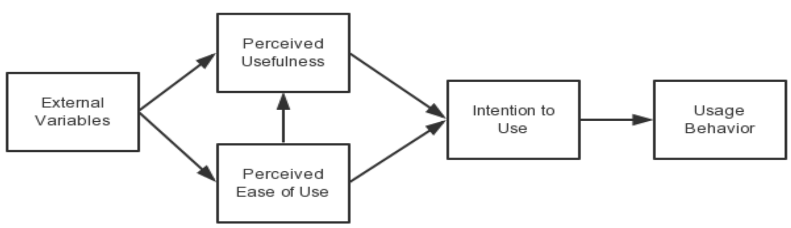

Figure 1.The TAM model (cited with permission from Venkatash & Davis, 1996)

The TAM model is one of the most popular theoretical models to explain and predict technology adoption (Lee, Cheung, & Chen, 2005; Legris, Ingham, & Collerete, 2003; Park, 2009; Saadé, Nebebe, & Tan, 2007; Surendran, 2012). Research has addressed the validity and reliability of the TAM model. Research has also investigated the TAM model's accuracy as a means for predicting individuals' technology adoption. The reliability of the TAM model has been demonstrated by showing that all absolute

measures were significant and considered acceptable through overall fit measures (Davis, 1989; Lee, Cheung, & Chen, 2005; Park, 2009; Saadé et al., 2007). The high validity of the TAM model has been shown in a variety studies (Adams, Nelson, & Todd, 1992; Al-Busaidi & Al-Shihi, 2010; Alharbi & Drew, 2014; Chau, 1996; Mathieson, 1991). The TAM model is shown to account for 40-50% of the variance associated with an individual's decision to adopt a new technology (Davis, 1989).

The TAM model has been modified in various studies by adding new variables. For example, Pavlou (2003) developed a model to predict the user's acceptance of e-commerce by adding new variables trust and perceived risk. A new version of TAM, which specifies the acceptance pattern and role of Internet self-efficacy, was developed to predict user's electronic service adoption (Hsu & Chiu, 2004). An online shopping acceptance model was developed based on the TAM model to better understand a user's shopping decision (Zhou, Dai & Zhang, 2007). An integrated model was developed mainly based on the TAM model to understand undergraduate students' e-learning acceptance by adding new variables related with e-learning systems (Park, 2009). The TAM model has been shown to be able to be adapted and be reliable in a variety of contexts, and these modified versions are likely to contain factors that are relevant to an instructor's decision to adopt a FCIM. All the modified TAM models described in the literature were shown to be reliable in the contexts in which they were used.

A limitation of the TAM model is it only includes two key explanatory variables, which are *perceived usefulness* and *perceived ease-of-use*, so it is insufficient to fully explain the relationship between a technology and the user adoption decision (Ma, Andersson, & Streith, 2005). According to Legris et al. (2003), there are other variables,

such as job relevance, and output quality, could influence a user's adoption decision. Because the TAM model contained so few variables to explain a user's adoption decision of new technologies, this might limit its ability to adequately examine an individual's decision to adopt a new technology. This limitation might result in inconsistent outcomes due to the lack of explanatory variables related to specific contexts (Chen, Gillenson, & Sherrell, 2002).

Though the TAM model has some limitations, its multiple variations have repeatedly proven to have validity and reliability in the numerous contexts in which they have been employed. The TAM model was extended into TAM2 by adding the critical factors such as social influence (subjective norm, voluntariness, and image), cognitive instrumental processes (job relevance, output quality, and result demonstrability) and experience, to explain user's perceived usefulness and usage intentions settings (Venkatesh & Davis, 1996). Venkatesh and Davis (1996) tested TAM2 in both voluntary and mandatory settings and found that it could explain more than 60% of user's adoption of a technology. The mostly used evolved model of TAM is the UTAUT model (Venkatesh et al., 2003).

Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model was formulated based on the significant constructs of TAM (Venkatesh et al., 2003). The TAM model and the UTAUT model are the most significant acceptance models present in the literature on user acceptance of technology or technical innovations (Ifenthaler & Schweinbenz, 2013). According to the UTAUT model (Figure 2), a user's acceptance of a specific technology, or a technological innovation, can be explained by several key determinants, which are performance

expectancy, effort expectancy, and social influence. These key determinants are direct predictors of behavioral intention or usage behavior. Facilitating condition is a direct predictor of usage behavior. External variables refer to the variables that might influence performance expectancy, effort expectancy, social influence, and the facilitating conditions, such as the user's personal characteristics, institute requirement, and students' motivations (Ifernthaler & Schweinbenz, 2013).

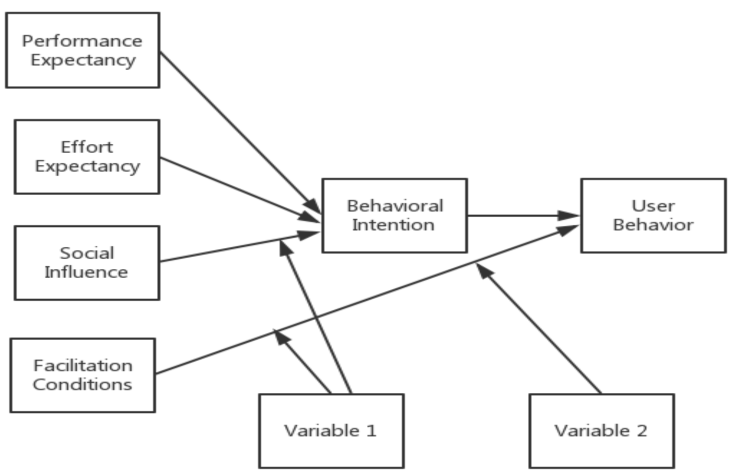

Figure 2. The UTAUT model (cited with permission of Venkatesh et al., 2003)

Performance expectancy. Performance expectancy is defined as the extent to which a user believes that using a technology, or a technological innovation, will help to improve his/her job performance in expectance (Venkatesh et al., 2003). Instructors' performance expectancy had a positive influence on their adoption of technological innovations (Ajjan & Hartshorne, 2008; Callum et al., 2014; Kopcha, 2013; Liu et al., 2010; Motaghian et al., 2013; Park et al., 2008). Instructors who implemented a FCIM were typically with high performance expectancy (Albert & Beaty, 2014; Beasley & Paskey, 2015; Benedict & Ford, 2014; Chapnick & Adam, 2014; Fautch, 2015; Ferreri & O'Connor, 2013; Harvey, 2014; Iru et al., 2015; James et al., 2014; Long et al., 2015;

Moffett & Mill, 2014; Moraros et al., 2015; Papadopoulos & Roman, 2010; Pike et al., 2015; Prashar, 2015; Simpson & Richards, 2014; Strayer, 2012; Touchton, 2015; Winquist, 2014).

Some instructors had high performance expectancy for helping students meet the course/subject requirements by using a FCIM. For example, a maritime instructor believed a FCIM could help to prepare students with the skills required in Maritime Industry, so he taught the course in a flipped classroom format (James et al., 2014). A number of instructors from various subject fields decided to adopt a FCIM because they had a high performance expectancy on helping students to meet the work force requirements in industry and business via in-class active learning activities, because a FCIM could provide students with a work-ready learning environment (Albet & Beatty, 2014; Fautch, 2015; James et al., 2014; Prashar, 2015).

Harvey (2014) stated foreign language instructors decided to adopt a FCIM because they had higher performance expectancy on helping students to achieve the subject requirements. According to Harvey (2014), using a FCIM in foreign language courses could provide students more in-class time to practice conversations and translations, rather than passively listening to instructors' lectures about grammar, vocabulary, and sentence structure. In some other studies, instructors decided to adopt a FCIM because they believed that it could be flexibly used in various educational settings (Beasley & Paskey, 2014; Benedict & Ford, 2014; Touchton, 2015). For example, the anthropology lab exercises were paired with classroom instruction in a flipped anthropology course (Beasley & Paskey, 2014). Students' math anxiety was reduced due

to a flexibly classroom arrangement in flipped math courses (Benedict & Ford, 2014; Touchton, 2015).

Some instructors had a high performance expectancy for increasing students' grades via adopting a FCIM (Albert & Beaty, 2014; Beasley & Paskey, 2014; Ferreri & O'Connor, 2013; Moraros et al., 2014; Papadopoulos & Roman, 2010). Instructors' performance expectancy that a FCIM could improve higher education students' 21st century skills, such as problem-solving skills, critical thinking skills, practical skills, and collaborative skills, was also significantly influential to their decision to adopt a FCIM (Beasley & Paskey, 2014; Iru et al., 2015; Long et al., 2015; Moraros et al., 2015; Strayer, 2012).

The instructors' belief that a FCIM could help to improve students' learning attitude had a positive impact on their decision to adopt a FCIM (Chapnick & Adam, 2014; Moffett & Mill, 2014; Moraros et al., 2015). An instructor's awareness of students' complaints about the traditional instructor-centered, lecture-based classroom instruction on lacking relevance to real-world practice (Moffett & Mill, 2014), lacking interest (Chapnick & Adam, 2014; Simpson & Richards, 2014), and lacking timely support when they did homework at home (Moffett & Mill, 2014; Winquist, 2014), motivated instructors to think of adopting a flipped classroom instructional approach in their redesigned courses. Additionally, an instructor's belief that the dynamic, vigorous and creative environment during the in-class sessions in a FCIM could improve students' sense of achievement and enthusiasm for learning motivated him/her to think of adopting a FCIM (Moraros et al., 2015).

Effort expectancy. Effort expectancy is the extent to which an individual believes using a technology, or a technological innovation, will help to free his/her effort in working (Venkatesh et al., 2003). Whether an instructor believes a technological innovation can free his/her time and effort, and whether s/he thinks the time and effort spent on initiating this technological innovation deserve, are directly related with an instructor's willingness to afford time and effort on the technological innovation, then have a direct impact on his/her decision to adopt it (Ifenthaler & Schweinbenz, 2013). Instructors' concern that technology-enhanced, student-centered instructional approaches might not free up the effort in instruction but cost much more time to learn to use them caused them to keep on a traditional instructor-centered, non-technology integrated, and lecture-based instructional approach (Callum et al., 2014; Kopcha, 2012; Liu et al., 2010).

Instructors had to invest a huge amount of time and effort to search and develop learning materials for students' flipped classroom learning (Chapnick, 2014; Moffett & Mill, 2014; Talbert, 2014). Instructors also had to update the learning tools for students' use per one or two years (McLaughlin & Rhoney, 2015; O'Flaherty & Phillips, 2015), and edit the existing learning resources in order to adapt to their own courses (James et al., 2014; O'Flaherty & Phillips, 2015; Young et al., 2014). Additionally, instructors had to pay significant efforts to re-organize the learning content (Chapnick, 2014; Dickerson et al., 2014), and design student-centered active learning activities (James et al., 2014; Long et al., 2015; O'Flaherty & Phillips, 2015). Many instructors were frustrated when they found students lacked preparation before class (Addy et al., 2014; Long et al., 2015; Lucille et al., 2014), and resisted to complete the pre-class assignments after they

invested much time and effort to initiate flipped classroom courses (Addy et al., 2014; Dickerson et al, 2014; Gilboy et al., 2014; Moran, & Milsom, 2015; Young et al., 2014). Conversely, a large number of instructors thought although they had to invest much time and effort on initiating a FCIM, their effort could be freed up in future, because they could save the learning materials and activity designs for future use (Dickerson et al., 2014; Iru et al., 2015; James et al., 2014; Moffett & Mill, 2014; Moran et al., 2015; O'Flaherty & Phillips, 2015). In this sense, effort expectancy might predict an instructor's decision to adopt a FCIM.

Facilitation condition. In UTAUT model, facilitation condition is defined as the degree to which a user believes that support exists for his/her use of a technology, or a technical innovation (Venkatesh et al., 2003). Instructors' perceived existence of the institutional and technical facilitations strongly predicted instructors' adoption choice of technological innovations (Addy et al., 2014; Ajjan & Hartshorne, 2008; Chapnick, 2014; Gilboy et al., 2015; Kopcha, 2012; Moran & Milsom, 2015; O'Flaherty & Phillips, 2015; Park et al., 2008; See & Conry, 2014).

The institutional and technical facilitations include the institutional policies and the superior requirements (Ajjan & Hartshorne, 2008; Gilboy et al., 2015; O'Flaherty& Phillips, 2015; Park et al., 2008), institutional funding support (Chapnick, 2014; Simpson & Richards, 2014), Internet access (Iru et al., 2015; Kopcha, 2012), Internet connection speed (Ajjan & Hartshorne, 2008; Jensen et al., 2015; McLaughlin & Rhoney, 2015; Moran & Milsom, 2015; O'Flaherty & Phillips, 2015), equipment in the classroom (Dickerson et al., 2014; James et al., 2014; Moran & Milsom, 2015; Touchton, 2015; Young et al., 2014), access to digital resources required for instruction (Ajjan &

Hartshorne, 2008; Motaghian et al., 2013), availability of the tools that enabled instructors to implement technological innovations (Albert & Beaty, 2014; Gilboy et al., 2015), technical support provided by the institution (Hensen et al., 2015; Moffett & Mill 2014; Simpson & Richard, 2014), and training workshops and other support services.

Social influence. In the UTAUT model, social influence is defined as the degree to which a user believes that others around him/her believe s/he should use the technology, or technological innovation (Venkatesh et al., 2003). Ajjan and Hartshorne (2008) put "peer influence," which was of similar meaning with social influence in the UTAUT model, as one of the critical factors that influenced instructors' decision to adopt Web 2.0 technologies. Ajjan and Hartshorne (2008) study defined peer influence as faculty's perception of whether their behavior of using Web 2.0 technologies is accepted and encouraged within other faculty around them.

The validity and reliability of the UTAUT model has been empirically determined and reported in a series of studies (Blagov & Bogolyubov, 2013; Oshlyansky, Cairns, & Thimbleby, 2007; Sundaravej, 2010; Venkatesh & Zhang, 2010). Sundaravej (2010) investigated the validity and consistency of UTAUT regarding user's acceptance of information technology dictates the result of coefficient analysis. Sundaravej (2010) found that 28 among the 30 items had good convergent and discriminant properties, and thus, it confirmed the validity of the UTAUT model by showing strong correlation for most items belonging to the same construct. Sundaravej (2010) also found the values of Cronbach's α for all the constructs were above 0.82, and it confirmed the results of reliability analysis of constructs of the UTAUT model. The results of inter-item

correlation matrix also provided more evidence that the measure designed based upon the UTAUT model is reliable.

A variety of translated versions of the UTAUT model are also reported to be validated in multiple cultural contexts (Oshlyansky, Cairns, & Thimbleby, 2007; Simeonova, Bogolyubov, Blagov, & Kharabsheh, 2014). Venkatesh and Zhang (2010) confirmed the validity and reliability of the UTAUT model when it was used separately in the US and China, but they found that the UTAUT model acquired greater generalizability power. Blagov and Bogolyubov (2013) tested the validity of the UTAUT model in three Russian companies across diverse industries and the Principal Component Analysis result showed that this model could be considered valid.

TAM Questionnaire

Davis (1989) developed the TAM questionnaire based upon on the TAM. Davis (1989) had conducted two studies involving 152 users and four application programs to test the content validity, reliability, and construct validity of the TAM questionnaire.

The TAM questionnaire is composed of two sets of questions accompanied by seven-point Likert scales. The two scales are: (a) the perceived usefulness scale, and (b) the perceived ease-of-use scale (Table 1).

Table 1.

The TAM questionnaire (Davis, 1989)

Sub-scale	Measurement item
Perceived usefulness	Using the technology in my job would enable me to accomplish tasks more quickly.
	Using the technology would improve my job performance.
	Using the technology in my job would increase my productivity.
	Using the technology would enhance my effectiveness on the job.
	Using the technology would make it easier to do my job.
	I would find the technology useful in my job).
Perceived ease-of-use	Learning to operate the technology would be easy for me.
	I would find it easy to get the technology to do what I want it to do.
	My interaction with the technology would be clear and understandable.
	I would find the technology to be flexible to interact with.
	It would be easy for me to become skillful at using the technology.
	I would find the technology easy to use.
Intention to use	I intend to be a heavy user of the technology.

In a study conducted by Davis (1989), the TAM questionnaire exhibited high convergent, discriminant, and factorial validity. Davis (1989) also reported that the Cronbach's alpha value of the usefulness scale in the TAM questionnaire was 0.98, and the Cronbach's alpha value of the ease-of-use scale 0.94. Additionally, a variety of studies had adjusted the TAM questionnaire to examine a use's acceptance of technologies (Lee, et al., 2005; Park, 2009; Saadé, et al., 2007; Sanchez-Franco & Roldan, 2005; Wang & Wang, 2009). In this series of studies, a variety of measures had been developed based on the TAM questionnaire, then validated and used. For example, in Wang and Wang's (2009) study about user acceptance on instructors' adoption of web-based learning systems, the measure was refined based on the TAM questionnaire and the specific topic of the study. The items included in the adjusted measure were considered highly reliable since the Cronbach's alpha coefficients of all the constructs were greater

than 0.70. An additional example is the measure used in Lee and Lehto's (2013) study on user acceptance of Youtube for procedural learning. Lee and Lehto (2013) modified the existing the TAM questionnaire to suit the research context of using Youtube for procedural learning.

The TAM questionnaire is limited in only including six questions to ask participants about the perceived usefulness and the perceived ease of use of a technology. For example, it only asks the participants to decide the extent to which the technology enhances effectiveness on the job. The construct of "job" is too broad. Even though "job" is relevant to instruction, this construct is too generic for extending it to a technology-enhanced "instructional job". Therefore, more questions are necessary for a modified version of the TAM to examine the multiple aspects of an instructional context, such as students' grades and learning motivations. The existing TAM questionnaire does not specify higher education instructors' decision to adopt a FCIM. Moreover, the existing TAM questionnaire is too general to correspond to the unique characteristics of a FCIM. For example, a flipped classroom instructional is typically composed of the pre-class learning phase and the in-class learning phase, but this aspect is not examined in the existing TAM questionnaire.

Summary

No prior research has been found that attempts to identify the key factors related to a higher education instructor's decision to adopt new instructional models. But, an instructor's adoption of new technologies and his/her adoption of student-centered, active learning instructional models are two typical ways to change classroom instruction (Callum et al., 2014; Ifenthaler & Schweinbenz, 2013; Kopcha, 2012; Prince, 2006).

Additionally, although the presence of technology is not necessary for these student-centered active learning instructional models, including a FCIM, active learning instructional models currently and typically are technology-enhanced. Specifically, technology is adapted to improve the delivery of these instructional models in order to provide digital native students with more appropriate instruction (Arum & Roska, 2010; Autry & Berge, 2011; Gaston, 2006; Pierce & Fox, 2012). Therefore, research findings on a higher education instructor's decision to adopt new technologies may be relevant to his/her decision to adopt a FCIM.

The TAM model and its evolved model, the UTAUT model, are two frequently used theoretical models to measure user's acceptance of an innovative technology (Davis, 1989; Davis & Davis, 2003; Venkatesh & Davis, 1996; Venkatesh, Morris, Venkatesh, Thong, & Xu, 2012), and to organize the factors that instructors consider critical to their adoption of technological innovations. These two models support the factors likely to be important to a higher education instructor's decision to adopt a new instructional model, such as a FCIM.

In this study, a proposed model based upon the TAM, the UTAUT, and other studies about an instructor's decision to adopt technological innovation was created to help understand the factors that might be relevant to an instructor's decision to adopt a FCIM. Based upon the literature review, six potential factors were identified that may be predictive of an instructor's decision to adopt a FCIM. These six potential predictive factors are: (a) technology self-efficacy, (b) openness to change, (c) performance expectancy, (d) effort expectancy, (e) facilitation condition, and (f) peer support. The UTAUT model sheds light on four of these factors: (a) performance expectancy, (b)

effort expectancy, (c) social influence, and (d) facilitation condition. Other studies about an instructor's decision to adopt technologies shed light on two factors: (a) technology self-efficacy and (b) openness to change. Chapter 3 will describe the six factors that constitute a proposed Flipped Classroom Acceptance Model (FAM) for predicting a higher education instructor's decision to adopt a FCIM model, the inventory designed based upon this model, and the process for gathering and analyzing data to determine the validity and reliability of the inventory.

Chapter 3

Methodology

This chapter describes the process of developing and validating an inventory designed to assess the critical variables involved in an instructor's decision to adopt a Flipped Classroom Instructional Model (FCIM). This chapter describes the research purpose, the research questions, the sampling process, instrument, the data collection procedure, and data analysis.

Statement of Research Purpose

The purpose of this study was to develop and initially validate an inventory to learn about the critical variables involved in a higher education instructor's decision to adopt a FCIM.

Research Questions

This study addressed the following research questions:

(1) Is the Instructor's Flipped Classroom Adoption Inventory (IFCAI) valid and reliable?

(2) Are the IFCAI subscales, which are Technology self-efficacy, Openness to change, Performance expectancy, Effort expectancy, Facilitation condition, and Peer support, predictive of post-secondary instructor's perceived likelihood of adopting a FCIM?

Flipped Classroom Acceptance Model (FAM) & Instructor's Flipped Classroom Adoption Inventory (IFCAI)

The FAM was developed in an attempt to understand a higher education instructor's decision to adopt a FCIM and to demonstrate the likely relationship among

the six potential variables as predictors of a higher education instructor's FCIM adoption decision. To investigate the relevance of this proposed FAM model, an inventory was developed to gather data on the six proposed factors that constitute the FAM model.

The IFCAI inventory was designed in order to measure the six factors that constitute the FAM. The IFCAI inventory is composed of six sub-scales, to mirror the six constructs of the FAM. The six sub-scales are: (a) technology self-efficacy (Table 2), (b) openness to change (Table 3), (c) performance expectancy (Table 4), (d) effort expectancy (Table 5), (e) institutional facilitation (Table 6), and (f) peer support (Table 7). A total of 43 items are included in IFCAI.

The inventory items associated with the six factors of the FAM model were randomly ordered within the survey before it was administered to the respondents (see Appendix A). A five-point Likert scale was used as the measurement scale for all questions in the six sub-scales. The 5-point Likert scale used in the IFCAI inventory is the following: "Strongly Disagree", "Disagree", "Neutral", "Agree", to "Strongly Agree." The last ten items in IFCAI addressed the dependent variable of this study to share information regarding the likelihood that they might adopt a FCIM (Table 8). There were nine additional items addressing the demographic information of the respondents, such as subject content in which they taught, teaching experiences, ranks, whether they had used Internet-based technologies in instruction, whether they had used multimedia learning resources in instruction, whether they had used student-centered instructional approaches in instruction, and whether they had used a FCIM (see Appendix B for detail).

As shown in Figure 3, the FAM consists of six constructs or factors. These are: (a) technology self- efficacy, (b) openness to change, (c) performance expectancy, (d)

effort expectancy, (e) institutional facilitation, and (f) peer support. There is one dependent variable of interest: likelihood for adopting a FCIM. These six factors are incorporated into the IFCAI instrument as six distinct sub-scales. The data from these sub-scales was analyzed to determine the degree to which each was a relevant, valid and reliable predictor of the dependent variable, which is an instructor's decision to adopt a FCIM.

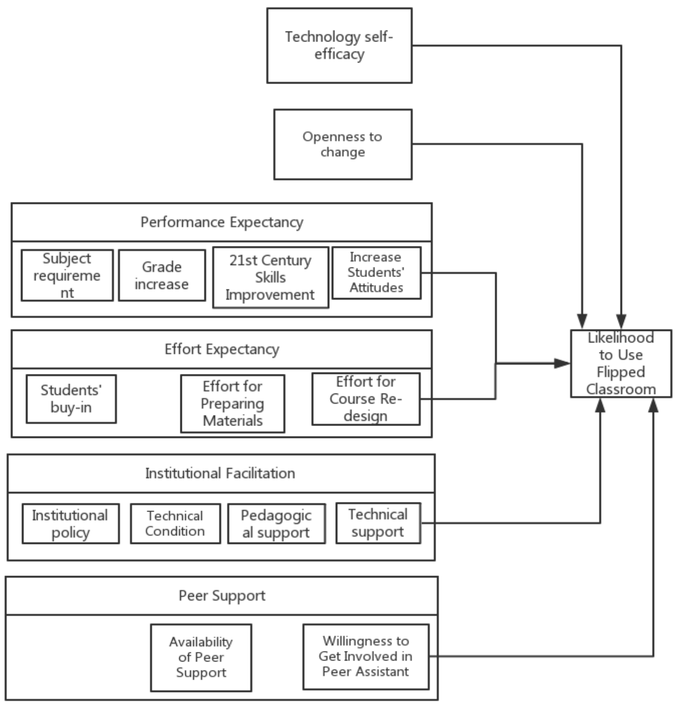

Figure 3. *The FAM model*

Technology self-efficacy. As described in Chapter 2, self-efficacy is defined as "people's judgments of their capability to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). An instructor's computer or technology self-efficacy is a strong predictor of his/her decision to use some specific instructional technologies. In this study, technology self-efficacy is defined as

instructors' judgments of their capabilities to integrate technologies into classroom to enhance students' pre-class and in-class learning, including creating multimedia presentations, locating online resources, facilitating students' use of online tools, and communicating with students with online tools. The example items in this construct include "I am confident I can create multimedia presentations to communicate curriculum content to students (*e.g.,* PowerPoint slides, Prezi)," "I am confident I can design learning activities that integrate technology and course content for my students," and "I am confident I can use online tools to engage students in collaborative group learning" (see Appendix B for detail).

Openness to change. As described in Chapter 2, an instructor's openness to change is defined as an instructor's predisposition for trying new instructional innovations, and the belief that s/he can take risks in instruction. In this study, openness to change refers to instructors' perspectives to predispose a traditional instructor-centered, lecture-based instructional model for trying student-centered instructional approaches. The example items in this construct include "I prefer that my students learn basic subject knowledge by themselves, rather than me teaching directly in class," and "In class, I prefer lecturing more, with students spending less time in practice-based learning activities" (see Appendix B for detail).

Performance expectancy. As described in Chapter 2, performance expectancy is defined as the extent to which a user believes that using a technology, or a technological innovation, will help to improve his/her job performance in expectance. In the FAM, performance expectancy is defined as the extent to which an instructor believes a FCIM (FCIM) will help to improve his/her performance in instruction, such as meeting the

course/subject requirements, increasing students' grade, improving students' 21st century skills (*i.e*. problem-solving skills, critical thinking skills, practical skills, and collaborative skills) (Chapnick, 2014). The example items in this construct include "I believe a FCIM will help to increase students' grades," "I think a FCIM will help to increase students' learning motivation," and "I believe a FCIM will improve students' problem-solving skills" (see Appendix B for detail).

Effort expectancy. As described in Chapter 2, effort expectancy is identified as the extent to which a user believes that using a technology, or a technological innovation, will help to free his/her effort in instruction. The example items in this construct include "Making learning materials for a flipped classroom course takes too much effort," and "Planning learning activities in a FCIM takes too much effort" (see Appendix B for detail).

Facilitation conditions. In the FAM shown in Figure 3, the facilitation conditions are clarified in more detail. Additional discussion of this factor is also included in Chapter 2. The facilitation conditions include the extent to which instructors feel that certain external factors (*e.g.,* institutional policies, superior requirements, institutional funding support, Internet access, Internet connection speed, equipment in the classroom, available of digital resources and tools, technical support and training workshops) exist. All of these external factors might influence an instructor's decision to adopt a FCIM. The example items in this construct include "I have the necessary technological equipment in my classrooms to use a FCIM," and "My institution offers training that can help me use a FCIM" (see Appendix B for detail).

Peer support. In the FAM, the peer support not only includes the social influence in the UTAUT model, but also the extent to which an instructor believes the existence of the peer assistance among instructors might help him/her to use a FCIM. Peer assistance refers to the encouragement, critiques, and assistance from other instructors, to make a more effective and more efficient instruction. Detailed discussion of this factor is also included in Chapter 2. The example items in this construct include “Other faculty on campus can help me adopt a FCIM,” and I am able to use an online learning community to get help with FCIM instruction” (see Appendix B for detail).

Table 2.

Questions in Technology Self-Efficacy subscale

	Question
1	I am confident I can create multimedia presentations (e.g. PowerPoint slides, Prezi) to communicate curriculum content to students.
2	I am confident I can locate online multimedia resources (e.g. Youtube video, Khan Academy videos) to support my instruction.
3	I am confident I can design learning activities that integrate technology and course content for my students.
4	I am confident I can facilitate students’ use of online tools (e.g. Dropbox, Onedrive, discussion board) to share learning materials.
5	I am confident I can help students to communicate with one another with online tools (e.g. discussion board).
6	I am confident I can use online tools to engage students in collaborative group learning.
7	I am confident I can communicate with students using online tools other than email (*e.g.,* Blackboard, Wiki, Google document).
8	I am confident I can use technology to encourage students to help one another in the learning process.

Table 3.

Questions in Openness to Change subscale

	Question
9	I prefer that my students learn basic subject knowledge by themselves, rather than me teaching directly in class.
10	In class, I prefer lecturing, rather than engaging students in learning activities.
11	I am open to learning more about new teaching strategies.
12	I am open to my students' use of new technologies (*e.g*., smart phone, tablet) in learning.
13	I am open to learning more about integrating technologies in my class.

Table 4.

Questions in Performance Expectancy subscale

	Question
14	A FCIM can help me to spend more time in class about current developments in my subject field.
15	A FCIM can help to increase students' grades.
16	A FCIM can help to increase students' learning motivation.
17	A FCIM cannot help students to apply what they learned.
18	A FCIM can improve students' problem-solving skills.
19	A FCIM can help students to show their content-related creativity in class.
20	A FCIM can help improve students' critical thinking skills.
21	A FCIM can help students to develop group work skills.
22	A FCIM can help students to locate needed valuable information to extend learning.
23	A FCIM cannot help to increase students' interest in learning.
24	It is a challenge to make students complete the pre-class learning assignment in a course that uses a FCIM.

Table 5.

Questions in Effort Expectancy subscale

	Question
25	Making learning materials for a flipped classroom course takes too much effort.
26	Planning learning activities in a FCIM takes too much effort.
27	In a FCIM, it is easy for the first-time students to understand their new responsibilities in flipped classroom learning.
28	It is difficult to engage students in tasks in a FCIM.
29	I think it will take too much time to make the learning materials for a flipped classroom course.
30	After the development and initial use of FCIM material, the effort required to teach using a FCIM will decrease.

Table 6.

Questions in Facilitation Condition subscale

	Question
31	I have the necessary classroom physical conditions (*e.g.,* flexible seat arrangement) to use a FCIM.
32	I have the necessary technological equipment in my classrooms to create a flipped classroom.
33	My institution offers training that can help me use a FCIM.
34	My institution provides multimedia instructional resources to support a FCIM.
35	My institution offers technical support for instructors to use a FCIM.
36	My institution offers instructional design support for the development of flipped classroom instructional courses.

Table 7.

Questions in Peer Support subscale

	Question
37	Other faculty on campus can help me adopt a FCIM.
38	I am able to use an online college teaching community to get help with flipped classroom instruction.
39	I feel comfortable asking other faculty members to help me with my instruction.
40	I feel comfortable in sharing my teaching practice with other faculty members.
41	I feel comfortable having other instructors observe my teaching.
42	I believe I can learn more about new teaching methods from other faculty members.
43	I believe I can improve my teaching through communicating with other faculty members.

Table 8.

IFCAI questions defining the dependent variable of this study

I am comfortable with the idea of using a FCIM.
I believe a FCIM is better than my current instructional approach.
I need to know more about FCIM.
I think I can coordinate the use of FCIM with my current assigned workload.
I am interested in learning more about the FCIM.
I believe FCIM will benefit my students' learning.
I am planning to use a FCIM in one or more of my classes in future.
I will recommend FCIM to other faculty members.
I am interested in increasing the use of FCIM at my institution.
I am interested in working with my institution to improve the FCIM.

Pilot Study

The IFCAI was pilot tested prior to being used to collect data in this study. Hill (1998) suggests 10 to 30 participants for pilot studies in survey research studies. In this study, 6 faculty members and 4 advanced graduate students in Instructional Technology provided feedback on editing and refining the survey. These pilot evaluators had either used a FCIM in their own instruction or were knowledgeable about the FCIM. Feedback from these evaluators in the pilot study was used to refine the IFCAI instrument and to improve its readability and content validity.

Participants

Population.

The population of interest in this study was higher education instructors, who would consider adopting a FCIM. The population included all individuals who teach college or university level courses, not only tenure track-faculty members, but also lecturers, part-time instructors, and Graduate Teaching Assistants who had the authority

to design a teach a course independently. In order to achieve a sample unbiased on the preference of a FCIM, all instructors, regardless of prior experience with the FCIM, were invited to participate.

Sampling.

The sample of respondents for this study was acquired by soliciting their participation through three UTK campus listservs. Thus, the members of the sample were volunteers from the membership of these three pre-existing listservs.

The three listservs were: (a) UTK Teaching and Learning Center (TLC) listserv, containing approximately 1000 faculty members who had attended the workshops sponsored by TLC, facilitated by Dr. Taimi Olsen, the director of TLC; (b) UTK Agriculture Campus faculty listserv, facilitated by Dr. Joanne Logan, an associate professor in the Department of Biosystems Engineering and Soil Science, containing approximately 100 faculty members; (c) UTK Community of Practice listserv, containing approximately 100 UTK faculty members who are interested in improving students' engagement, facilitated by Dr. Christine Goode, the facilitator of the Community of Practice. Based upon the number of faculty who monitored these campus listservs, the potential sample size was approximately 1000 instructors at UTK. Because some faculty may be members of more than one listserv, participants wer e reminded in the invitation letter to complete the survey only once.

Data Collection and Analyses

Data Collection.

This study used Qualtrics, a web-based survey software tool available for use by all faculty, staff, and students at UTK, for data collection. The survey was posted on

Qualtrics, and a link to the survey was generated. The items in the six subscales in IFCAI were scrambled in mixed order (see Appendix A). With the support of Dr. Taimi Olsen, the director of TLC, Dr. Joanne Logan, an associate professor in Department of Biosystem Engineering and Soil Science, and Dr. Christine Goode, the facilitator of the Community of Practice, an invitation email, which included the link to the survey (see Appendix C), was released through the three listservs for the instructors at UTK. No questions collecting participants' identifying information was included in the survey (*i.e.,* names or ID number). The link to the online survey was emailed to the potential participants. The invitational email provides a brief description of the flipped classroom and the survey link. The instructors who volunteered to participate were told to click the link to view the informed consent statement that explained that their participation is voluntary, participants may self-select to revoke participation at any time, and all demographic information would remain protected and private (see Appendix D). No personal information that might permit the identification of the respondent was collected by the survey. At the end of the informed consent statement, the participants were instructed to click a button to enter the survey.

To encourage participation, a reminder was sent in the three listservs after one week. At the end of the first two weeks after the survey was released, not enough valid responses had been received. In order to increase the number of valid responses, a reminder was sent in the three listservs again, and the researcher released the survey to some instructors on campus via friendship. At the end of the third week, enough valid responses (above 200) had been received.

Question 1: Data Analysis.

SPSS 23 was used for the statistical analysis. Data analysis began with generating a descriptive analysis of all the items. Next, Exploratory Factor Analysis (EFA) was used to establish validity by determining the factor structure among the items from the IFCAI to determine the factor structure.

EFA identifies the underlying factor structure and the relationship between items in a dataset (Meyer, Gamst, & Guarino 2011). An oblique rotation was used because in contrast to an orthogonal rotation, it allows correlations among factors. The number of factors was not constrained, in order to allow the factorial structure to emerge through analysis.

According to established practice, any of the IFCAI items with factor loadings under .70 should be deleted from the measurement model (Cronbach, 1951; Santos, 1999; Meyer et al., 2011). However, because .70 is very stringent in social science, and 0.40 is typically used as a cutoff value (Santos, 1999). For this analysis, any items with factor loadings under 0.40 were deleted from the measurement model. Based upon the FAM model and proposed six-factor solution, the first model explored was a six-factor model, but the data from the EFA showed that the best solution was a three-factor model. The three-factor solution procedure was conducted by deleting all crossloaded items and items with factor loadings under .40.

Based upon this analysis, a number of the IFCAI items were shown to be poorly correlated with the three primary factors and should be removed from the inventory. In this study, Cronbach's alpha was computed to determine the internal consistency of the inventory.

The revised IFCAI inventory retained all items with individual Cronbach alpha coefficients greater than 0.70 (Kannan & Tan, 2005). According to Meyer et al. (2011), an inventory is considered to be highly reliable if the overall Cronbach alpha coefficients for each scale are larger than 0.70.

Question 2: Data Analysis.

To address Research Question 2, a multiple regression analysis was used. The factors determined from EFA were used as the predictor variables, to determine which of them were better predictors of a higher education instructor's decisions to adopt a FCIM. A multiple linear regression was calculated to predict the Higher Education instructors' decisions to adopt a FCIM based on the factors determined from EFA. The independent variables were initially proposed as technology self-efficacy, pedagogical openness, performance expectancy, effort expectancy, facilitation condition, and peer support. The dependent variable was an instructor likelihood to adopt a FCIM.

Possible Threat to Reliability and Validity

The threats to the reliability of the measure in the proposed study included: subject reliability and data processing reliability, sample size, and potential biases in volunteer sample. In addition, data was collected from a convenience sample, not a random sample. There were a variety types of colleges, including community college, public university, and private university. All the participants were from one large public university.

Subject reliability. Participant fatigue may have been a threat to the reliability of this study (Bordens & Abbott, 2004). There were a total of 66 questions in the survey. Participants' fatigue might have affected their responses. Additionally, possible mistakes

by respondents in the interpretation of the wording of items and errors in conducting or interpreting the results of the statistical analysis also might have influenced the reliability of the inventory.

Selective sample attrition. The participants' possible attrition during filling out the survey might threaten the internal validity of the study. Other threats to the internal validity of this study included the possible statistical regression effects caused by the possible extreme scores from some participants, potential sample bias, and the potential lack of representativeness of the sample.

Chapter 4

Results

This chapter describes the results of the data analysis outlined in Chapter 3. This chapter begins with describing the demographic information of the respondents. Then, this chapter presents the validity and reliability results for the Instructors' Flipped Classroom Adoption Inventory (IFCAI). Finally, the results of the multiple regression analysis are presented.

Demographic Information

A total of 287 participants responded to the solicitation to participate in the study by completing the IFCAI survey. From this larger group of respondents, 227 completed the survey. The demographic information from these 227 respondents is shown in Figure 4, Figure 5, and Figure 6.

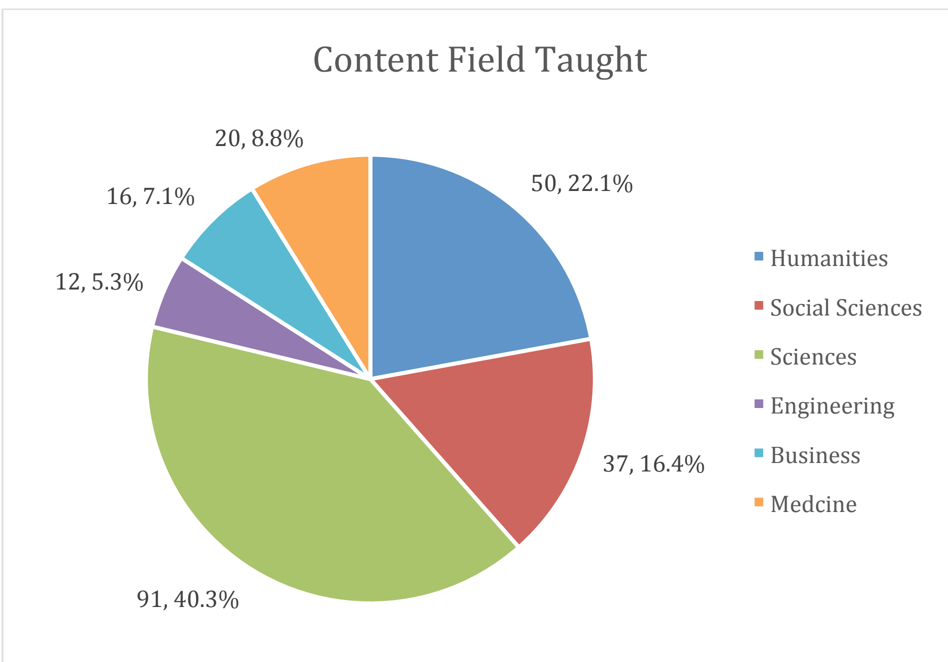

Figure 4. *Distribution of participants by content field taught*

Figure 4 shows that among the 227 respondents who completed the survey, up to 91 (40.3%) taught in one of several content fields of Science. A total of 50 participants (22.1%) taught in one of several content fields of Humanities. The other participants taught in the content fields of Social Sciences, Medicine, Business, and Engineering.

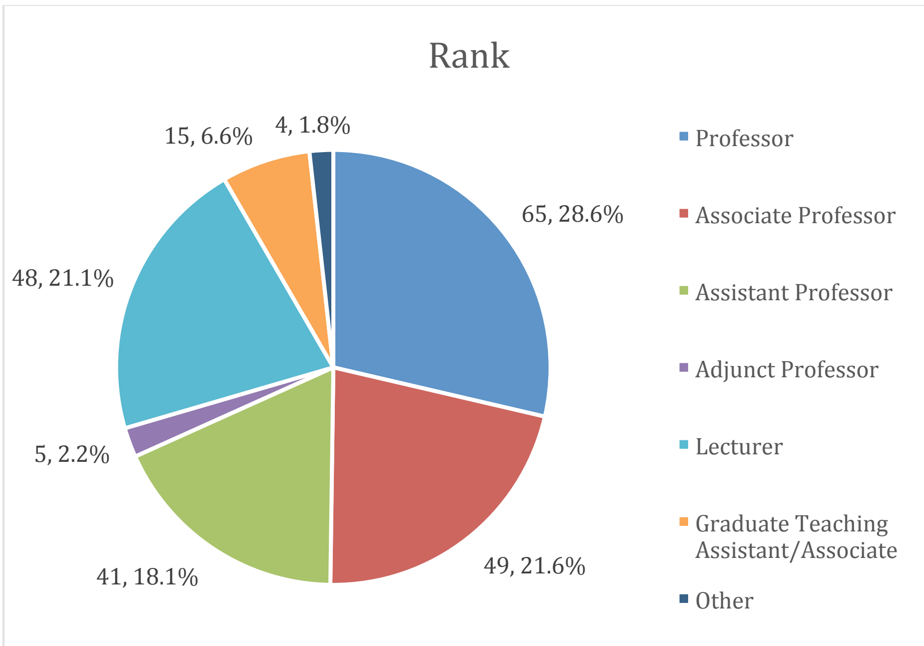

Figure 5. *Distribution of participants by rank*

Figure 5 shows that among the 227 respondents who completed the survey, 65 (28.6%) were Professors, 49 (21.6%) were Associate Professors, 48 (21.1%) were Lecturers, 41 (18.1%) were Assistant Professors. The 4 participants who identified their rank as "Other" responded that they were working as Academic Quality and Assessment Researcher, Assistant Librarian, postdoctotal research fellow, and Staff member at the university.

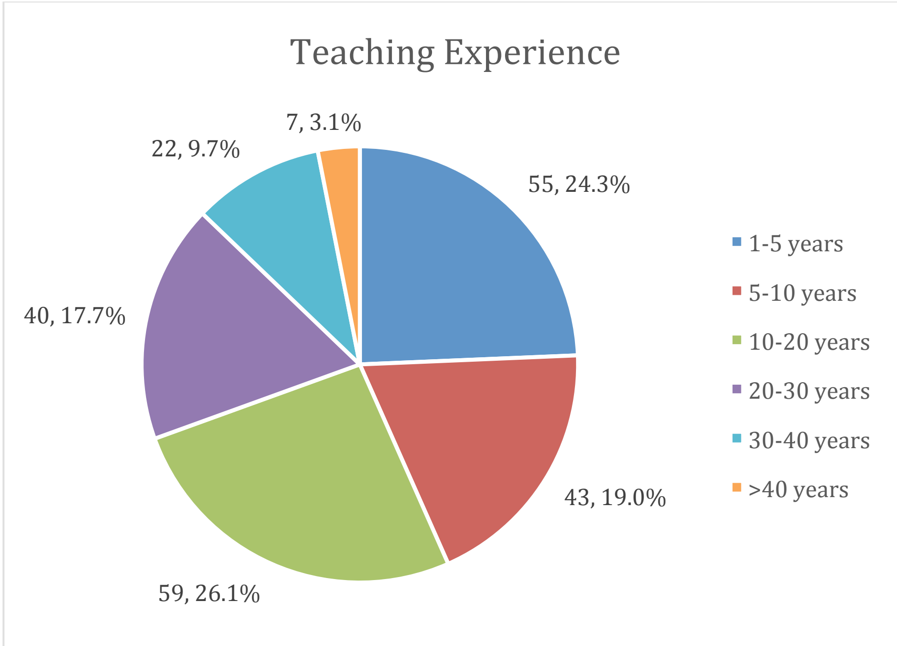

Figure 6. *Distribution of participants by years taught at college/university level*

Figure 6 shows that 43.3% of respondents had taught at college/university level less than 10 years, 12.8% had college/university level teaching experience for more than 30 years. On average, the mean college/university level teaching experience for all respondents was 16.2 years (SD = 12.29).

Among the 227 respondents who completed the survey, 208 (91.6%) reported using multimedia technologies (*e.g.,* PowerPoint, Keynote, Prezi, Youtube, Khan Academy, Smartboard) in instruction. A total of 150 (66.1%) reported using Internet-based technologies (*e.g.,* Dropbox, Google Drive). A total of 205 respondents (90.3%) reported using student-centered learning activities (*e.g.,* discussion, small group work, project-based learning) in instruction.

The respondents reported diverse experiences with using a FCIM. A total of 129 (56.8%) reported having used a FCIM before. When asked about frequency of using a

FCIM in instruction, 60 participants (26.4) reported “don’t use any aspect of the FCIM,” 35 participants (15.4%) reported “rarely use the FCIM techniques,” 63 participants (18.9%) reported “sometimes use the FCIM techniques,”, 43 participants (18.9%) reported “frequently use the FCIM techniques in classroom,” and 26 participants (11.5%) reported “always use the FCIM techniques in classroom.”

Research Question 1: Is IFCAI valid and reliable?

An EFA of the 43 items addressing the six proposed factors which was performed on the inventory responses from 227 instructors responded. Prior to running the analysis with SPSS, the data were screened by examining descriptive statistics on them, inter-item correlations, and possible univariate and multivariate assumption violations. From this initial assessment, all the 43 variables were found to be interval-like, variable pairs appeared to be univariate normally distributed, and all cases were independent of one another. Because of the large sample size, the variables-to-cases ratio was considered adequate.

The researcher ran a series of unconstrained extraction and rotation procedures, including a 6-factor solution, a 5-factor solution, a 4-factor solution, and a 3-factor to identify what structure best fit the data. All but the 3-factor solution resented significant crossloadings or generated negative values bigger than .40. Thus, a 3-factor maximum likelihood extraction and oblique rotation procedure generated the strongest factor structure.

In the 3-factor EFA solution, the three factors cumulatively accounted for 58.84% of the total variance associated with an instructor’s decision to adopt a FCIM. The scree plot generated from the 3-factor EFA with SPSS 23 is shown as Figure 7. This 3-factor

model was shown to account for most variance among the several factorial models examined. As shown in Figure 7, the first three factors had eigenvalues above 1.0. These three factors accounted for more than half of the total variance.

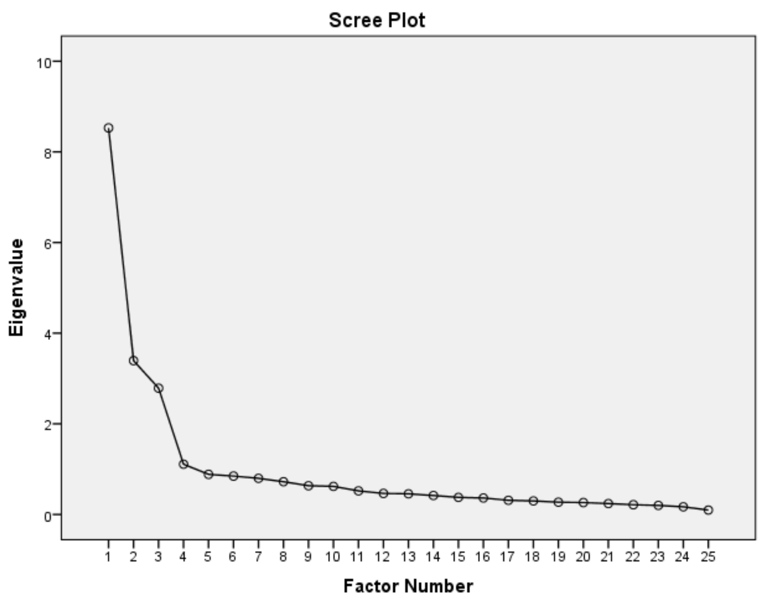

Figure 7. SPSS scree plot of the 3-factor EFA solution

The structure matrix (Table 9) shows the correlations between factors and the items for the rotated solution.

Table 9.

Structure matrix after a 3-factor EFA

	Factor Loading		
	1	2	3
FCIM38	**.917**	.381	.254
FCIM27	**.908**	.380	.296
FCIM32	**.842**	.410	.241
FCIM15	**.791**	.310	.263
FCIM33	**.784**	.284	.304
FCIM39	**.751**	.390	.199
FCIM9	**.700**	.290	.289
FCIM3	**.594**	.211	.192
FCIM22	**.549**	.255	.136
FCIM42	**.420**	.125	.054
FCIM31	.383	**.833**	.128
FCIM41	.359	**.830**	.233
FCIM25	.301	**.794**	.187
FCIM40	.291	**.787**	.156
FCIM13	.334	**.694**	.312
FCIM20	.251	**.605**	.172
FCIM37	.174	**.576**	.244
FCIM7	.264	**.544**	.279
FCIM4	.280	**.432**	.237
FCIM29	.234	.282	**.855**
FCIM35	.182	.181	**.854**
FCIM23	.279	.287	**.778**
FCIM18	.187	.176	**.738**
FCIM6	.284	.238	**.506**

Extraction Method: Maximum Likelihood.
Rotation Method: Oblique with Kaiser Normalization.

As shown in Table 9, the items with factor loading values in bold in the second column were strongly correlated with the set of the items grouped as Factor 1. These items were retained in the revised IFCAI inventory as subscale 1, Performance Expectancy. The items with factor loading values in bold in the third column were strongly correlated with the set of the items grouped as Factor 2. These items were retained in the revised IFCAI inventory as subscale 2, Technology Self-efficacy. The items with factor loading values in bold in the fourth column were strongly correlated

with the set of the items grouped as Factor 3. These items were retained in the revised IFCAI inventory as subscale 3, Outside Support. IFCAI items with factor loading values less than .40 and relatively high crossloadings (.30 and higher) were deleted from further consideration in the factor analysis. These items were also eliminated from the new IFCAI instrument. New subscales for IFCAI were constructed based upon the organization shown in Table 10 (see revised version of IFCAI in Appendix E).

Table 10.

Subscale organization

Subscale	Item	Original Subscale
Subscale 1:	FCIM38	Performance Expectancy
Performance Expectancy	FCIM27	Performance Expectancy
	FCIM32	Performance Expectancy
	FCIM15	Performance Expectancy
	FCIM33	Performance Expectancy
	FCIM39	Performance Expectancy
	FCIM9	Performance Expectancy
	FCIM3	Effort Expectancy
	FCIM22	Performance Expectancy
	FCIM42	Performance Expectancy
Subscale 2:	FCIM31	Technology Self-efficacy
Technology Self-efficacy	FCIM41	Technology Self-efficacy
	FCIM25	Technology Self-efficacy
	FCIM40	Technology Self-efficacy
	FCIM13	Technology Self-efficacy
	FCIM20	Pedagogical Openness
	FCIM37	Technology Self-efficacy
	FCIM7	Technology Self-efficacy
	FCIM4	Effort Expectancy
Subscale 3:	FCIM29	Facilitation Condition
Outside Support	FCIM35	Facilitation Condition
	FCIM23	Facilitation Condition
	FCIM18	Facilitation Condition
	FCIM6	Peer Support

Although this study examined the logical possibility of six discrete predictive subscales, after the extraction and rotation in the EFA, only three subscales remain in the new IFCAI. However, the EFA process demonstrated that many items in the proposed six subscales were very similar to one another, for example, as shown in Appendix F, FCIM 43 “It is a challenge to make students complete the pre-class learning assignment in a course that uses a FCIM” and FCIM 16 “In a FCIM, it is easy for first-time students to understand new responsibilities.”

All items from the original Technology Self-efficacy, except FCIM 1 “I am confident I can create multimedia presentations to communicate curriculum content to students (*e.g.,* PowerPoint slides, Prezi)” remain in the new Technology Self-efficacy subscale in the new IFCAI instrument. Only FCIM 20 “I am open to my students’ use of new technologies (e.g., Internet, Smart phones, Youtube, Wikipedia) in learning” from the original Pedagogical Openness subscale remained in the new IFCAI and was merged into new Technology Self-efficacy subscale. All the other items from the original Pedagogical Openness subscale were eliminated. FCIM 9 “I believe a FCIM will help to increase students’ grades” and FCIM 21 “I think other instructional models (e.g., Problem-based learning, Game-based learning, Service learning) can help students to apply what they learned more effectively” were eliminated from the original Performance Expectancy subscale, and the other items from the original Performance Expectancy subscale were retained in the new Performance Expectancy subscale. Only two items from the original Performance Expectancy subscale, FCIM 4 “Making learning materials for a flipped classroom course takes too much effort” and FCIM 22 “It is difficult to engage students in learning tasks in a FCIM” were retained in the new IFCAI based upon

high factor loading values. These two items were included in the new Performance Expectancy and new Technology Self-efficacy subscales. Four items from the original Facilitation Condition subscale in the original IFCAI instrument were retained in the Outside Support subscale in the new IFCAI instrument. Only one item, FCIM 6 "Other faculty on campus can help me adopt a FCIM" from the original Peer Support subscale in the original IFCAI instrument was retained in the new IFCAI instrument, and it was merged in the Outside Support subscale because of its high factor loading value (see Appendix F for detail).

The new Performance Expectancy subscale is composed of most of the items from the original "Performance Expectancy" subscale but with the addition of item FCIM 22 "It is difficult to engage students in learning tasks in a FCIM". FCIM 22 is from the original Effort Expectancy subscale (see Appendix F for detail).

The new Technology Self-efficacy subscale is composed of most items from the original Technology Self-efficacy subscale, plus one item FCIM 4 "Making learning materials for a flipped classroom course takes too much effort." FCIM 4 is from the original Effort Expectancy subscale (see Appendix F for detail).

The new Outside Support subscale is composed of four items from the original Institutional Facilitation subscale, plus one item FCIM 6 "Other faculty on campus can help me adopt FCIM." FCIM 6 is from the original Peer Support subscale (see Appendix F for detail).

The internal consistency of all the items in the newly revised IFCAI inventory as assessed by coefficient alpha. The Cronbach's alpha coefficient for all the items in the new IFCAI was .91. The internal consistency of Subscale 1: Performance Expectancy

was .92. The internal consistency of Subscale 2: Technology Self-efficacy was .882. The internal consistency of Subscale 3: Outside Support was .80. The IFCAI inventory was therefore deemed to have high internal consistency with this pilot sample.

Based upon the findings reported for Research Question 1 above, the original Research Question Two was not analyzed since the proposed six-factor model was not supported by the analysis. A revised Research Question Two was analyzed to determine the predictive potential of the revised three-factor FAM model.

Revised Research Question 2: Are the new IFCAI subscales, which are Performance expectancy, Technology self-efficacy, and Outside Support, predictive of post-secondary instructor's perceived likelihood of adopting a FCIM?

The three factors, Performance Expectancy, Technology Self-efficacy, and Outside Support, were used in a standard multiple regression analysis to predict instructors' adoption decision of a FCIM. The correlations of the three factors is shown in Table 11. As shown in Table 11, all correlations are statistically significant.

Table 11.

Correlations among the variables in multiple regression analysis

		adoption	expectancy_1	selfefficacy_2	support_3
Pearson Correlation	adoption	1.000	.813	.432	.229
	expectancy_1	.813	1.000	.408	.292
	selfefficacy_2	.432	.408	1.000	.301
	support_3	.229	.292	.301	1.000
Sig. (1-tailed)	adoption	.	.000	.000	.000
	expectancy_1	.000	.	.000	.000
	selfefficacy_2	.000	.000	.	.000
	support_3	.000	.000	.000	.
N	adoption	209	209	209	209
	expectancy_1	209	209	209	209
	selfefficacy_2	209	209	209	209
	support_3	209	209	209	209

The prediction model was statistically significant, $F(3, 205) = 104.76$, $p < .001$, and accounted for approximately 67% of the variance of adoption ($R^2 = .675$, Adjusted $R^2 = .670$). Instructors' adoption decision of a FCIM is primarily predicted by Factor 1: Performance Expectancy, and to a lesser extent by Factor 2: Technology Self-efficacy. Performance Expectancy receives the strongest weight in the model followed by Technology Self-efficacy. With the sizeable correlations between the predictors, the unique variance explained by each of the variables indexed by the squared semipartial correlations was quite low (Table 12). Inspection of the structure coefficients suggests that, with the possible exception of Factor 3: Outside Support, the other significant predictors were strong indicators of the latent variable described by the model.

Table 12.

Standard regression results

Model	b	SE-b	Beta	Person r	sr^2	Structure Coefficient
Constant	.584	.183				
Factor 1: Performance Expectancy*	.700	.040	.771	.813	.477	.842
Factor 2: Technology Self-efficacy*	.129	.045	.128	.432	.013	.139
Factor 3: Outside Support	-.031	.038	.034	.229	.001	-.100

Note. The dependent variable is adoption decision, $R^2 = .675$, Adjusted $R^2 = .670$.
sr^2 is the squared semi-partial correlation.
$*p < .05$

The four open-ended questions included on the IFCAI were optional. Most respondents gave no response to any of the open-ended questions. Thus, they were not included in data analysis.

Summary

The data analysis described above was conducted on a total of 227 valid survey responses. After an EFA with maximum likelihood extraction and oblique rotation procedure solution, a viable 3-factor model for the IFCAI instrument was generated. It includes 24 items in 3 subscales, which are Performance Expectancy, Technology Self-efficacy, and Outside Support. A follow-up multiple regression analysis was conducted to determine the degree to which the factors predicted the dependent variable (higher education instructors' decision to adopt a FCIM. The result of the standard multiple regression analysis reveals that Performance Expectancy and Technology Self-efficacy are significant predictors of a higher education instructor's decision to adopt a FCIM.

Chapter 5

Discussion

This chapter contains the interpretations of the results reported in Chapter 4. The current investigation involved the development and initial validation of an inventory to determine the relevance and predictive validity of the Flipped Classroom Acceptance Model (FAM) for describing higher education instructors' decision to adopt a Flipped Classroom Instructional Model (FCIM). This study used an Exploratory Factor Analysis (EFA) and reliability analysis to test the inventory for its relationship to targeted constructs as well as internal reliability. The validation of an inventory to determine the relevance of the key factors to a higher education instructor's decision to adopt a FCIM is a unique contribution to the current research on flipped classroom, as prior research on flipped classroom has not focused on exploring the factors related to instructors' FCIM adoption decisions.

An EFA generated a valid and predictive 3-scale, 24-item IFCAI instrument. The EFA results revealed that the newly revised instrument is stronly internally consistent, and the 24 items had strong correlations with one of the three factors. However, comparing the newly revised IFCAI to the originally proposed 6-subscale, 43-item IFCAI instrument, 19-items were deleted because of crossloading or low factor loading. There are a variety of causes of low factor loading or crossloading, such as the sample size of this study was still relatively small, the wording of these items might not evoke the participants' ideas, or these items might not seem to be interested or valuable to the participants.

Previous research revealed that instructors' pedagogical openness influenced their willingness to integrate instructional technologies into the classroom (Baylor & Ritchie, 2002; Shamir-Inbal, Dayan, & Kali, 2009), and their willingness to adopting technology-enhanced, student-centered learning approaches (Blau & Peled, 2012; Park, Lee, & Cheong, 2008). Previous research also revealed that instructors who adopted a FCIM were usually open to the predisposition of a traditional instructor-centered, lecture-based instructional model for trying the innovative, student-centered instructional approaches (McCurry & Martins, 2010; Simpson & Richards, 2014; Towle & Breda, 2014; Winquist, 2014). However, the findings of this study conflicted with the previous research. Almost all the items in the original Pedagogical Openness scale were eliminated from EFA. This could be explained by that approximately 40% of the respondents had teaching experience less than 10 years. These respondents were very open to using innovative student-centered, technology-enhanced instructional strategies in instruction. Additionally, other two demographic information questions' responses showed that more than 90% of the respondents reported using multimedia technologies, and more than 90% of the respondents reported using student-centered learning activities. The responses of these two questions also revealed that in general, the respondents in this study had a high level of pedagogical openness.

No previous study had been found that shows the significance of peer support among higher education instructors. The findings of this study aligned with previous research because only one item from the original Peer Support subscale in the original IFCAI instrument was found to correlate strongly with any other items on the instrument and the analysis re-grouped this item with the items in the Facilitation Condition subscale.

This may support previous research that found that peer support among instructors is not a practice that is popular in higher education. Many respondents even had no conception of how the peer support among higher education instructors worked.

Only two items from the original Effort Expectancy subscale were retained in the new IFCAI and these were merged into the new Performance Expectancy subscale and the new Technology Self-efficacy subscale in the new IFCAI instrument. The reasons for why these two items showed high factor loading values in these two new subscales should be examined in future research.

Previous research revealed that instructors' performance expectancy had a positive influence on their decision to adopt technological innovations (Ajjan & Hartshorne, 2008; Kopcha, 2013). Instructors who adopted a FCIM typically had high performance expectancy on improving students' learning performance with adopting this instructional model (Albert & Beaty, 2014; Harvey, 2014; Papadopoulos & Roman, 2010; Touchton, 2015). The findings of this study supported this previous research. The multiple regression analysis results revealed that among the three factors extracted from EFA, Performance Expectancy was the strongest predictor of a higher education instructor's decision to adopt a FCIM. The second strongest predictor was Technology Self-efficacy. The third strongest predictor was Outside Support, but it was not a significantly strong predictor. This multiple regression result shows that according to the respondents, what they are mostly concerned about are whether or not and to what extent a FCIM could improve the instructional performance of their classroom teaching and learning. The results also can provide suggestions to the institutions that plan to enhance instructors' use of innovative instructional approaches. Institutions should help

instructors to understand the benefits of innovative instructional approaches, what these approaches can bring to their classroom instruction, and how they can improve instructors' instructional performance. Thus, the results of this study suggest that institutions should help to enhance instructors' performance expectancy via helping them understand what benefits the innovative instructional approaches can bring to their classroom instruction. Institutions should also help instructors reflect on their own current instruction, and have a conception of how the innovative instructional approaches can solve the problems in their current instruction.

Based on the outcome of this study, the newly revised FAM is a three-factor model that does a good job predicting a higher education instructor's decision to adopt a FCIM. However, more research needs to be done to validate this three-factor model with larger samples and to determine what relationship, if any, might exist between the other three potential factors and an instructor's decision to adopt a FCIM. In other words, more work needs to be done to validate the 3-factor model and further explore the 6-factor model. This additional research should help clarify which of these two models is the better predictor of instructors' adoption decisions regarding a FCIM. Future research should involve a bigger sample from more diverse settings, in order to provide more data on the validity and reliability of the new IFCAI. Items in original Pedagogical Openness subscale and original Peer Support scale may be reworded and still used in future investigations, with the aim of determining whether or not these factors might make critical contributions to determining instructors' adoption decisions of a FCIM. Moreover, the results of this study revealed that higher education instructors' performance expectancy had the strongest predictive ability on their decision to adopt a FCIM. Thus,

future research could involve how to improve higher education instructors' performance expectancy through formal and informal training.

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Appendices

A Screencasts of IFCAI on Qualtrics

THE UNIVERSITY of TENNESSEE UT

Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

INFORMED CONSENT STATEMENT

Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

INTRODUCTION

You are invited to participate in a research study conducted by Taotao Long, a doctoral student in Department of Educational Psychology and Counseling at the University of Tennessee.

INFORMATION ABOUT PARTICIPANTS' INVOLVEMENT IN THE STUDY

As an instructor at UTK, you are invited to participate in an anonymous survey about your current teaching practice and your views on flipped classroom instructional models (FCIM). It will require about 15 minutes. The survey will be anonymous and all your answers will be kept confidential. No names or identifying details will be asked in the survey.

RISKS

There are no foreseeable risks other than those encountered in everyday life. But if you choose not to participate, you will not be penalized in any way. You can also withdraw at any time during the study without penalty.

BENEFITS

No benefit other than helping the researcher better understand a college instructor's decision to adopt a flipped classroom instructional model.

CONFIDENTIALITY

Your responses will be anonymous with no link to your identity. All survey data will be stored securely. No reference will be made in oral or written reports which could link participants to the study.

CONTACT INFORMATION

If you have questions at any time about the study or the procedures, (or you believe you experience adverse effects as a result of participating in this study) you may contact the researcher, Taotao Long, at tlong11@vols.utk.edu, and (865) 974-9881 or her advisor, Dr. Michael Waugh, at waugh@utk.edu. If you have questions about your rights as a participant, contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697.

CONSENT

Please feel free to print a copy of this page for your records if you wish to do so.
If you do not wish to participate in this survey: Simply close your browser.
To affirm your willingness to participate in the survey: Click on the **"NEXT"** button below.

NEXT

THE UNIVERSITY of TENNESSEE UT

Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

DIRECTIONS:
When completing this survey, please think of each statement in relation to your experience in instruction, and indicate to what extent you agree with the statement. Please respond to each item and share your thoughts on how each one relates to your current teaching responsibilities.

A ***Flipped Classroom*** Instructional Model (FCIM) is an instructional strategy in which students learn the subject content before class, typically through instructor-provided short videos and other materials, and come to classroom meetings for practice and active learning experiences, such as solving problems, discussion, and group projects.

In what content field do you teach?

____

Please identify your cultural background.

____

How many years have you taught at the college/university level (e.g., 1)

______

What is your rank?

- ○ Professor
- ○ Associate professor
- ○ Assistant professor
- ○ Adjunct Professor
- ○ Lecturer
- ○ Graduate Teaching Assistant/Associate
- ○ Other, please specify ________

Do you use *multimedia technologies* (*e.g.*, PowerPoint, Keynote, Prezi, Youtube, Khan Academy, Smart board, or others) in your courses?

- ○ Yes
- ○ No

Do you use *Internet-based technologies* (*e.g.*, Dropbox, Google Drive, Onedrive, Discussion Board, Skype, Google Chat, Zoom) in your courses?

- ○ Yes
- ○ No

Do you use *student-centered learning activities* (*e.g.*, discussions, small group work, project-based learning, case study) in your courses?

- ○ Yes
- ○ No

Have you used a Flipped Classroom Instructional Model (FCIM) before?

- ○ Yes
- ○ No

Please select which item best describes you at this time:

- ○ I do not use any aspect of the FCIM in my courses
- ○ I rarely use the FCIM techniques in my courses
- ○ I sometimes use the FCIM techniques in my courses
- ○ I frequently use the FCIM techniques in my courses
- ○ I always use the FCIM in my courses

PREVIOUS NEXT

THE UNIVERSITY of TENNESSEE UT

Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

A ***Flipped Classroom*** Instructional Model (FCIM) is an instructional strategy in which students learn the subject content before class, typically through instructor-provided short videos and other materials, and come to classroom meetings for practice and active learning experiences, such as solving problems, discussion, and group projects.

I am confident I can create multimedia presentations to communicate curriculum content to students (*e.g.,* PowerPoint slides, Prezi).

- ● Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I prefer that my students learn basic subject knowledge by themselves, rather than me teaching directly in class.

- ● Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I think a Flipped Classroom Instructional Model (FCIM) will help me to spend more in-class time on current developments in the subject being taught in the course.

- ● Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

Making learning materials for a flipped classroom course takes too much effort.

- ● Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I have the necessary physical classroom conditions to use a FCIM (*e.g.,* flexible seat arrangement, smart board, Internet access, LCD projector).

- ● Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

Other faculty on campus can help me adopt a FCIM.

- ● Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

PREVIOUS NEXT

Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

A ***Flipped Classroom*** Instructional Model (FCIM) is an instructional strategy in which students learn the subject content before class, typically through instructor-provided short videos and other materials, and come to classroom meetings for practice and active learning experiences, such as solving problems, discussion, and group projects.

I am confident I can locate online multimedia resources to support my instruction (*e.g.*, Youtube videos, Khan Academy videos).

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

In my courses, I prefer lecturing more, with students spending less time in practice-based learning activities.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

I believe a Flipped Classroom Instructional Model (FCIM) will help to increase students' grades.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

Planning learning activities in a FCIM takes too much effort.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I have the necessary technological equipment in my classrooms to use a FCIM.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I am able to use an online learning community to get help with FCIM instruction.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

PREVIOUS NEXT

0% Survey Completion 100%

Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

A ***Flipped Classroom*** Instructional Model (FCIM) is an instructional strategy in which students learn the subject content before class, typically through instructor-provided short videos and other materials, and come to classroom meetings for practice and active learning experiences, such as solving problems, discussion, and group projects.

I am confident I can design learning activities that integrate technology and course content for my students.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

I am open to learning more about new teaching strategies.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

I think a Flipped Classroom Instructional Model (FCIM) will help to increase students' learning motivation.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

In a FCIM, it is easy for first-time students to understand new responsibilities.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

I feel comfortable asking other faculty members to help me with my instruction.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

My institution offers training that can help me use a FCIM.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

PREVIOUS NEXT

0% Survey Completion 100%

Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

A ***Flipped Classroom*** Instructional Model (FCIM) is an instructional strategy in which students learn the subject content before class, typically through instructor-provided short videos and other materials, and come to classroom meetings for practice and active learning experiences, such as solving problems, discussion, and group projects.

I am confident I can facilitate students' use of online tools to share learning materials with other students (*e.g.,* Dropbox, Onedrive, Google Drive, Discussion Board).

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

I am open to my students' use of new technologies (*e.g.,* Internet, Smart Phones, Youtube, Wikipedia, Social Media) for learning content in my field.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

I think other instructional models (*e.g.,* problem-based learning, game-based learning, service learning) can help students to apply what they learned more effectively THAN a Flipped Classroom Instructional Model (FCIM).

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

It is difficult to engage students in learning tasks in a FCIM.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

My institution provides multimedia instructional resources to support a FCIM.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

I feel comfortable in sharing my teaching practices with other faculty members.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

PREVIOUS NEXT

0% Survey Completion 100%

Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

A ***Flipped Classroom*** Instructional Model (FCIM) is an instructional strategy in which students learn the subject content before class, typically through instructor-provided short videos and other materials, and come to classroom meetings for practice and active learning experiences, such as solving problems, discussion, and group projects.

I am confident I can help students to communicate with each other through online tools (*e.g.*, Discussion Board, Blog).

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I am open to learning more about integrating technologies in my classroom teaching.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I believe a Flipped Classroom Instructional Model (FCIM) will improve students' problem-solving skills.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I think it will take too much time to make the learning materials for a flipped classroom course.

- ◯ Strongly Disagree
- ◯ Disagree
- ◯ Unsure
- ◯ Agree
- ◯ Strongly Agree

My institution offers technical support for instructors using a FCIM.

- ◯ Strongly Disagree
- ◯ Disagree
- ◯ Unsure
- ◯ Agree
- ◯ Strongly Agree

I feel comfortable having other instructors observe my teaching.

- ◯ Strongly Disagree
- ◯ Disagree
- ◯ Unsure
- ◯ Agree
- ◯ Strongly Agree

PREVIOUS NEXT

0% Survey Completion 100%

Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

A ***Flipped Classroom*** Instructional Model (FCIM) is an instructional strategy in which students learn the subject content before class, typically through instructor-provided short videos and other materials, and come to classroom meetings for practice and active learning experiences, such as solving problems, discussion, and group projects.

I am confident I can use online tools to engage students in collaborative group learning.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I think a Flipped Classroom Instructional Model (FCIM) will help students to show their content-related creativity in class.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I feel a FCIM will help students to develop group-work skills.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

After the development and initial use of FCIM material, the effort required to teach using a FCIM will decrease.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

My institution offers instructional design support for the development of FCIM courses.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

I believe I can learn more about new teaching methods from other faculty members.

- Strongly Disagree
- Disagree
- Unsure
- Agree
- Strongly Agree

PREVIOUS NEXT

0% Survey Completion 100%

Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

A ***Flipped Classroom*** Instructional Model (FCIM) is an instructional strategy in which students learn the subject content before class, typically through instructor-provided short videos and other materials, and come to classroom meetings for practice and active learning experiences, such as solving problems, discussion, and group projects.

I am confident I can communicate effectively with students with online tools other than email (*e.g.*, Blackboard, Wiki, Google Document).

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I believe a Flipped Classroom Instructional Model (FCIM) will help improve students' critical thinking skills.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I think a FCIM will help students to locate needed information to extend learning.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I am confident I can facilitate students' use of online tools for sharing learning materials with other students (e.g., Dropbox, Google Drive, Onedrive, Discussion Boards).

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

I am confident I can use technology to encourage students to help one another in the learning process.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

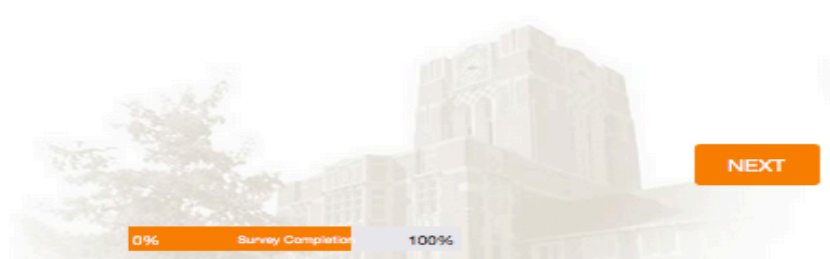
I believe that instructional models other than FCIM can better help to increase students' interest in learning.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

It is a challenge to make students complete the pre-class learning assignment in a course that uses a FCIM.

- ○ Strongly Disagree
- ○ Disagree
- ○ Unsure
- ○ Agree
- ○ Strongly Agree

PREVIOUS NEXT



Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

A ***Flipped Classroom*** Instructional Model (FCIM) is an instructional strategy in which students learn the subject content before class, typically through instructor-provided short videos and other materials, and come to classroom meetings for practice and active learning experiences, such as solving problems, discussion, and group projects.

I am comfortable with the idea of using a Flipped Classroom Instructional Model (FCIM).

- Extremely comfortable
- Somewhat comfortable
- Neither comfortable nor uncomfortable
- Somewhat uncomfortable
- Extremely uncomfortable

I believe a FCIM is better than other instructional approaches I have used in past.

- Strongly Disagree
- Disagree
- Not sure
- Agree
- Strongly Agree

I need to know more about FCIM.

- Strongly Disagree
- Disagree
- Not sure
- Agree
- Strongly Agree

I think I can coordinate the use of FCIM with my current assigned work load.

- ○ Strongly Disagree
- ○ Disagree
- ○ Not sure
- ○ Agree
- ● Strongly Agree

I am interested in learning more about the FCIM.

- ○ Strongly Disagree
- ○ Disagree
- ○ Not sure
- ○ Agree
- ○ Strongly Agree

PREVIOUS NEXT

0% Survey Completion 100%

Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

A ***Flipped Classroom*** Instructional Model (FCIM) is an instructional strategy in which students learn the subject content before class, typically through instructor-provided short videos and other materials, and come to classroom meetings for practice and active learning experiences, such as solving problems, discussion, and group projects.

I believe that using a Flipped Classroom Instructional Model (FCIM) will benefit my students' learning.

- ○ Strongly Disagree
- ○ Disagree
- ○ Not sure
- ○ Agree
- ○ Strongly Agree

I am planning to use a FCIM in one or more of my classes in future.

- ○ Strongly Disagree
- ○ Disagree
- ○ Not sure
- ○ Agree
- ○ Strongly Agree

I will recommend FCIM to other faculty members.

- ○ Strongly Disagree
- ○ Disagree
- ○ Not sure
- ○ Agree
- ○ Strongly Agree

I am interested in increasing the use of FCIM at my institution.

- Strongly Disagree
- Disagree
- Not sure
- Agree
- Strongly Agree

I am interested in working with my institution to improve the use of FCIM in teaching on campus.

- Strongly Disagree
- Disagree
- Not sure
- Agree
- Strongly Agree

PREVIOUS NEXT

0% Survey Completion 100%

Survey of Issues Related to Higher Education Instructors' Views on Potential Use of a Flipped Classroom Instructional Model (FCIM)

A ***Flipped Classroom*** Instructional Model (FCIM) is an instructional strategy in which students learn the subject content before class, typically through instructor-provided short videos and other materials, and come to classroom meetings for practice and active learning experiences, such as solving problems, discussion, and group projects.

How do you feel about using a Flipped Classroom Instructional Model (FCIM) to teach courses in your academic field?

What do you think might be the greatest benefit associated with using a FCIM?

What do you think might be the greatest problem associated with using a FCIM?

Please share any problems or challenges you face that might prevent you from adopting or using a FCIM for your teaching.

PREVIOUS NEXT

0% Survey Completion 100%

B IFCAI Prior to Pilot Study

Survey on Higher Education Instructors' Decision to Adopt a FCIM

DIRECTION:
When completing this survey, please think of each item in relation to your teaching experience, and indicate to what extent you agree with the item. Please respond to each item and share your thoughts on how each one relates to your current teaching responsibilities.

Flipped Classroom is an instructional model in which students learn the subject content before class typically through instructor-provided short videos or other materials, and come to classroom meetings for practice, such as solving problems, discussion, and group projects.

SECTION 1 *[This section is used to collect participants' demographic information.]*

1. What content area do you teach? _____________

2.Which of the following cultural background best describes you? American African East Asian South Asian European None above, please specify ________________________

3. How many years have you taught at college/university level (*e.g.* 1) _______

4. What is your rank? Professor Associate professor Assistant professor Adjunct Professor Lecturer Graduate Teaching Assistant/Associate

5. Do you use *multimedia technologies* (*e.g.* PowerPoint, Keynote, Prezi, Youtube, Khan Academy, Smartboard, or others) in your courses? Yes No

6. Do you use *Internet-based technologies* (*e.g.* Dropbox, Google Drive, Onedrive, Discussion Board, Skype, Google Chat, Zoom) in your courses? Yes No

7. Do you use *student-centered learning activities* (*e.g.* discussions, small group work, project-based learning, case study) in your classroom? Yes No

8. Have you used a Flipped Classroom Instructional Model (FCIM) before? Yes No

9. Please select which item best describes you at this time:
I do not use any aspect of the FCIM in my classroom.
I rarely use the FCIM techniques in my classroom.
I sometimes use the FCIM techniques in my classroom,
I frequently use the FCIM techniques in my classroom.

I always use the FCIM in my classroom.

Please rate each of the following statements on the following 1-5 scale:
1 = Strongly Disagree
2 = Disagree
3 = Unsure
4 = Agree
5 = Strongly Agree

SECTION 2
[Sub-scale 1: Technology Self-efficacy
This scale contains the items for participants to have a self-report on the degree to which they believe they are confident on teaching with technology.]

1. I am confident I can create multimedia presentations to communicate curriculum content to students (*e.g.,* PowerPoint slides, Prezi).

2. I am confident I can locate online multimedia resources to support my instruction (*e.g.,* Youtube video, Khan Academy videos).

3. I am confident I can design learning activities that integrate technology and course content for my students.

4. I am confident I can facilitate students' use of online tools to share learning materials with other students (*e.g.,* Dropbox, Onedrive, discussion board).

5. I am confident I can help students communicate with one another through online tools (*e.g.,* discussion board).

6. I am confident I can use online tools to engage students in collaborative group learning.

7. I am confident I can communicate with students using online tools other than email (*e.g.,* Blackboard, Wiki, Google document).

8. I am confident I can use technology to encourage students to help one another in the learning process.

SECTION 3
[Sub-scale 2: Openness to Change
This sub-scale contains the items for participants to have a self-report on the degree to which they believe that they can take the risks of predisposing for trying new instructional approaches, such as student-centered learning activities, and self-directed learning strategies.]

9. I prefer that my students learn basic subject knowledge by themselves, rather than me teaching directly in class.

10. In class, I prefer lecturing more, with students spending less time in practice-based learning activities.

11. I am open to learning more about new teaching strategies.

12. I am open to my students' use of new technologies in learning.

13. I am open to learning more about integrating technologies in my class.

SECTION 4
[Subscale 3: Performance Expectancy
This sub-scale contains the items for participants items for participants to have a self-report on the degree to which they believe a FCIM can make their instruction more effective.]

14. I think a FCIM will help me to spend more time in class on current developments in the class subject.

15. I believe a FCIM will help to increase students' grades.

16. I think a FCIM will help to increase students' learning motivation.

17. I think other instructional models can help students to apply what they learned more effectively.

18. I believe a FCIM will improve students' problem-solving skills.

19. I think a FCIM will help students to show their content-related creativity in class.

20. I believe a FCIM will help improve students' critical thinking skills.

21. I feel a FCIM will help students to develop group work skills.

22. I think a FCIM will help students to locate needed information to extend learning.

23. I believe other instructional models can better help to increase students' interest in learning.

24. It is a challenge to make students complete the pre-class learning assignment in a course that uses a FCIM.

SECTION 5
[*Sub-scale 4: Effort Expectancy*

The items in this sub-scale are for participants to have a self-report on the degree to which they think a FCIM can save their effort in instruction.]

25. Making learning materials for a flipped classroom course takes too much effort.

26. Planning learning activities in a FCIM takes too much effort.

27. In a FCIM, it is easy for first-time students to understand new responsibilities.

28. It is difficult to engage students in learning tasks in a FCIM.

29. I think it will take too much time to make the learning materials for a flipped classroom course.

30. After the development and initial use of FCIM material, the effort required to teach using a FCIM will decrease.

SECTION 6
[Sub-scale 5: Facilitation Condition
The items in this sub-scale are used for participants to have a self-assessment on

the degree to which they believe on the existence of facilitation conditions which can help them to use a FCIM.]

31. I have the necessary physical classroom conditions to use a FCIM (*e.g.,* flexible seat arrangement).

32. I have the necessary technological equipment in my classrooms to use a.

33. My institution offers training that can help me use a FCIM.

34. My institution provides multimedia instructional resources to support a FCIM.

35. My institution offers technical support for instructors using a FCIM.

36. My institution offers instructional design support for the development of FCIM courses.

SECTION 7
[Sub-scale 6: Peer Support
This sub-scale contains the items for participants to have a self-assessment on the degree they believe on the existence of the peer assistance among instructors on helping them to use a FCIM.

37. Other faculty on campus can help me adopt a FCIM.

38. I am able to use an online learning community to get help with instruction.

39. I feel comfortable asking other faculty members to help me with my instruction.

40. I feel comfortable in sharing my teaching practice with other faculty members.

41. I feel comfortable having other instructors observe my teaching.

42. I believe I can learn more about new teaching methods from other faculty members.

43. I believe I can improve my teaching through communicating with other faculty members.

SECTION 8

[These items are used to address the dependent variable and to assess participants' acceptance to the flipped classroom, they are 5 point Likert scale items: 1 = Strongly Disagree 2 = Disagree 3 = Unsure 4 = Agree 5 = Strongly Agree]

44. I am comfortable with the idea of using a FCIM.

45. I believe a FCIM is better than my current instructional approach.

46. I need to know more about FCIM.

47. I think I can coordinate the use of FCIM with my current assigned work load.

48. I am interested in learning more about the FCIM.

49. I believe FCIM will benefit my students' learning.

50. I am planning to use a FCIM in one or more of my classes in future.

51. I will recommend FCIM to other faculty members.

52. I am interested in increasing the use of FCIM at my institution.

53. I am interested in working with my institution to improve the FCIM.

[Open-ended questions]
54. How do you feel about using a FCIM to teach courses in your academic field?
____

55. What do you think might be the greatest advantage of using a FCIM?
____

56. What do you think might be the greatest problem of using a FCIM?
____

57. What challenges do you perceive in your adoption of a FCIM?
____

C Invitation Email to the Participants

Subject: Survey of Teaching Practices

Body:
The Tennessee Teaching and Learning Center invites you to participate in a short survey (approximately 15 minutes) about selected aspects of your teaching practices and your views on flipped classroom approaches to teaching at the college/university level. The information provided by the survey will help the TennTLC better meet your needs as teaching faculty and will also support the ongoing research of a PhD student who is interested in Flipped Classroom Instructional Model. Your thoughts and views about teaching university students are important. Please take a few minutes to share them with us.

Please click HERE to begin the survey process. Thank you for your time and support.

[A Flipped Classroom Instructional Model (FCIM) is an instructional strategy in which students learn the subject content before class, typically through instructor-provided short videos and other materials, and come to classroom meetings for practice and active learning experiences, such as solving problems, discussion, and group projects.]

Tennessee Teaching and Learning Center
618 Greve Hall 618, 821 Volunteer Blvd
865-974-3933

D Informed Consent Statement

INFORMED CONSENT STATEMENT

Using A FCIM in Higher Education: Instructor's Perspectives

INTRODUCTION

You are invited to participate in a research study conducted by Taotao Long, a doctoral student in Department of Educational Psychology and Counseling at the University of Tennessee.

INFORMATION ABOUT PARTICIPANTS' INVOLVEMENT IN THE STUDY

As an instructor at UTK, you are invited to participate in an anonymous survey about your decision to use a Flipped Classroom Instructional Model (FCIM). It will require about 20-30 minutes. The survey will be anonymous and all your answers will be kept confidential. No names or identifying details will be asked in the survey.

RISKS

There are no foreseeable risks other than those encountered in everyday life. But if you choose not to participate, you will not be penalized in any way. You can also withdraw at any time during the study without penalty.

BENEFITS

No benefit other than helping the researcher better understand a college instructor's decision to adopt a FCIM.

CONFIDENTIALITY

Your responses will be anonymous with no link to your identity. All survey data will be stored securely. No reference will be made in oral or written reports which could link participants to the study.

To participate, please click the link to the survey BELOW. If you don't wish to continue, just close your browser.

CONTINUE to the survey *[a link to the survey in Appendix A]*

Thank you for your consideration and time.

CONTACT INFORMATION

If you have questions at any time about the study or the procedures, (or you believe your experience adverse effects as a result of participating in this study,) you may contact the researcher, Taotao Long, at tlong11@vols.utk.edu, and (865) 974-9881 or her advisor, Dr. Michael Waugh, at waugh@utk.edu. If you have questions about your rights as a participant, contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697.

E New IFCAI Organization

Subscale	Item
Subscale 1: Performance Expectancy	FCIM38 I believe a Flipped Classroom Instructional Model (FCIM) will help improve students' critical thinking skills FCIM27 I believe a FCIM will improve students' problem-solving solving skills FCIM32 I think a FCIM will help students to show their content-related creativity FCIM15 I think a FCIM will help to increase students' learning motivation FCIM33 I feel a FCIM will help students to develop group-work skills. FCIM39 I think a FCIM will help students to locate needed information to extend learning. FCIM9 I believe a FCIM will help to increase students' grades. FCIM3 I think a FCIM will help me to spend more in-class time on current developments in class subject FCIM22 It is difficult to engage students in learning tasks in a FCIM. FCIM42 I believe that instructional models other than FCIM can better help to increase students' interest
Subscale 2: Technology Self-efficacy	FCIM31 I am confident I can use online tools to engage students in collaborative group learning. FCIM41 I am confident I can use technology to encourage students to help one another in the learning process FCIM25 I am confident I can help students to communicate with each other through online tools (e.g., Discussion board) FCIM40 I am confident I can facilitate students' use of online tools for sharing learning materials with students (e.g. Dropbox, Onedrive, discussion board) FCIM13 I am confident I can design learning activities that integrate technology and course content for my students FCIM20 I am open to my students' use of new technologies (e.g., Internet, Smart Phones, Youtube video) FCIM37 I am confident I can communicate effectively with students with online tools other than email (e.g. discussion board) FCIM7 I am confident I can locate online multimedia resources to support my instruction (e.g., Youtube video, Khan Academy video) FCIM4 Making learning materials for a flipped classroom course takes too much effort.
Subscale 3: Outside Support	FCIM29 My institution offers technical support for instructors using a FCIM. FCIM35 My institution offers instructional design support for the development of FCIM courses. FCIM23 My institution provides multimedia instructional resources to support a FCIM. FCIM18 My institution offers training that can help me use a FCIM. FCIM6 Other faculty on campus can help me adopt a FCIM.

F The Items Retained and Eliminated from Original IFCAI

Subscale	Item	Retained (Y/N)
Subscale 1: Technology Self-efficacy	FCIM 1 I am confident I can create multimedia presentations to communicate curriculum content to student(e.g., PowerPoint slides, Prezi).	N
	FCIM 7 I am confident I can locate online multimedia resources to support my instruction (e.g., Youtube video, Khan Academy videos).	Y
	FCIM 13 I am confident I can design learning activities that integrate technology and course content for my students	Y
	FCIM 25 I am confident I can help students to communicate with each other through online tools (e.g., Discussion Board)	Y
	FCIM 31 I am confident I can use online tools to engage students in collaborative group learning.	Y
	FCIM 40 I am confident I can facilitate students' use of online tools to share learning materials with other students (e.g., Dropbox, Onedrive, discussion board).	Y
	FCIM 37 I am confident I can communicate effectively with students with online tools other than email ((e.g., Blackboard, Wiki, Google document).	Y
	FCIM 41 I am confident I can use technology to encourage students to help one another in the learning process	Y
Subscale 2: Pedagogical Openness	FCIM 2 I prefer that my students learn basic subject knowledge by themselves, rather than me rather than me teaching directly in class.	N
	FCIM 8 In my courses, I prefer lecturing more, with students spending less time in practice-based learnining activities.	N
	FCIM 14 I am open to learning more about new teaching strategies.	N
	FCIM 20 I am open to my students' use of new technologies (e.g., Internet, Smart Phones, Youtube, Wikipedia) in learning	Y
	FCIM 26 I am open to learning more about integrating technologies in my classroom teaching.	N
Subscale 3: Performance Expectancy	FCIM 3 I think a Flipped Classroom Instructional Model (FCIM) will help me to spend more in-class time on current developments in the class subject.	Y
	FCIM 9 I believe a Flipped Classroom Instructional	N

	Model (FCIM) will help to increase students' grades.	
	FCIM 15 I think a Flipped Classroom Instructional Model (FCIM) will help to increase students' learning motivation	Y
	FCIM 21 I think other instructional models (e.g., problem-based learning, game-based learning, service learning) can help students to apply what they learned more effectively.	N
	FCIM 27 I believe a Flipped Classroom Instructional Model (FCIM) will improve students' problem-solving solving skills	Y
	FCIM 32 I think a Flipped Classroom Instructional Model (FCIM) will help students to show their content-related creativity	Y
	FCIM 33 I feel a FCIM will help students to develop group-work skills.	Y
	FCIM 38 I believe a Flipped Classroom Instructional Model (FCIM) will help improve students' critical thinking skills	Y
	FCIM 39 I think a FCIM will help students to locate needed information to extend learning.	Y
	FCIM 42 I believe that instructional models other than FCIM can better help to increase students' interest	Y
Subscale 4: Effort Expectancy	FCIM 4 Making learning materials for a flipped classroom course takes too much effort.	Y
	FCIM 10 Planning learning activities in a FCIM takes too much effort.	N
	FCIM 16 In a FCIM, it is easy for first-time students to understand new responsibilities.	N
	FCIM 22 It is difficult to engage students in learning tasks in a FCIM.	Y
	FCIM 28 I think it will take too much time to make the learning materials for a flipped classroom course.	N
	FCIM 34 After the development and initial use of FCIM material, the effort required to teach using a FCIM will decrease	N
	FCIM 43 It is a challenge to make students complete the pre-class learning assignment in a course that uses a FCIM	N
Subscale 5: Facilitation Condition	FCIM 5 I have the necessary physical classroom conditions to use a FCIM (e.g., flexible seat arrangement)	N
	FCIM 11 I have the necessary technological equipment in my classrooms to use a FCIM.	N
	FCIM 18 My institution offers training that can help me use a FCIM.	Y

	FCIM 23 My institution provides multimedia instructional resources to support a FCIM.	Y
	FCIM 29 My institution offers technical support for instructors using a FCIM.	Y
	FCIM 35 My institution offers instructional design support for the development of FCIM courses.	Y
Subscale 6: Peer Support	FCIM 6 Other faculty on campus can help me adopt a FCIM.	Y
	FCIM 12 I am able to use an online learning community to get help with FCIM instruction.	N
	FCIM 17 I feel comfortable asking other faculty members to help me with my instruction.	N
	FCIM 24 I feel comfortable in sharing my teaching practices with other faculty members.	N
	FCIM 30 I feel comfortable having other instructors observe my teaching.	N

Vita

Taotao Long was born in Wuhu, Anhui, China. She obtained a Bachelor of Science degree from Central China Normal University in June 2007 in Instructional Technology. After graduation, she accepted a graduate teaching assistantship at Beijing Normal University, Beijing, China, in the master program in Instructional Technology. Taotao graduated with a Master of Science degree in Instructional Technology in June 2010. She got enrolled at The University of Tennessee, Knoxville, to pursue her Doctor of Philosophy degree at the Department of Educational Psychology and Counseling in August 2010. She worked as a graduate teaching assistant at the Department of Educational Psychology and Counseling and a graduate research assistant at the Educational Advancement Program. During her Ph.D. program, she proposed and completed a series of research projects about student-centered, active learning approaches. Taotao graduated with a Doctor of Philosophy degree in education in August 2016.