12-2022

The Role of Instructor Presence and Class Size in Promoting Engagement Among Adults Pursuing Undergraduate Degrees Online: A preregistered study.

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The Role of Instructor Presence and Class Size in Promoting Engagement Among Adults Pursuing Undergraduate Degrees Online: A preregistered study.

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Education in Adult and Lifelong Learning.

by

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December 2022
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Abstract

Adult learners who pursue undergraduate degrees online are an understudied group who have characteristics that separate them from traditional younger students or graduate students who might be the same age. These characteristics could give them a different experience in online courses. Do adult learners experience instructor presence in a way that makes them engage in their courses more? Is that measurable by a validated measurement of student engagement? This preregistered study seeks to answer how the student engagement of adult learners seeking an undergraduate degree in a 100% online environment is effected by the presence of the instructor. The data analysis examines instructor directed facilitation with individual students as well as the whole class and correlates that with the results of the Online Student Engagement Scale created by M. D. Dixson.

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CHAPTER 1: INTRODUCTION

Introduction

Student engagement is important to learning in the classroom and in online classes. Student engagement can be expressed as the psychological effort that the student puts into learning the course material (Pascarella & Terenzini, 2005). For some online learners, however, it is not so simple. Adult learners experience online learning differently than more traditional students as a result of additional circumstances in their lives that compete for their attention (Hardin, 2008). Often, they have full-time jobs, dependents, and other commitments that limit the amount of effort they can devote to a class.

An important influence on adult learners' engagement online is instructor presence. Instructor presence online is expressed through the design of the course and the directed facilitation of the material (Shea et al., 2006). Displaying presence in an online course takes considerable planning and work. Communication, feedback, intellectual mentoring, and modeling problem solving skills are some of the ways an instructor shows presence (Angeli et al., 2003; Leslie, 2019; Metz, 2011; Pawan et al., 2003). Student perceptions of instructor presence correlate with high levels of student satisfaction (Park & Kim, 2020). Increasing the amount of interaction between instructors and students has a positive impact on engagement and retention (Gay & Betts, 2020). Instructor presence and interaction with students are important pieces in the success of online students (Kent, 2013).

Research on class size in university settings has shown that class size can affect the amount of interaction between the instructor and students online (Taft et al., 2019). Bettinger and Long (2018) tracked 60,000 freshmen university students, controlling for selection bias, and found that an increase in class size increased the dropout rate. What can be done to keep students

in the classes and keep them engaged? Bandura (1971) said that most learning comes from observing others. Modeling the behaviors and actions of others is a much more efficient way to learn then trial and error. If the instructor demonstrates presence in the course, does it increase the engagement of adult students? And if so, how might class size effect this relationship? This proposed study seeks to investigate the role of instructor presence and class size in promoting engagement among adults pursuing undergraduate degrees online from the University of Arkansas.

In this chapter, I outline the importance of instructor presence and student engagement in online courses, and how both support student success in an educational setting. I highlight why adult learners are different than other student groups and why they should be studied independently. I also address why class size was chosen as a moderator for this study. Then I define important concepts associated with this study. After explaining the questions that guide this study, I will conclude with a discussion of the scope and limitations.

Background of Study

According to the U.S. National Center for Education Statistics in 2016, there were nearly eight million nontraditional (24 years of age and older) undergraduates, and of those, over 42% were in fully online degree programs. The flexibility in time and location of online degrees makes them an appealing opportunity for adults. When an adult decides to earn a degree in higher education, that adult learner has a purpose in mind (Hardin, 2008). With greater numbers of nontraditional students returning to complete a degree, there is a need to accommodate these older students who likely have less time to devote to learning (Romero & Barberà, 2011) than traditional college age students. They have an aspiration to advance themselves that comes from motivations inherent in being an adult, such as recognizing the value of education and the

rewards that come with it (Knowles et al., 1998). The adult learners in this study are nontraditional students seeking an undergraduate degree through 100% online courses at a non-profit, four-year university in the U.S.

Because of life and time constraints, maintaining the engagement of these online adult students is essential. Robertson et al. (2005) found that online students spend more time studying than students in face-to-face classes. Additionally, nontraditional students devote more time to studying on average than traditional students (Krause et al., 2005). Survey evidence from adult learners has shown that engagement is a factor in their perceived success (Hixon et al., 2016). In this study, student engagement will be measured using a validated survey instrument administered near the end of the semester before finals week.

Although an incomplete picture, instructor presence can be primarily thought of as the active things instructors do in their online classes–these actions are familiar to the role of an instructor. Instructors demonstrate presence in their online courses in a variety of ways: through participation with students in discussions (Buelow et al., 2018), or prompt and detailed feedback on assignments (Sheridan & Kelly, 2010), or even recorded video lectures (d'Alessio et al., 2019; Scagnoli et al., 2019). Two additional common methods are through private communication and visiting one-on-one during office hours (Cuseo, 2018) in person or virtually. Instructor presence data will be collected during the semester that the courses are offered using indicators mentioned above and by Anderson et al. (2001) and Shea et al. (2006) such as, modeling the thinking processes and guiding student focus.

The amount of time an instructor has to devote to students in a particular course is affected by the number of students enrolled. Mandernach and Holbeck (2016) found three categories of tasks are involved in teaching online: "interacting with students, evaluating

student's work, and lecture prep/modification to course" (p. 12). Of the three, they found that the most time is spent on grading and feedback on assignments. Their conclusions support similar findings by Van de Vord and Pogue (2012). From those findings, it is easy to see how increasing the number of students could decrease the time that an instructor has to be present and engage by increasing the amount of student work to be evaluated. Additionally, increasing class size is one of the barriers to providing timely and quality feedback as reported by a survey of instructors (Conrad, 2016).

The benefits for instructors interacting with smaller classes not only impact the instructor but the students as well. Some of the benefits of smaller classes are increased interaction between instructors and students, greater knowledge of individual students (Blatchford et al., 2003), and increased student participation (Finn et al., 2003). While such findings derive from face-to-face classrooms, it is easy to see how that would extent into the online class. Focusing on the effects of class size in online classes, Taft et al. (2019) performed an extensive literature review and highlighted similar findings: smaller online classes are associated with the ability to utilize teaching methods that are conducive to higher order thinking, student engagement, individualized feedback, and collaborative learning. In this study, class size data for online courses will be collected from the learning management system.

Quantitative research data on adult learner engagement in undergraduate online courses has not been disaggregated from other student data. Undergraduate adult learners have life situations different than traditional undergraduate students or graduate students and should be evaluated as a separate group when it comes to engagement online.

Need and Purpose of the Research

There are many reasons why adult learners pursue undergraduate degrees. The three most often listed reasons in articles are: a) adults have lost their job and feel that a degree will help them in the job market, b) adults acknowledge a need for an additional degree to advance in their career, and c) adults have delayed their pursuit of a bachelor's degree until they had more time (Columbia Southern University, 2019; Limestone University Blog, 2019; Nadworny, 2018). The adult learner will face stressors and situations that traditional students do not face. There are factors that make online classes easier for adult learners to complete an education. Some of those factors are no set class time, no driving to a university, no parking, and no extra childcare cost. Still, there are still additional barriers that nontraditional students must overcome to be successful. Some of those barriers are family and children obligations, maintaining a full-time job, and finding time to study (Hardin, 2008; Rabourn et al., 2018). Consequently, adult learners might find it difficult to succeed in the conventionally structured classroom (Scheg, 2014) even when that is replicated online. The quality and quantity of time adult learners invest in the class affects their performance (Romero & Barberà, 2011).

When students feel engaged, they will put forth more effort to learn (Banna et al., 2015; Martin & Bolliger, 2018). In a survey of traditional and nontraditional students, nontraditional students put more weight on being engaged and supported in the course than traditional students (Hixon et al., 2016). Student engagement is an important factor in student success online (Meyer, 2014). Adult learners value learning activities that require interaction with other students and the content (Hixon et al., 2016). However, while adult students put more value in engagement, with the constraints that adult students often have, they frequently have a problem maintaining engagement in their online courses.

Heller et al. (2010) suggest students view engagement as instructor feedback and interaction, while instructors view engagement in terms of the content and learning outcomes. Heller et al. further describe that there is still some discrepancy as to what constitutes engagement or presence by the instructor. However, other research has shown that when instructors create active learning situations (e.g. projects, group work, solving problems, and experiential learning (Meyer, 2014)) and intentional communication (e.g. individual emails, detailed feedback (Dixson et al., 2017)), those features help students feel engaged in the course (Dixson, 2010). Students perceive that an effort has been made by the instructor to be present. Students experience instructor presence in the course through course design, choice of material, communication, interactions, and directed facilitation that only a subject matter expert could produce (Anderson, 2004; Garrison et al., 1999; Garrison & Cleveland-Innes, 2005; Rourke et al., 2001; Shea et al., 2006).

Instructor presence and interactions with students can be affected by the number of students in the course. Harfitt and Tsui (2015) interviewed students in large and small enrollment language classes and the students reported that there were more occasions to ask questions and a "more engaging learning environment" (p. 853) in small enrollment courses. Interestingly, when studying the effects of class size in online courses, Bettinger et al. (2015) found no apparent effect on learning. However, the differences between what Bettinger et al. considered large was 34 students on average as compared to small classes having 31 students. After reviewing 58 journal articles, Taft et al. (2019) were able to generalize the suggested enrollments in online to "small (≤ 15)," "medium (24–30)" and "large (40+)" with additional gradients in between those numbers (p. 222). The research by Taft et al. are discussed more thoroughly in chapter two. After

searching the literature for further clarification, there was no discrete definition as to what was considered small versus large enrollment in online courses.

Further supporting the idea that as class size increases there is a negative effect on instructor presence, Lowenthal et al. (2019) interviewed 37 faculty teaching courses online with enrollments of 30 or more students. They argued that communication and assessment in high enrollment courses are two of the four major challenges in teaching effectively in online classes with large numbers of students. This implies that instructor presence and interaction are negatively affected with a medium or large number of students enrolled, and the effects could be greater as enrollment increases.

Supporting the need for this study, no research was found that specifically addressed this group of online, nontraditional, undergraduate students and the effect of instructor presence on their engagement. Student engagement is desirable as it is one of the factors that leads to student success. Hixon et al. (2016) determined that the design of the course influenced how nontraditional students perceive the quality of the course. But that is only half of instructor presence. The other half is how the instructor interacts with the students (Shea et al., 2006). This study will quantitatively determine if current instructor presence practices influence student engagement for adult online learners pursuing an undergraduate degree. This study will inform course designers, instructors, and policy makers to ensure that effective design and facilitation methods are used when addressing this growing group of students. Additionally, this study will test the current practice against a population whose data have not been disaggregated in other studies or not studied at all.

Definitions

Adult Learner – In the context of this study, the term *adult learner* will be considered synonymous with nontraditional student. The National Center for Education Statistics define nontraditional students as being 24 years of age or older (NCES, n.d.). The NCES makes the case that nontraditional status should be more precisely defined on a scale as possessing 1–4 characteristics of being nontraditional. Those characteristics include: "delayed enrollment, part-time attendance, being independent, working full time while enrolled, having children, being a single parent, or being a recipient of a GED or high school completion certificate" (NCES, n.d., p. 1). Since the study takes place at the U of A, I will use the definition and data acquired from the Global Campus (2021). The Global Campus is the academic unit in charge of developing and managing the online courses for the university. The age of 24 and older is the demarcation of nontraditional used in this study.

Learning Management System (LMS) – An LMS is software system that securely hosts and delivers learning content to learners online (Berking & Gallagher, 2015). The LMS is usually accessed via a web browser. The LMS at the University of Arkansas at the time of this research is Blackboard 9.1 SaaS, Version Build: 3500.0.6-rel.16+7744aa6. (*This will likely change by the time I perform data collection.*)

Class Size – Class size is defined as the number of students enrolled in one particular course (Taft et al., 2019) as listed in the student information system of the university. One course could have two or more sections, but those sections are merged into one course in the LMS so that the instructor will interact with all students through that one course instance.

Instructor Presence – In online courses, *instructor presence* is described as the interactions that the instructor has with students. I use the two components of instructor presence

as described by Shea et al. (2006): design and directed facilitation. Design is how the course materials and assessments are visually and functionally arranged in the LMS.

Directed Facilitation – Shea et al. showed that directed facilitation is all of the interactions, communications, and direct instructions manifested by the instructor that help teach the students. It is what instructors "do" (2006, p. 176) throughout the semester. I address two aspects of directed facilitation: interactions with individual students and interactions with the whole class. Some students could receive more individual interactions with the instructor and that could make a difference in their engagement.

Online Education – Online education uses computers and the Internet as the method of transmitting learning materials and gathering assignments. An online course usually has no synchronous and/or face-to-face meetings and is a "course where most or all of the content is delivered online" (Allen et al., 2016, p. 7). Online education is a subset of distance education. Kentnor defines distance education as, "a method of teaching where the student and teacher are physically separated" (2015, p. 22). Distance education in the U.S. has been occurring since the first organized system for sending mail and parcels was developed in the early 1700s (Kentnor, 2015).

Student Engagement – In the research that validates the Online Student Engagement Scale (OSE), (see Appendix A) Dixson (2015) defines student engagement as:

> Engagement involves students using time and energy to learn materials and skills, demonstrating that learning, interacting in a meaningful way with others in the class (enough so that those people become "real"), and becoming at least somewhat emotionally involved with their learning (i.e., getting excited about an idea, enjoying the learning and/or interaction). Engagement is composed of individual attitudes, thoughts, and behaviors as well as communication with others. Student engagement is about students putting time, energy, thought, effort, and, to some extent, feelings into their learning. (p. 4)

Research Questions

This study addresses the following research questions.

Primary Research Questions:

1. For adult learners in online courses at the U of A, is there a positive relationship between instructor presence and student engagement?
2. Do student engagement scores differ across online courses?

Secondary Research Questions:

1. Does increased instructor directed facilitation with an individual student increase that adult student's engagement after controlling for instructor directed facilitation with the whole class?
2. Does increased instructor directed facilitation with the whole class increase adult student's engagement after controlling for instructor directed facilitation with an individual student?
3. Does class size influence the relationship between instructor directed facilitation with an individual student and student engagement?
4. Does class size influence the relationship between instructor directed facilitation with the whole class and student engagement?

Scope and Limitations

The scope of this research is adult learners enrolled as 100% online students attending undergraduate classes at the University of Arkansas.

One limiting factor is that the online instructors asked to participate are aware of the research plan. Being aware of the study, it is possible that the instructors will increase their presence or alter their usual teaching practices in other ways in the online course. That could be a

threat to internal validity and impact the reliability of the data. However, the implications will be explained to the faculty, and I will request that they do not deviate from their normal teaching methods. Since this study is looking for a relationship between instructor presence and student engagement, an increase in instructor presence could be an aid in highlighting that connection if it exists for adult students online.

Another limitation is that the participating instructors will be responsible for a portion of the data collection. I will ask instructors to self-report individual student interactions, and it is possible that the numbers reported will be biased. Instructors may fail to report some interactions simply through oversight. To address this concern, I will send reminders every two weeks to instructors to ensure the accuracy of their data collection. This is explained further in chapter 3. Some of the instructor directed facilitations with individual students are data that cannot be obtained by observation of the online courses in the LMS.

Certain students are more likely to take surveys and participate in research. This is a potential risk for self-selection bias in the results. Since I cannot include participant data without students' permission, I will attempt to mitigate this issue and increase participation by explaining how the results of this study could benefit other adult learners in the future and by offering students the chance of winning a gift card to incentivize participation.

A further limitation could be the students' motivation. Motivation has been identified in the literature as a factor in an individual student's completion and success in a course (Alarcon & Edwards, 2013). However in this case, adult learners will have a higher level of motivation because they recognize the value and reward of education, and because of their commitment to pursue more education (Knowles et al., 1998). Motivation will not be addressed.

There could also be problems with participant availability and sample size. Adult learners have additional constraints on their time available to devote to learning (Romero & Barberà, 2011). It is possible that after the students consent to participate in the study at the beginning of the semester, they will not complete the survey near the end of the semester. I will attempt to mitigate this concern as well by offering a gift card as an incentive.

An addition limitation is the difference in teaching styles and experience between the instructors in the study. To address this concern, I will use multilevel modeling procedures, which will allow me to partition variance that occurs across classrooms. Using software created to calculate minimum sample sizes for multilevel models, I determined that a minimum number of 30 classes with an average of least 7 adult students per class is needed for sufficient power to conduct this analysis (Bulus et al., 2019).

Summary

This chapter explores the background of adult learners pursuing an undergraduate degree online in a university setting. Adult learners have situations in their lives that make their experience of acquiring a degree in higher education different than traditional students (Romero & Barberà, 2011), and the number of adult learners is growing. In recent data from 2016, the National Center for Education Statistics reported that online students accounted for 42% of the nearly eight million nontraditional students seeking an undergraduate degree, yet they remain an underrepresented group in the literature.

This chapter suggests a relationship between student success and student engagement. Additionally, this chapter illustrates how instructor presence affects student engagement in online courses, despite persistent challenges for students and instructors in maintaining

engagement. One important challenge is class size. These connections and challenges will be made clearer in the literature review.

I make a case for the need to study instructor presence and its effect on the student engagement of adult learners in online courses. The questions guiding this study support the main purpose of this study to determine if there is a positive relationship for adult learners in online courses at the U of A between instructor presence and student engagement.

CHAPTER 2: LITERATURE REVIEW

Introduction

Since 2003, the number of adult learners choosing online education to complete an undergraduate degree has been increasing. In 2016 that number was 3,360,000 (NCES, 2016). While there has been research into methods and practices to make online learning effectual and rewarding for traditional undergraduate (Chickering & Gamson, 1987) and graduate students (Robertson et al., 2005; Fahara & Castro, 2015), little research has focused on how those methods and practices helped or hindered adult learners when they choose to pursue an undergraduate degree online.

Literature was gathered using ERIC, ProQuest, Taylor & Francis Online, and Google Scholar. The first group of search terms used was: online course, online education, online instruction, distance education, distance course, distance instruction, or web-based instruction. The second group was: adult learner, adult student, nontraditional, or non-traditional. The third group was: engage, engagement, participate, participation, or presence. The fourth group was: faculty, instructor, or professor. At least one word or phrase from all four groups had to appear in the search results. An additional constriction on the results was words or phrases from groups three and four had to occur in the text within three words of each other. This helped narrow the topic of the research to include variations of instructor presence.

This chapter places instructor presence and student engagement in the context of prior research and scholarly work relating to this study. This chapter also offers a review and analytical synthesis of relevant literature according to how instructor presence and student engagement have been researched and connected in the past. A gap in the literature regarding adult learners indicates a need for this area of study. Social Learning Theory (SLT) is then

examined and explained as a useful lens to guide the development of research questions and hypotheses.

Conceptual Framework

Instructor Presence

The concept of instructor presence can be traced back to the Seven Principles for Good Practice in Undergraduate Education, written by Chickering and Gamson (1987). To develop the principles they consulted other researchers and experts in education and compiled a list of commonsense practices. They wrote that the model instructor: "(1) Encourages contacts between students and faculty; (2) Develops reciprocity and cooperation among students; (3) Uses active learning techniques; (4) Gives prompt feedback; (5) Emphasizes time on task; (6) Communicates high expectations; and (7) Respects diverse talents and ways of learning" (p. 2). These are general suggestions that predated the more concise definition of online teaching presence later developed by (Garrison et al., 1999).

Two years after Chickering and Gamson, another early thinker in the field of distance education, Moore (1989) conceptualized three types of interaction: learner-content, learner-learner, and learner-instructor. He proposed those interactions as an effort to standardize definitions in the literature regarding learning interactions in distance education. Moore pointed out the importance and necessity of the learner-instructor interaction because the instructor was the subject matter expert who selected the content, modeled and demonstrated skills, guided the students, and assessed if they have learned the required knowledge (1989).

A decade later, Garrison et al. (1999) moved the concept of instructor presence into the Internet age of online teaching and learning. At the time, social constructivism in education was the "interdependence of social and individual processes in the co-construction of knowledge"

(Palincsar, 1998, p. 345) with the teacher as the guiding force behind construction. Garrison et al. expanded the existing social constructivist model of learning and created what they called the Community of Inquiry (CoI). In CoI a group of students led by a teacher worked together to construct knowledge and create meaning. They showed that learning occurs through the interface of three components: "cognitive presence, social presence, and teaching presence" (Garrison et al., 1999, p. 3). They called it "teaching presence" instead of instructor presence because as the CoI took shape, students could also teach other students as the instructor stepped back to a guiding role (1999).

Even though Garrison et al. (1999) made room for the possibility of others taking the lead in the instruction, the research on teaching presence has been conducted with only instructors in the role of teaching presence, not other students. Angeli et al. (2003); Pawan et al. (2003); and Shea et al. (2006) all studied situations that were instructor led. Anderson (2004) made an important addition to previous work with Rourke et al. (2001) by making the distinction that the instructor employed, "subject matter expertise through a variety of forms of direct instruction" (p. 274). Angeli et al. (2003) and Pawan et al. (2003) found similar results that showed that without instructional intervention and guidance the students would not reach a higher level of discovery and meaning making. What was being called teaching presence was actually instructor presence.

In the further development of CoI, Garrison et al. (1999) defined teaching presence as the design and facilitation of all the content that takes place in the online learning situation. In later writings with Anderson et al. (2001), Garrison evolved teaching presence into three components: design, facilitation, and direct instruction. However, the research performed by Shea et al. (2006) later found that facilitation and direct instruction could be condensed into the term "directed

facilitation" (p. 181) resulting in two components of teaching presence (here after *instructor presence*): design and directed facilitation.

The research into instructor presence has grown. Garrison and Cleveland-Innes (2004) surveyed graduate students and found that they primarily had trouble adjusting to how to participate and interact in the online setting. Then Garrison and Cleveland-Innes (2005) looked at how graduate students changed their approach to online courses based on the design and demand of the course. They surmised that it is not merely the number of interactions but the quality of interactions that bring about meaningful learning. They felt that instructor presence supplies the "structure (design) and leadership (facilitation/direction) to establish social and cognitive presence" (2005, p. 144) necessary in the students to accomplish meaningful learning.

More confirmation of the value of instructor presence was found by Wang and Liu (2020). They looked at the effects of instructor presence on student participation and knowledge creation in three different online courses all taught by one experienced online instructor. They found that student participation was increased by course design, organization, and instructor facilitation. Knowledge creation was increased by the instructor's initial facilitation and then a purposeful decrease of interaction to make room for the students to construct knowledge collaboratively.

Garrison et al. (1999), Anderson et al. (2001), and Anderson (2004) found that while planning, organization, and communication establish the baseline for instructor presence, it was the collaboration, self-direction, and learning interactions that brought the students into the cognitive level where meaningful leaning happens. Research by Casey and Kroth (2013) supports those findings. Casey and Kroth (2013) performed qualitative research to explore instructor presence from the faculty point of view. The instructors in their research were

identified by college deans as excellent online instructors, and eight were chosen from accredited universities in the Northwestern part of the United States. All of the instructors taught in either the business or education colleges of their respective universities; the level of the courses taught was not mentioned. The coded interviews by Casey and Kroth were analyzed along with the syllabus from each instructor's class. Four categories emerged: "planning and organization, communication, collaborative work and student self-direction, and learning relationships" (2013, p. 3). Students have come to expect more engagement from online education, and innovative instructors have devised ways to support them (Casey & Kroth, 2013).

As a counter point, Preisman (2014) found little to support the added benefit for the extra work involved for the instructor to make sure that instructor presence was enhanced. Preisman researched her own courses over three semesters to determine if the instructor effort spent adding greater teaching presence would create a benefit for the students. In the study, there were 124 graduate students in an online degree program in a small state college in Nebraska. The research was conducted in two sections of the same course taught over three semesters. Preisman studied why students took online classes. She reviewed other studies that showed instructor presence was frequently not mentioned in the results of student surveys asking why they chose online versus face-to-face. Preisman added extra elements of presence mentioned by Anderson et al. (2001), but did not include the expectation of collaborative knowledge building in the course. Preisman concluded that the extra time and energy did not yield significant results in the measure. Acknowledging the limitations and possible biases of the self-study Preisman (2014) stated, "This research also suggests the need for an instructor to be *present* as opposed to having a *presence*" (p. 13).

While some research did not bear out direct connections between instructor presence and added benefits for students (Casey & Kroth, 2013; McNeill et al., 2019; Preisman, 2014) there was still overall support in the literature for the idea that increased instructor presence was something that benefits student engagement and learning (Baker, 2010; Kyei-Blankson et al., 2019; Wang & Liu 2020; Zhu et al., 2019).

In support of instructor presence were studies like Baker's. Baker (2010) concluded from the survey results of 377 undergraduate and graduate students, that instructor presence was a "significant predictor of student affective learning, cognition, and motivation" (p. 22). Baker collected age data, but did not report it in the study. Additionally, Zhu et al. (2019) used J. W. Pennebaker's participation analysis and the linguistic inquiry word count tool, and S. C. Herring's computer-mediated communication speech act taxonomy to perform a case study of graduate students in an educational technology program. Zhu et al. found a "positive relationship between teaching presence and student-perceived learning, as well as teaching presence and student satisfaction" (p. 15). Also, Kyei-Blankson et al. (2019) collected survey data from ~70 graduate students over the course of four semesters. The survey included the three elements of interaction from Moore (1989) and the three types of presence defined in the CoI. They found that although all six elements were rated positively and students valued them necessary to their learning experience, the three that were most highly rated were: "teaching presence, learner-instructor interaction, and social presence" (p. 16).

Current research lends support for the old adage that no matter where it occurs, even online, *good teaching is good teaching*. Shea et al. (2006) summarized instructor presence as an expression of the choices of material and how it was arranged (design) and the active instructor who guided and corrected the interactions between the students and their material (directed

facilitation). Instructor presence was both passive and active; it was a result of choices made when building the course and the active participation of the instructor during the course.

Student Engagement

Tyler planted the seed of student engagement when he said, "It is what *he* [sic] does that he learns, not what the teacher does" (1949, p. 63). Later Astin's (1984/1999) description of student involvement was very similar to the current definitions of student engagement. He called it an expenditure of physical and psychological effort by the student; it happened on a scale of more or less, not a binary of yes or no; it had measurable and immeasurable features. Astin (1984/1999) looked for a way to describe what happened in the student that affected their learning. As he saw it, there was information going into the students on one side and the assessments happened on the other side, but what was missing was how the input was transformed into the output. Astin called it "student involvement" (1984/1999, p. 518); that term transformed into student engagement. It was the behavioral process in the middle.

As educational research transitioned into the twenty-first century, the definition of student engagement expanded to include a focus toward online learning. Kearsley and Shneiderman (1998) suggested a way to situate student engagement in technology-based education. They said students should engage with other students through using technology in learning activities that are meaningful and worthwhile. Garrison et al. (1999) framed previous versions of student engagement as cognitive presence. In 2001, Garrison et al. defined cognitive presence as "the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry" (p. 11).

Barkley (2010) stepped away from CoI and redefined student engagement as the, "mental state that results from the synergistic interaction between motivation and active learning. This

engagement occurs on a continuum: it starts at the intersection of motivation and active learning, but these two works synergistically and build in intensity" (p. 8). Other researchers like Barkley not directly studying the CoI model, favored a traditional view of student engagement. Groccia, while working with Burns et al. (2004), later with others (Groccia et al., 2012) and then solo, developed a three-pronged model of student engagement consisting of "behavioral, affective, and cognitive levels" (Groccia, 2018, p. 13). The student must put forth effort and determination for the behavioral level. Interest in the topic and motivation to learn were components of the affective level. The cognitive level brought the higher order thinking of reflection and connecting the learning experience to other experiences and knowledge. In the Model of Student Engagement that evolved over the years, these three levels were simply called, "doing, feeling, and thinking" (2018, p. 4). The model also suggested ways in which to engage students with other students, in teaching, in learning, in research, with the faculty and staff, and with the community (Groccia, 2018).

While developing and testing the Online Student Engagement scale, Dixson defined student engagement as:

> students using time and energy to learn materials and skills, demonstrating that learning, interacting in a meaningful way with others in the class (enough so that those people become "real"), and becoming at least somewhat emotionally involved with their learning. (2015, p. 4)

Additionally, Dixson called student engagement "behaviors as well as communication with others" in order to demonstrate their feelings and connections to the learning (2015, p. 4).

While a general definition of student engagement began to emerge from the literature there was more to consider. There were different connotations of student engagement discussed in the literature: engagement in the classroom, engagement outside the classroom, engagement in extracurricular activities and their benefits and detriments (Astin, 1984/1999; Groccia & Hunter,

2012). Another poignant definition came from Pascarella and Terenzini (2005). They clarified student engagement as that which served the academic purpose of the student: psychological engagement. They said that "the more the student is psychologically engaged in activities and tasks that reinforce and extend the formal academic experience, the more he or she will learn" (p. 149).

Martin and Bolliger (2018) surveyed students about what helped them engage in online courses and received interesting results. They asked what strategies, based on Moore's (1989) types of interaction, the students perceived to be important and to identify the most valuable. The survey was given to mostly graduate students in online programs from eight universities in the U.S. The students reported that the learner-to-instructor interactions were the most important. And when asked about teaching strategies that helped them engage, the top five in descending order were: course materials, discussions, instructions and design, instructor feedback, and instructor presence (Martin & Bolliger, 2018, p. 213-214).

Utilizing data gathered by the National Survey of Student Engagement (NSSE), Dixson (2010, 2015) devised, refined, and validated the Online Student Engagement (OSE) scale (see Appendix A). Using the OSE, Dixson was able to go beyond typical satisfaction surveys and course evaluations and get closer to measuring "what students do (actively and in their thought processes) as well as how they feel about their learning and the connections they are making with the content, the instructor, and other students" (2015, p.4). Going forward in this study, when student engagement is mentioned, it will be as Dixson defined it. It is the time, energy, and emotion spent to learn and demonstrate that learning, and to meaningfully interact with others in the class.

In the literature, student engagement was not identified as the theoretical pinnacle of higher order thinking and meaning making, but it is a necessary step toward that goal. If the students are not engaged then they cannot go further. Engagement is where the learning starts.

Class Size

When reviewing the literature on class size there are different conclusions. In face-to-face classroom it seems intuitive that smaller classrooms allow for more instructor-student interactions and better learning outcomes as Harfitt and Tsui (2015) found. They studied the effects of class size on students learning a language in a secondary education in a face-to-face classroom setting. The class sizes were 21–27 for the smaller classes and 37–41 for the larger class sizes. Each teacher taught a small and a large class during the same semester. The researchers gathered data by class observation and multiple interviews with both students and teachers. Their finds revealed that the students in the smaller classes had a stronger sense of community in the class.

From interview data the students in the smaller classes cited "better classroom management, increased opportunities to ask questions, and better relations with their peers and teachers. They also referred to a happier and more engaging learning environment" (Harfitt & Tsui, 2015, p. 853) as reasons for their positive attitude about learning. The coded data showed factors that reinforced the initial response. Those factors were: "a sense of community and group harmony, engagement with learning, peer support and language learning anxiety, students' sense of competence and self-worth, and teacher-student relationships" (Harfitt & Tsui, 2015, p. 853). When considering how much an instructor can interact with the whole class or individual students, the findings of Harfitt and Tsui suggest that the number of students enrolled in that class could be a moderating factor.

Additionally, looking at quantitative data based on final grades as a result of class size, Kokkelenberg et al. (2008) found that after controlling for student demographics and other factors the effect of class size on grades is negative. They looked at all undergraduate students for the semesters between fall 1992 and spring 2004. Their data was one grade per student per course. They removed students who dropped or withdrew. From the total dataset of over 764,000 student grades, they concluded that as enrollment increased student grades went down.

After reviewing the Kokkelenberg et al. (2008) study, Ake-Little et al. (2020) decided to look specifically at race and gender to see if their grades were better or worse in large enrollment classes. They studied a large population of students in face-to-face undergraduate general education courses and collected 172,516 grades over 14 semesters. Looking at race and gender they found that in small class sizes (≤25 students) the under-represented groups had better grades than they did in large class sizes (≥31 students). But at the larger class size there was no significant difference between the grades of the under-represented groups and those of the other students. They suggest that this result could be from the change in pedagogy where instructors change from formative assessment to summative assessments in larger classes to help mitigate the increased grading load.

Looking at only online courses, Taft et al. (2019) performed a review of 58 journal articles that suggested or referenced a number for class size. There was no consensus on the ideal enrollment number. As would be expected, the ideal varied depending on the course from large (potentially hundreds of students) lecture-based foundational freshmen and sophomore classes, to much smaller numbers (20–30) for senior-level major class, and the average graduate class had the smallest number (15>). But these numbers were only guesses based on historical norms. In the final discussion, Taft et al. (2019) created a table of class size numbers matched the

learning needs and pedagogical strategies based on the subset of 18 articles that directly referenced both topics. They recommend the following sizes of online classes be match with the following numbers of students:

Table 1

Online Class Size and Recommended Terminology

Online Class Size	**Number of Students**
Small:	≤ 15
Small–medium:	16–23
Medium:	24–30
Medium–large:	31–39
Large:	40–no upper limit

Note. Reprinted from "One Size Does Not Fit All: Toward an Evidence-Based Framework for Determining Online Course Enrollment Sizes in Higher Education," by S. Taft, K. Kesten, M. El-Banna, 2019, *Online Learning Journal, 23*(3), p. 222 https://doi.org/10.24059/olj.v23i3.1534

What is important to remember is that the class size categories match with a preferred learning need and pedagogical strategy. For example, the small class size allows for constructivist methods of teaching and a high level of instructor presence. But as class size increased, the methods become more objectivist, where assessments become standardized tests, and the faculty presence is minimal. Also consider that in a real teaching situation, there would be no magic tipping point where 30 students allow for some constructivist teaching methods and a moderate level of instructor presence and then with 31 students, constructivism would no

longer be possible and instructor presence would be greatly reduced. The point is that class size could affect the ability of the instructor to manifest presence on a continuum.

Connection Between Instructor Presence, Student Engagement, and Class Size

The connections between instructor presence and student engagement were found throughout the research literature on the topics. Garrison et al. (1999) reviewed results from student surveys, and they found that students have a preference for instructors who demonstrate presence. The Community of Inquiry model (Garrison et al., 1999) that promotes three different kinds of presence (teaching, social, cognitive) postulates that cognitive presence of the students is the goal. It is where the highest level of learning (or meaning making) occurred. But cognitive presence is not an all or nothing measure; there are levels of engagement that lead up to that highest level. In further research on the causal relationship among the three presences, Garrison et al. (2010) stopped short of that highest goal by saying that instructor presence was found to have a "significant influence in facilitating and directing student learning activities" (p. 35). Student engagement must occur before students rise to that higher level. That was echoed in the results from a student survey by Martin and Bolliger (2018) on which they remarked, "Online learners want instructors who support, listen to, and communicate with them" (p. 218). These interactions are how instructors can encourage student engagement.

Additional studies based in surveys, showed that student perceptions of instructor presence corresponded to a perceived higher level of learning and student engagement: Arbaugh and Hwang (2006) surveyed online MBA students with a mean age of 32 years old; Shea et al. (2006) surveyed online students where 60% of them were 26 years and older; Garrison et al. (2010) surveyed online Master's students with no age data collected; Sheridan and Kelly (2010) surveyed 65 students, 81.5% of whom were graduate students; and Martin and Bolliger (2018)

surveyed students with a mean age of 39.6 from freshmen to doctorial students. A strong correlation found by Martin and Bolliger (2018) was that students liked regular communication from their instructors and want instructors who are responsive and encouraging. Students generally wanted and expected instructors to interact and be present in their online courses. If students perceive that the instructor is not present then their engagement will likely drop.

While using a similar method to Anderson et al. (2001) of reviewing coded discussion posts as a way to quantify presence, Zhao and Sullivan (2017) initially came to a different conclusion. They found that in a discussion board as the instructor increased the number of messages posted and threads created, overall there was a drop in student engagement (defined by participation). However, when they looked at the type of messages the instructor posted, the posts where the instructor asked a question or pushed to students to think more deeply prompted more student engagement.

Gay and Betts (2020) used mixed methods to study over 3,000 undergraduate students taking the same online course during a six-year period. The demographic of age was not collected. They employed instructor presence boosting course design strategies common in the Quality Matters higher education rubric, such as asking students to introduce themselves to the whole class on a discussion board and active learning methods such as collaborative work related to current events (Quality Matters, n.d.). Additionally, Gay and Betts added components intended to increase instructor presence through directed facilitation, such as instructor videos explaining the topic in more depth, instructor videos describing the objectives and requirements of assignments, creating assignments that connect with real world issues and giving personalized and in-depth feedback on assignments.

Those additional components added by Gay and Betts, correlated with an increase in course pass rate. Previous to the additions, the course pass rate ranged from 69%–88%, and at the end of the study it was 90%–93%. Furthermore, the course attrition rate dropped from 5% to 1% by the end of the study. The course evaluation survey section that showed the measure of student engagement on a 5-point Likert scale averaged for the three years at 4.67 (Gay & Betts, 2020, pp. 110–112). This study showed that increased instructor presence can positively affect student engagement.

Research indicates the size of the social learning group can affect the number of interactions between students and interactions instigated by the instructor (Harfitt & Tsui, 2015). The number of interactions is a factor for instructors to demonstrate their presences in online courses. In a study by d'Alessio et al. (2019), they corelated the number of interactions (number of feedback $r^2 = 0.71$, $p = 0.04$ and frequency of course announcements $r^2 = 0.525$, $p = 0.04$) with a significant drop in the number of D and F grades at the end of the course. Their findings taken with Taft et al. (2019), suggest that class size should be addressed as a moderator in this study.

Adult Learners as Undergraduate Online Students

Using Knowles as a reference to describe the characteristics of adult learners, adults are often thought of as independent and self-directed learners. They bring knowledge from life experiences that they use in the learning process to help make connections and draw conclusions. They are motivated learners who recognize the intrinsic and extrinsic value of education. They have a strong inclination to connect what they learn to their existing lives and careers (Knowles et al., 2005).

Reflecting on the research with a focus on adult learners pursuing undergraduate degrees online, we can draw few solid conclusions. There is limited research examining this specific group. In the literature reviewed, the data for adult learners were frequently not disaggregated. And where the data for adult learners were disaggregated, the categories of undergraduate and graduate were not. We know that with aggregated undergraduate and graduate data, adult students preferred a logically designed course with clear objectives, expectations, and assessment instructions more than traditional students when surveyed (Hixon et al., 2016). Hixon et al. surmised that was connected to the limited amount of time adult learners can devote to school. From other similarly aggregated survey data, Martin and Bolliger found that adult learners have a strong preference for indicators of instructor presence (2018), and adult learners are more academically engaged (Rabourn et al., 2018).

Although adults are often thought of having the qualities of good students, they face unique challenges. One of the barriers adult learners face is that undergraduate degrees are not planned with them in mind. Undergraduate courses differ from graduate courses in obvious ways like rigor and objectives, but also class size, age demographic, and topics. Undergraduate courses tend to have much higher enrollments than graduate courses. These higher enrollments can make it difficult for instructors to connect with individual students. Also, undergraduate courses have a much higher concentration of traditionally aged students which leads instructors to focus on learning methods more focused toward them. For instance, the adult student might not need a focus on collaborative work because of having already acquired that skill in the work place, or a much lesser need for mentoring since they have clear motivations and goals for their education (Rabourn et al., 2018). Graduate degrees consist of courses that are very focused on the degree goal. All of the courses relate directly to the subject matter. However, undergraduate degrees

require courses in a variety of general education topics in addition to courses dedicated to a major. An adult learner might find it difficult to see the reason to take courses outside their major beyond the need to merely check a box. Adult learners want to see a direct application of knowledge to their educational goal or current career (Knowles et al., 1998).

There are life and situational difficulties that adults face when pursuing an undergraduate education like, marriage, dependents, maintaining a career, and others. Additionally, there are often challenges regarding academic deficiencies and psychological stressors. According to Hardin (2008) some adults might have been away from academic setting long enough to have forgotten how to study, or forgotten certain areas of knowledge important to success in undergraduate courses: algebra, basic science, writing skills, etc. Also, some adults coming from a career where they were the expert suddenly find it stressful to be in a situation where they are the novice (Hardin, 2008). Knowing that adult students learn differently and have different challenges when pursuing an undergraduate degree, should prompt instructors and administrators to consider this group's unique situation and make accommodations in order to help these students be successful.

Theoretical Framework

Social Learning Theory and Social Cognitive Theory

According to Bandura (1971) most learning comes from observation of others and the results of their actions. Those observations could be of simple cause and effect, or the observer could be watching someone model a behavior, action, or skill. For that modeling to be effective, the observer would need to pay attention, remember, and if applicable, be able to physically reproduce the actions of the leaning. Bandura called these: "attention processes, retention processes, motoric reproduction processes" (1971, pp. 7–8). The idea that almost all of our

learning resulted from social observation or interaction with others was the basis of Bandura's Social Learning Theory (SLT).

This social modeling of learning did not require that the model and observer be present together synchronously. "The basic modeling process is the same regardless of whether the desired behavior is conveyed through words, pictures, or live actions" (Bandura, 1971, p. 10). Bandura admitted that not all modeling situations are equal. For example, modeling the pronunciation of words is better as audio or video than a static image. This connects SLT with asynchronous online learning through methods of instruction commonly used in online courses such as recorded video lectures.

The impact of modeling is supported by a study conducted by Garrison and Cleveland-Innes (2005) in online discussion forums. They studied 75 undergraduates in four discussion groups. Two groups had high-level modeling where the instructor showed an example (a model) of how to construct an effective response post and the other two groups were low-level modeling without the example. They found that students engaged more meaningfully and thoroughly in the high-level modeling groups. Further support came from Hill et al.; they found that modeling in web-based learning environments helped students to understand how to think about topics unfamiliar to them (2009).

Bandura expanded the SLT into the current Social Cognitive Theory (SCT). Like the SLT, SCT also centered learning in a social context with an active interaction between students, content, and instructors modeling behaviors and actions, to construct knowledge (Bandura, 2005). However, the difference with SCT was that Bandura added in the feature of human agency called self-efficacy (Bandura, 1999). Self-efficacy was the amount to which a person believed that they can learn a certain ability. In a learning situation, this translated to *motivation*

to learn. Was the observer motivated (either through internal or external means) to imitate the modeled action. That expanded his essential conditions for effectual modeling to: attention, retention, reproduction, and motivation (Bandura, 1971, 1999). This research is concerned with the core of SCT which remained the same as SLT; it "posits that learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behavior" (LaMorte, 2019, p. 1). In this research as a condition of past experiences, adult learners recognize the benefits of education (Knowles et al., 1998) and since they are pursuing advanced education they are already motivated to some degree. The question of motivation is beyond the scope this study. Since motivation will not be studied, going forward this research only employs the SLT.

There would be no social learning without interacting with others. And that interaction can only be positive if there is a sense of a shared goal (Berry, 2019). That shared goal is the objective of the course, and guiding the students to that goal is what instructors "do" (Shea et al., 2006, p. 176); that is instructor presence. There are two components to instructor presence: design and directed facilitation (Shea et al., 2006). In an online course, there are two types of instructor directed facilitation that can contribute to the presence of the instructor: directed facilitation that the instructor has with the whole class and directed facilitation that the instructor has with an individual student. The amount and effect of these interactions could vary. They will be examined separately.

In the SLT, the modeling of behaviors and actions is an important part of learning. From research we see that class size could impede the number of interactions that an instructor can produce (Harfitt & Tsui, 2015), and that would potentially reduce the instructor presence that the instructor would be able to manifest in the online class through those interactions. A decrease in

the number of interactions the students see, would suggest a decrease in the number of behaviors that students would imitate. That would decrease their engagement in the course. The influence of class size will be addressed for both types of directed facilitation when considering its effect on student engagement.

Statement of the Research Problem

This study will address the following research problem. Most research in online learning is performed on either traditional undergraduate students or graduate students. Adult learners in undergraduate programs have life situations different than traditional students in the same programs or students in graduate programs. Given that no research was found that specifically targeted undergraduate adult learners regarding instructor presence and student engagement in online classes, the first question addresses the non-traditional student experience at a university. The second question addresses the possible difference in engagement among a group of online courses.

Primary Research Questions:

1. For adult learners in online courses at the U of A, is there a positive relationship between instructor presence and student engagement?
2. Do student engagement scores differ across online courses?

Primary Hypotheses:

1. Increasing instructor presence increases student engagement.
2. Students are more engaged in courses where instructors are more present.

Advancing the idea that there are two types of directed facilitation in which instructors can engage with students, the first two secondary research questions address those.

Secondary Research Questions:

Research Question 1: Does increased instructor directed facilitation with an individual student increase that adult student's engagement after controlling for instructor directed facilitation with the whole class?

Hypothesis 1: As the instructor direct facilitation increases with individual students, individual student engagement increases after controlling for instructor direct facilitation with the whole class.

Research Question 2: Does increased instructor directed facilitation with the whole class increase adult student's engagement after controlling for instructor directed facilitation with an individual student?

Hypothesis 2: As the instructor direct facilitation increases with the whole class, student engagement increases after controlling for instructor direct facilitation with an individual student.

Research Question 3: Does class size influence the relationship between instructor directed facilitation with an individual student and student engagement?

Hypothesis 3: As class size increases, the effect of instructor direct facilitation on individual students on student engagement decreases.

Research Question 4: Does class size influence the relationship between instructor directed facilitation with the whole class and student engagement?

Hypothesis 4: As class size increases, the effect of instructor direct facilitation with the whole class on student engagement decreases.

Summary

According to the National Center for Education Statistics in 2016 there were nearly eight million nontraditional (here defined as over 24 years of age) undergraduates. Of that number,

over 42% were in fully online undergraduate degree programs. There continues to be a growing need to study and support this section of the population.

The Social Learning Theory tells us that people learn by observing and replicating the actions of others. As instructors model interaction and engagement, students should display the same mannerisms. We explored the research about instructor presence and student engagement regarding online learning. When surveyed, nontraditional students perceived instructor presence to be more important than traditional students did as part of their engagement in online learning (Hixon et al., 2016). Does that result match when nontraditional undergraduate online students are disaggregated?

In studies of undergraduate students where nontraditional students were not disaggregated in the data, the research shows instructor presence is linked to student engagement (Baker, 2010; Park & Kim, 2020; Wang & Liu, 2020). Student engagement is an important component in course completion. Course completion and satisfaction are important for retention and degree completion for students. But knowing that adult learners face additional barriers to success (Hardin, 2008; Rabourn et al., 2018; Romero & Barberà, 2011), what is the effect for this particular group of students?

Although it is not clear at what number the class size influences the amount of presence an instructor can manifest in a course, it is clear that it does have an effect in face to face classes (Harfitt & Tsui, 2015) and in online classes (d'Alessio et al., 2019; Gay & Betts, 2020). It is easy to imagine that as the number of students grow, it becomes increasingly difficult for the instructor to interact with students individually, however interactions with the whole class could remain the same.

Can student engagement in online classes be enhanced through instructor presence and does that make a positive difference for this understudied group of students?

CHAPTER 3: METHODOLOGY

Introduction

This chapter explains the methods and techniques used for this study. This includes every element involved in planning and conducting the research. In order, the following sections review the design, setting, participants, materials, measures, data collection and analysis, and threats to internal and external validity. The design explains the type of study and provides a detailed description. The setting and participants describe where the study will occur, the population to be studied, and the demographics of the participants. The materials and measures explain the instruments used and how the variables are defined. Data collection and analysis describe how the data will be acquired and the multilevel models used for testing. Internal and external validity is addressed before the summary.

Research Questions and Hypotheses

The following questions guide the study. Their associated research hypotheses are informed by Social Learning Theory and the empirical literature. Questions and substantive hypotheses are matched with their null hypothesis and alternative hypothesis.

Primary Research Questions:

1. For adult learners in online courses at the U of A, is there a positive relationship between instructor presence and student engagement?
2. Do student engagement scores differ across online courses?

Primary Hypotheses:

1. Increasing instructor presence increases student engagement.
2. Students are more engaged in courses where instructors are more present.

I will use an unconditional random intercept model to determine if there is clustering in the level 2 variable. It will answer the second primary research question. If the results are significant then multilevel modeling will be necessary.

H_0: $\mu_{0j} = 0$

H_A: $\mu_{0j} > 0$

Where μ_{0j} is the random intercept variance component indicating the magnitude of variation in student engagement between online courses.

Secondary Research Questions:

Research Question 1:

Does increased instructor directed facilitation with an individual student increase that student's engagement after controlling for instructor directed facilitation with the whole class?

Hypothesis 1:

As the Instructor Directed Facilitation increases with Individual students (IDFI), individual Student Engagement (SE) increases after controlling for Instructor Directed Facilitation with the Whole class (IDFW).

H_0: $\gamma_{10} = 0$

H_A: $\gamma_{10} > 0$

Where γ_{10} is the slope of the relationship between instructor directed facilitation with the individual student and student engagement.

Research Question 2:

Does increased instructor directed facilitation with the whole class increase adult student's engagement after controlling for instructor directed facilitation with an individual student?

Hypothesis 2:

As the Instructor Directed Facilitation increases with the Whole class (IDFW), Student Engagement (SE) increases after controlling for Instructor Directed Facilitation with an Individual student (IDFI).

H_0: $\gamma_{01} = 0$

H_A: $\gamma_{01} > 0$

Where γ_{01} is the slope of the relationship between instructor directed facilitation with the whole class and student engagement.

Research Question 3:

Does class size influence the relationship between instructor directed facilitation with an individual student and student engagement?

Hypothesis 3:

As Class Size (CS) increases, the effect of Instructor Directed Facilitation of Individual students (IDFI) on Student Engagement (SE) decreases.

H_0: $\gamma_{11} = 0$

H_A: $\gamma_{11} < 0$

Where γ_{11} is the slope of the relationship between class size, IDFI, and student engagement.

Research Question 4:

Does class size influence the relationship between instructor directed facilitation with the whole class and student engagement?

Hypothesis 4:

As Class Size (CS) increases, the effect of Instructor Directed Facilitation with the Whole class (IDFW) on Student Engagement (SE) decreases.

H_0: $\gamma_{011} = 0$

H_A: $\gamma_{011} < 0$

Where γ_{011} is the slope of the relationship between class size, IDFW, and student engagement.

Methods

Study Design

This is a non-experimental, cross-sectional, associative study. The first aim is to investigate the associations between instructor directed facilitation and course engagement with adult students in 100% online classes. The second aim is to investigate whether these associations are moderated by class size. This study has two levels of variables and will use multilevel linear modeling to analyze the data. Pending IRB approval, I will request a review of enrollment records from Global Campus and attain the courses that have the highest enrollment

of nontraditional students pursuing online degrees and the names of those students. I will then contact the instructors of those courses and ask them to participate in the study.

With regard to minimum sample size needed for the level 2 variables, the literature recommends anywhere from 25 (Paterson & Goldstein, 1991) to 50 (Maas & Hox, 2005). Following the suggestion of Huang (2018), I used a software package to calculate the sample sizes for both the level 1 and level 2 variables. PowerUp! is a tool created by Maynard and Dong (2013) to calculate minimum effect and samples sizes in multilevel models. I used a web version called PowerUpR v1.0.4 created through a National Science Foundation grant by Bulus et al. (2019) to calculate the sample sizes for my study. The following settings were used: a medium effect size (Cohen's d = 0.5), a two tailed test, two level 2 variables, ICC 10%, proportion of variance in the outcome explained by level 1 (student) and level 2 (classroom) variables were both 5%, and average proportion of units randomly assigned to conditions was 17%. The 17% was determined by contacting the instructors of 176 courses and needing 30 or more to agree to participate (17%, $n_2 = 30$). For level 1, I will need to draw at least 7 student participants on average from each of the 30 courses ($n_1 = 210$).

The instructors and I will collect the directed facilitation data. The instructors will track the number of communications and interactions with individual students (IDFI) and allow me access to their online course in the Blackboard learning management system (LMS), so the directed facilitation to the class (IDFW) can also be tracked. The number of directed facilitations with individual students will be obtained from the instructors counting and reporting to me the number of direct emails between the instructors and individual students and any other communication that took place between them where no other students were involved. The other components of instructor interaction with individual students I will count. As part of the research

agreement with the instructors, I will have access to the courses on Blackboard. I will be able to count the number of instructor feedback comments on individual assignments for the students being studied and any other interactions that do not involve the whole class.

The number of directed facilitations with the whole class will be obtained by accessing the online course and counting instances of announcements, course emails, recorded lectures, assignment instructions, and any other instance of communication directed at the class as whole.

The student engagement variable will be measured using the OSE (see Appendix A) as developed by Dixson (2015). Only student participants who agree to participate, complete the OSE survey, and complete the course will be counted. Any data gathered on students who withdraw from the course will be removed. Class size will be determined by the number of students enrolled in the course at the end of the semester.

The two independent variables are aspects of instructor directed facilitation: facilitation that occurs with the entire class and facilitation that occurs individually with students. The dependent variable is the engagement of the students with the course. From research (Harfitt & Tusui, 2015) class size has been identified as a potential moderator. To control for instructor experience in teaching online, only instructors who have taught fully online courses for at least two semesters will be asked to participate.

Instructor presence is defined as directed facilitation and course design (Shea et al., 2006). The design component of instructor presence will be controlled by including only courses that have been through the Global Campus new course design or revision process after 2017. All courses that have been designed or revised after 2017 in conjunction with Global Campus instructional designers have all met the Quality Matters (QM) essential standards for online higher education courses.

QM (https://www.qualitymatters.org/) is a consortium of educational experts who devised and periodically revise a rubric of standards relating to design, instructional material, technology, student support, and alignment of competencies that are required for quality in online courses. Since its creation, the rubric is periodically revised and the number of standards change based on research. Currently there are 42 standards with rankings of important, very important, and essential. Global Campus currently only requires that online courses approved for delivery meet the essential standards. All of the courses chosen for the research will have met the 23 essential design standards for online courses. The design factor of instructor presence is controlled for in this way.

Study Setting

The setting of the study is the University of Arkansas, a non-profit, four-year, research 1 (R1) university located in the south-central area of the U.S. The enrollment in the fall of 2020 was 27,562 students in 10 colleges and schools. In the fall 2021, there were 1,443 faculty, giving the university a student-to-faculty ration of 19:1 (Quick Facts, 2021). The Global Campus is the unit of the University of Arkansas that partners with colleges and departments in "designing, developing, launching, and maintaining online undergraduate, graduate and certificate/licensure programs" (Global Campus, 2021, p. 2). Additionally, Global Campus tracks the admission, enrollment, graduation, and demographics of all online students.

The choice of using a single university as the setting was made for four reasons. Attempting to get IRB approval from multiple locations is much more difficult. Secondly, getting access to student records, LMS course data and willing instructors was made easier by using the University of Arkansas, since I am currently an instructional designer employed by the university, and I know the proper channels as to how to access that data pending IRB approval.

Thirdly, I know many instructors, and hope that will help influence them to participate and collect data. That would be much more difficult if multiple universities were chosen, and I was asking unknown instructors to help with a research project. Lastly, in order to control for a design confound, I have to ensure that courses are similarly designed in the LMS. All online courses at the University of Arkansas are reviewed by instructional designers against 23 of the three point level Quality Matters (QM) rubric standards. QM is discussed in more detail in other sections.

Participants and Placement

The participants will be adult learners pursuing an undergraduate degree exclusively online. As reported in the Global Campus Annual Report 2020-2021 (Global Campus, 2021), for all age groups, exclusively online and undergraduate comprised 1,609 students. From that total 1,145 reported as female and 464 reported as male. Additionally from that same total, 907 were categorized as in-state students by their legal residence at date of admission, and 702 were out-of-state (p. 36).

Adult learners are commonly defined in the literature as 24 years of age or older (Hixon et al., 2016). However, the Global Campus tracks the age of their online students with different categories: under 18, 18–19, 20–21, 22–24, 25–29, 30–34, 35–39, 40–49, 50–64, and 65 and over (Global Campus, 2021, p. 36). I will be using data collected by the Global Campus. The database query will be altered to pull data for 24 years and older. As explained before, I will define an adult learner as 24 years and older.

The Arkansas Department of Higher Education (n.d.) defines “online courses” and “online programs” as courses and programs that deliver 50% or more of the content online. That is not precisely defined enough for this study. However, “exclusively online” is defined as

students who are enrolled only in web-based courses for an academic year. By narrowing the study to undergraduate adults who study exclusively online, the participant pool excludes traditional students or non-traditional students who only occasionally take an online class.

From the report, the number of adult learners pursuing an undergraduate degree exclusively online at the university was reported with the previously listed age groups. The number reported in the Global Campus Annual Report 2019-2020 is larger than 1,117 (Global Campus, 2021). A precise number will be attained from the data query after the 11th day of the semester when drop/add is over and the enrollment of all classes is set. In the report, the demographic data such as gender or location, were not separated by age categories. I will list the demographic data accessible to me for this select group after IRB approval.

The students chosen for the study are a convenience sample. Situationally, it is impossible to randomly assign the enrollments of students. Exclusively online adult students enrolled in yet to be identified courses will be invited to participate in the survey of engagement. To determine the sample size the PowerUpR was used. PowerUp! is a tool used to conduct power analyses for multilevel models to determine the minimum necessary sample size (Maynard & Dong, 2013). PowerUpR v1.0.4 is a web based version of PowerUp! created by Bulus et al. (2019). The settings were for a medium effect size, Cohen's d of 0.5, with a two tails, the Type I error at 0.05, the Type II error rate at 0.2 and the power at 0.8. The results gave a minimum total sample size of 210 for level 1 variables and 30 for level 2 variables.

Materials

The dependent variable of student engagement will be measured by the Online Student Engagement scale (OSE) created by Dixson (2010). The OSE scale was created in 2010 and refined and validated by Dixson in 2015. It is a 19-question survey that addressed four categories

of student engagement: skills, emotion, participation, and performance through Likert questions on a scale of 1–5.

- Skill indicators are: “Study regularly, stay up on reading, look over class notes, be organized, listen/read carefully, take good notes over readings, PPT, video lectures” (p. 6).
- Emotion indicators are: “Put forth effort, find ways to make materials relevant, apply to my life, find ways to make material interesting, really desire to learn” (p. 6).
- Participation indicators are: “Have fun in online chats, Participate actively in forums, Help fellow students, Engage in online conversations, Post regularly in forum, Get to know other students” (p. 6).
- Performance indicators are: “Do well on tests, Get good grades” (p. 6).

The OSE validation process consisted of correlating observational behavior that can be measured in the LMS and the self-reported survey results. The two measures were the taking in of content (reading posts, clicking links, watching videos, etc.) and application/interaction behavior such as: “number of e-mails sent, discussions posted, assessments finished, and assignments submitted” (Dixson, 2015, p. 8). In the resulting analysis, Dixson checked correlation between the self-reports in the scale and the observation and application behaviors. Only the application learning behaviors were found to have a significant correlation with the self-reporting scale. That part of the scale was validated with regard to objective data about application behaviors that were more engagement oriented ($r = .48$, $p < .01$). “The validity of self-reports of engagement used by the OSE is supported by actual behaviors in the online class” (Dixson, 2015, p. 9). This research will only use the validated part of the OSE scale.

The type of assignments used in the courses, either potentially leaning toward non-interactive or highly interactive which would skew the results, was controlled by using the OSE scale. The scale was valid regardless of the types of assignments the students complete: replies to discussion posts, quizzes, exams, written papers, and etc.

Measures

Student engagement is the perception by the students of how interested in and how much participation they engaged in throughout the course. Dixson describes student engagement as "students using time and energy to learn materials and skills, demonstrating that learning, interacting in a meaningful way with others in the class." (2015, p. 4). By doing so, students become psychologically invested in their learning. Operationally, student engagement is measured by the Online Student Engagement Scale created and validated by Dixson, (2015). The Scale is 19 questions each rated by the students on a Likert range of one to five; one is "not at all characteristic of me" and five is "very characteristic of me." The range of possible scores is 19–95.

Facilitation of course interactions and the visibility of the instructor (Mandernach et al., 2006) are important to demonstrate presence. Instructor presence is evident to students through communication, frequent comments, and feedback (Kassinger, 2004). Instructor presence consists of two components, design and directed facilitation (Shea et al., 2006). Directed facilitation has two factors that could affect how the adult learns differently: interactions with the class as a whole, and interactions with individual students.

Instances of directed facilitations with the whole class will be counted by me after the instructors grants access to the course in the LMS. The following will be counted: instances of

announcements, class-wide emails, recorded lectures, assignment instructions, and any other instance of communication directed at the class as whole.

Instances of directed facilitations with individual students will be counted primarily by the instructors participating in the study. The following will be counted: direct emails between the instructor and individual students, and any other communication that takes place between the instructor and individual students where no other students were involved. I will be able to count personal feedback on assignments, as I will have access to the grade center in the LMS. I will perform as much of the data collection as possible to reduce the amount that the instructors perform. I will also send reminders every two weeks throughout the semester to help the instructors remember to track and report the numbers of individual instances of directed facilitations with students. The reporting of the numbers will be made easier for the instructors by adding a column hidden from students in the grade center of the LMS where the instructors can simply keep a tally of numbers for each adult learner in the their course.

Class size is a continuous variable. The lower limit of class size starts at 15. That denotes the minimum number of enrolled students required for an undergraduate class to be offered (Office of the Provost, 2012) in any particular semester. It will be determined by the number of students enrolled in the course at the end of the semester. Any information gathered on students who dropped the course before the end of the semester will be removed.

Data Collection

The course instructors and I will collect the data for the independent variables from the courses yet to be identified. The courses will be purposefully chosen to control for the design component of instructor presence. All instances of announcements, class-wide emails, class-wide feedback, recorded lectures, assignment instructions, and any other instance of communication

that were directed at the class as whole will be coded for directed facilitation to the whole class. All one-on-one interactions between the instructor and individual students will be coded for directed facilitation with individual students. These interactions are: direct emails between the instructor and individual students, personal feedback on assignments, one-on-one virtual office hour visits and any other communication that takes place between the instructor and individual students where no other students are involved.

Recording the data will be made as easy as possible for the instructors. In the Grade Center of the LMS, I will add a Smart View that will collapse the rows of the grade center to only show the adult learners in the course. Additionally, I will create columns hidden from students, for the instructor to add the IDFI variable for each of those students every two weeks directly into the grade center. I will send reminder emails to the instructors that coincide with every two weeks.

As a reassurance that the measurements are reliable, I will extract an anonymized sample of data and ask a colleague who is familiar with research and these types of data to review the sample. I will compare our results and discuss any discrepancies to assure interobserver agreement.

The dependent variable data will be collected via the OSE survey administered through Qualtrics (https://www.qualtrics.com). The survey will be completed directly into the software to ensure the integrity of the survey and the data. After IRB approval, I will need the identified students to give consent to be studied. It is necessary to the study that the results of the OSE survey be connected with the independent variable IDFI for each student. After the drop/add date has passed and the course enrollment is stable, the link for the consent form will be available in the LMS course to only the identified adult student, and I will email a separate link to make sure

each one sees it. As an incentive to give consent and participate, I will mention that the survey should only take eight minutes or less to complete (19 questions rated on a 5-point Likert scale), all data will be secured, and upon completion of the survey the students will be entered into a random drawing for a $100 Amazon.com gift card.

Class size data, consisting of the number of students enrolled in the course when the survey was administered, will be collected through LMS access to the courses provided by permission of the instructors.

The data will be collected from the instructor, LMS, and the survey. All data will be collected during the same semester in which the classes occur. During the preliminary data collection, the data will be entered into an Microsoft Excel spreadsheet that will be password protected and stored in an encrypted folder. Once the collection is complete, student names and student identification numbers will be correlated to the IDFI variable and the OSE survey results. After adding the student data, a review will be conducted to verify the accuracy of the data entry. Then a code will be created to maintain the correlations but anonymize the data. The code will transpose student, instructor and course identifiers with a string of letters and numbers: students (S001), instructors (I01), and courses (C01). That code will be used to anonymize the data of any personal identifiers. The original Excel file and the file containing the code will be stored in a different encrypted folder than the one used for storage of the anonymized data files.

The original Excel file containing all of the collected data and the code file will be stored in a password protected, encrypted folder on a personal Box.com account. The anonymized SPSS database will be stored in a different password protected, encrypted folder on a personal Box.com account. The type of encryption is 128-bit Advanced Encryption Standard (AES). I am

the only person who knows the password. All data in both encrypted folders will be scheduled to be deleted 3 years after completion of the research.

Data Analysis

The anonymized data will be imported into an SPSS database for analysis. A summary of data will be compiled by using SPSS to examine the means, construct graphs, and list the features of the distributions of the variables.

Linear regression is a good fit for when two or more predictors and the independent variables, the dependent variable, and the moderator are all continuous. Additionally, there are two levels of variables: student level variables and class level variables. Multilevel linear regression is required when there are two or more levels of variables. Multilevel linear regression will be the statistical test used to test the relationship between student engagement and the other predictors. The hierarchical method allows the entry of known predictors into the model in the order of their importance to the result (Field, 2018). The predictors will be entered hierarchically into the multiple linear regression model. For the data analysis SPSS version 27 (https://www.ibm.com/products/spss-statistics) will be used.

Table 2

List of Variables and Characteristics

Name	Type	Continuous / Not Continuous	Level	Range
Instructor Directed Facilitation increases with the Whole class (IDFW)	Independent Variable	Continuous	2	0 +

Instructor Directed Facilitation increases with Individual students (IDFI)	Independent Variable	Continuous	1	0 +
Student Engagement (SE)	Dependent Variable	Continuous	1	19–95 [a]
Class Size (CS)	Moderator	Continuous	2	14 + [b]

Note. [a] The range of student engagement is determined by the possible score on the OSE.

[b] The lower limit of class size denotes the minimum number of enrolled students required for an undergraduate course to be offered (Office of the Provost, 2012).

The research on other groups of students (traditional undergraduate and graduate), has shown that instructor presence (design and directed facilitation) is a significant predictor of student engagement. Design is removed as a consideration by using QM designed and internally reviewed courses. The two components of directed facilitation are variables at different levels. The Instructor Directed Facilitation with Individual students (IDFI) varies at the level of the student; it is level one. The Instructor Directed Facilitation increases with the Whole class (IDFW) varies at the level of the class; it is level two.

The first step is to test for significance in the variance component by running an unconditional random intercept model. This is answering one of the primary research questions: Do student engagement scores differ across online courses? If there is a significant random

intercept variance component, that means there is clustering within classrooms. If there is clustering, then I will proceed with multilevel modeling.

1. $SE_{ij} = \gamma_{00} + \mu_{01} + \varepsilon_{ij}$

Model 2 answers the main effects research questions 1 and 2. It determines if IDFI and IDFW account for variation in a student's engagement with the class.

2. $SE_{ij} = \gamma_{00} + \gamma_{10}\ IDFI_{ij} + \gamma_{01}\ IDFW_{ij} + \gamma_{02}\ CS_{ij} + \mu_{01} + \varepsilon_{ij}$

The next four models answer the two interaction research questions 3 and 4. Model 3 determines if the average IDFI slope across all online courses varies across courses, meaning that it is a not a good fit for all online courses. A random slope variance component is added to this model.

3. $SE_{ij} = \gamma_{00} + \gamma_{10}\ IDFI_{ij} + \gamma_{01}\ IDFW_{ij} + \gamma_{02}\ CS_{ij} + \mu_{01} + \varepsilon_{ij} + \mu_{10}\ IDFI_{ij}$

Providing that μ_{10} is significant, I will run model 4 to answer research question 3 and determine the relationship between IDFI, SE, and CS. An IDFI and class size interaction is added to model 4. If γ_{11} is significant, then relationship between IDFI and student engagement varies as a function of class size.

4. $SE_{ij} = \gamma_{00} + \gamma_{10}\ IDFI_{ij} + \gamma_{01}\ IDFW_{ij} + \gamma_{02}\ CS_{ij} + \mu_{01} + \varepsilon_{ij} + \mu_{10}\ IDFI_{ij} + \gamma_{11}\ IDFI_{ij}$ (CS_{ij})

Model 5 determines if the average IDFW slope across all online courses varies across courses, meaning it is not a good fit for all online courses. A random slope variance component is added to this model.

5. $SE_{ij} = \gamma_{00} + \gamma_{10}\ IDFI_{ij} + \gamma_{01}\ IDFW_{ij} + \gamma_{02}\ CS_{ij} + \mu_{01} + \varepsilon_{ij} + \mu_{01}\ IDFW_{ij}$

To answer research question 4, an IDFW and class size interaction is added to model 5. If γ_{011} is significant, then relationship between IDFW and student engagement varies as a function of class size.

6. $SE_{ij} = \gamma_{00} + \gamma_{10} IDFI_{ij} + \gamma_{01} IDFW_{ij} + \gamma_{02} CS_{ij} + \mu_{01} + \varepsilon_{ij} + \mu_{01} IDFW_{ij} + \gamma_{011} IDFW_{ij} (CS_{ij})$

To check the assumptions of multilevel linear modeling, the following will be examined. Scatterplots will be used to compare each independent variable with the dependent variable to ensure linear relationships. The errors between the observed and predicted data will be assessed for normality using a histogram generated by SPSS. The histogram will show any outliers that could influence the model. Multicollinearity occurs when a strong correlation exists between two or more predictors (Field, 2018). To ensure that multicollinearity is not an issue, I will create a correlation matrix between all predictor variables and flag any correlations > 0.80.

Significant relationships between predictor variables and the outcome will be identified using the *p*-value associated with each regression coefficient ($p < .05$). A significant and positive relation between SE and IDFI would mean that student engagement increases with greater instructor directed facilitation with individual students. Likewise, a significant and positive relation between SE and IDFW would mean that student engagement increases with greater instructor directed facilitation with the whole class. In models 4 & 6, a significant and negative relation between CS and IDFI and IDFW, respectively, would mean that for every one unit increase of class size, the relationships between IDFI, IDFW, and student engagement would decrease. To compare the fit of nested models (e.g., model 3 vs 4), the Akaike Information Criterion (AIC) will be used. Lower AIC scores indicate better fit.

Internal and External Validity

Internal validity is a concern with alternative explanations and how they will be controlled. Because this study is cross-sectional, causality cannot be inferred. Only relationships between variables will be addressed. There is the possibility of unaccounted for confounding variables that could skew the research, such as: gender, ethnicity, socioeconomic status. Those variables will not be measured, so effects for which cannot not be controlled. The effects of these variables at the student and instructor level, however, can be partitioned into within-class and between-class variance using the intraclass correlation coefficient (ICC). This will allow the study to identify the degree to which demographic variables at either level may be playing a role in student engagement.

There is also the possibility of a lingering history effect since the data will be collected in the spring of 2022 the first semester where all classes resumed normal modes after the COVID-19 pandemic. There could be some remaining psychological factors and stresses that effect the way the students respond to instructor presence and also how they respond on the survey. Kecojevic et al. (2020) found that students (other than freshmen) were dealing with high levels of anxiety and depression related to employment loss and difficulty focusing on academic work.

Selection bias could be a threat to internal validity. The students will be studied in courses in which they themselves enroll; due to the situation of higher education, random enrollment is not possible. The group of students that will be studied could have preexisting similarities or differences that interact with instructor presence (independent variable) and be the unknown cause of the observed outcome.

Additionally, there is the possibility of experimenter bias regarding the collection of the two factors of instructor directed facilitation: facilitation with the whole class and facilitation with individual students. Every effort will be made to count and code the entries correctly.

Concerns for volunteer (or self-selection) bias are also present. The participants will be volunteers who choose to consent and fill out the survey. It is possible that they will not share the same characteristics with the general population of adult learners (Salkind, 2010) and in that case an extrapolation to other universities or other groups of adult learners would not be recommended. Random sampling as a method, is optimized for generalizability (Murad, 2018). The inability to perform random sampling in this situation is also an additional threat.

Summary

This chapter provides a review of the research questions guiding this study and an overview of the methodology that will be used. The design is a non-experimental, cross-sectional, descriptive study. The setting is a land-grant, R1 university, and the participants are exclusively online adult learners. The study employs observational and survey data that will be collected from courses selected to control for the design aspect of instructor presence. The study addresses instructor presence and its effect on the engagement of adult students in online courses. Multilevel regression is the method used to analyze the data. The results of the data analysis will be summarized in the next chapter.

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Appendix A

Online Student Engagement Scale (Dixson, 2015, p. 15)

Within the course, how well do the following behaviors, thoughts, and feelings describe you?

Please answer using the following scale:

1. *not at all characteristic of me*
2. *not really characteristic of me*
3. *moderately characteristic of me*
4. *characteristic of me*
5. *very characteristic of me*

1. Making sure to study on a regular basis
2. Putting forth effort
3. Staying up on the readings
4. Looking over class notes between getting online to make sure I understand the material
5. Being organized
6. Taking good notes over readings, PowerPoints, or video lectures
7. Listening/reading carefully
8. Finding ways to make the course material relevant to my life
9. Applying course material to my life
10. Finding ways to make the course interesting to me
11. Really desiring to learn the material
12. Having fun in online chats, discussions or via email with the instructor or other students
13. Participating actively in small-group discussion forums

14. Helping fellow students

15. Getting a good grade

16. Doing well on the tests/quizzes

17. Engaging in conversations online (chat, discussions, email)

18. Posting in the discussion forum regularly

19. Getting to know other students in the class

Appendix B

UNIVERSITY OF ARKANSAS

To:	Ken Muessig L00010674null
From:	Justin R Chimka, Chair IRB Expedited Review
Date:	12/08/2021
Action:	**Exemption Granted**
Action Date:	12/08/2021
Protocol #:	2111367999
Study Title:	The Role of Instructor Presence and Class Size in Promoting Engagement Among Adults Pursuing Undergraduate Degrees Online

The above-referenced protocol has been determined to be exempt.

If you wish to make any modifications in the approved protocol that may affect the level of risk to your participants, you must seek approval prior to implementing those changes. All modifications must provide sufficient detail to assess the impact of the change.

If you have any questions or need any assistance from the IRB, please contact the IRB Coordinator at 109 MLKG Building, 5-2208, or irb@uark.edu.

cc: Kevin M Roessger, Investigator