THE EFFECTS OF LECTURE CAPTURE USE AND STUDENT ENGAGEMENT ON THE EXAM SCORES OF FIRST YEAR PHARMACY STUDENTS

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ABSTRACT

Lecture capture technology has quickly become a common component in many classrooms and lecture halls on college campuses across the world. This quantitative study aimed to identify the effects of lecture capture and student engagement on student performance in a school of pharmacy. Student performance for this study was measured by the end of a semester course exam score. Additionally, the study aimed to identify whether the use of recorded lectures could be predicted by the engagement scores of students. Engagement scores of students were self-reported by students using the Student Course Engagement Questionnaire. The student usage of lecture capture or, more importantly, how long students watched each recorded lecture was obtained through Panopto analytics. Lecture capture and the use of recorded lectures was found to have a positive effect on student achievement. Engagement was identified as a strong predictor of student achievement. However, engagement was not considered a predictor of student usage of recorded lectures. These findings suggest that lecture capture and student engagement could have a positive effect on student achievement in the pharmacy curriculum. This finding validates the implementation of lecture capture and supports previous studies that engagement is a strong predictor of student achievement. Supporting student success through the encouragement of adding the reviewing of recorded lectures to their study routines and discovering methods to increase student engagement may enhance student performance.

DEDICATION

Hugh Morrow, Sr. (“Papa Hugh”) was my grandfather. He played football, basketball, and baseball for the Crimson Tide in the mid-1940s. He set many records at The University of Alabama in football. He was voted the school’s best athlete and even held a record at the Sugar Bowl until 2022. More importantly, he was a family man. Much of my personality is based off his sayings, teachings, and mannerisms. This one is for you, Papa Hugh. We miss you and thank you for all those years we got to spend together. Roll Tide!!

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CHAPTER I

INTRODUCTION

Lecture capture is defined by Educause as an "umbrella term describing any technology that allow instructors to record what happens in their classrooms and make it available digitally" (Cavanagh et al., 2008). Lecture capture is becoming a common addition to many classrooms in higher education institutions across the country (Marchand et al., 2014). Students have expressed the need to have this technology available to them as part of an active learning platform to enhance their resources to ensure academic success in their courses (Marchand et al., 2014). Lecture capture availability has given students extra resources to prepare for exams and other course activities (Bennett, 2018). The availability of this technology has altered how students prepare for exams by giving them another resource (Bennett, 2018). Pharmacy students have been one of the primary majors that have benefitted from this technology (Marchand et al., 2014).

Topale (2016) suggested that the use of recorded lectures paired with consistent classroom attendance has enhanced student academic performance. Students are able to review past lectures and they are able to master a larger amount of material by having this technology available to them (Bennett, 2018). This technology has also been beneficial for students who are categorized as English as a Second Language (ESL) or as having a learning disability (Bennett, 2018).

Lecture capture recording enhances the engagement component of a teacher's instruction (Garrett, 2011; Van Hof 2016). Students are able to continue being involved in the lecture after

the class session has been completed. Students who are engaged have proven that they perform better academically as compared to their nonengaged peers (Garrett, 2011; Van Hof 2016). Access to recorded lectures allows students to be exposed to a teacher's immediacy behavior and this will allow students to become connected to the content and the teacher's instruction (LeFebvre & Allen, 2014).

Engagement and positive immediacy behavior have both been shown to enhance the learning environment and increase student performance. Having access to lectures that promote active learning can further enhance a student's connection to the learning and give the students more confidence (LeFebvre & Allen, 2014).

Statement of the Problem

Lecture capture has become common trend in many classrooms across the country (Bosshardt & Chiang, 2016). Students who are enrolled in a professional pharmacy program are no stranger to this trend (Monaghan et al., 2011). However, research on the effect of lecture capture use and engagement on the students' performance (exam scores) is limited. The goal was to identify how lecture capture use and student engagement affects entering pharmacy school students' exam scores. More specifically, did the total amount of time reviewing lecture recordings and the student's level of engagement have an impact on the students' performance (exam scores)?

Statement of Purpose

The purpose of this study was to examine the impact of lecture capture use and student engagement on 1st-year pharmacy students' exam scores and to explore the relationship between engagement and the time students spent watching recorded lectures.

Significance of the Problem

This study gives practitioners and researchers the necessary information to identify the necessity of lecture capture in pharmacy education. This study adds to the growing research on lecture capture. Much of the data for this type of research are qualitative in nature. The quantitative nature of this study gives evidence to faculty and administrators to justify the use of this technology.

Research Questions

1. What effect does the total amount of time students view recorded lectures have on students' exam scores?
2. Is there a relationship between student engagement scores and exam scores?
3. Does engagement score predict use of recorded lectures?

Methods

This particular study was quantitative in nature. The study focused on the analysis of total time spent viewing recorded lectures in relation to students' exam scores. This information determined whether the amount of time spent viewing the lectures has a significant impact on the student's exam score. Data were obtained through Panopto and questionnaire results. Participants completed an engagement questionnaire to determine their level of engagement for skills, emotional, participation/interaction, and performance engagement. This information was then used to identify whether a relationship exists between engagement and lecture capture use.

Each individual's total time watching the entire recorded lectures set was grouped according to time and compared to the group and median score. A multiple regression analysis was used to determine the degrees to which each engagement factor affected the exam score. A

simple regression analysis was used to determine whether engagement predicted the amount of time students spent watching the recorded lectures.

Theoretical Framework

Student academic success can be predicted by the level of student engagement (Fredin et al., 2015). Repeated studies have suggested that students who possess a higher level of engagement will experience a higher amount of success in their coursework (Fredin et al., 2015; Terry et al., 2015). Higher education data surrounding this concept have increased over the past couple of decades (Baydas et al., 2015).

Alexander Astin's (1984) research with his theory of student involvement was the precursor to student engagement research. Astin based his theory on three elements: inputs, environment, and outputs. The elements of this theory have had a widespread impact on education. Students will arrive to a course or school with background experiences that will have an impact on their studies (Astin, 1984). The environment created by the university and outside influences will have an impact on the student's experience and, ultimately, the outcome of the student's time at the university (Astin, 1984).

Astin's theory of student involvement created five basic assumptions concerning involvement (Astin, 1984). Students must invest in their studies and that level of investment will be proportional to what is gained from their experience (Astin, 1984). Astin's findings suggested that student involvement is directly related to student academic performance (Astin, 1984).

Over time, Astin's theory of student involvement transitioned into the theory of student engagement (Kuh, 2001). The university and the student have a role to play in their overall engagement; however, the particular engagement level for a particular course is dependent upon

the student. There are many factors that are components of a student's overall engagement (Kuh, 2001). This study focused on the factors that affect student course engagement.

Engagement Defined

Research has shown engagement is a predictor of student success and learning begins with engagement and the many challenges and relationships that support engagement (Brown et al., 2017). Engagement may stray away from the concept of lecture capture, but engagement is the primary reason to include lecture capture in higher education courses (Brown et al., 2017). Engagement can be measured using a common instrument, the Student Course Engagement Questionnaire (SCEQ; see Appendix A). The SCEQ can measure four latent factors: *Skills Engagement*, *Emotional Engagement*, *Participation/Interaction Engagement*, and *Performance Engagement* (Brown et al., 2017). Through an exploratory factor analysis, the Handelsman et al. (2005) study identified these four latent factors and this was later confirmed in the Brown et al. (2017) study.

These latent factors can affect overall student engagement and their study habits. Performance engagement is the behavioral component of learning (Brown et al., 2017). Students have various motives to study and perform at a certain level in a course or program. Skills engagement is the strategies a student utilizes to succeed (Brown et al., 2017). These strategies are developed over time and they must be supported and encouraged by an external source, such as a teacher (Brown et al., 2017). These strategies include the use of lecture capture, recorded lectures, and an active learning platform.

Emotional engagement refers to the student's investment in learning the material and participation/interaction engagement is the willingness to participate in active learning strategies with other members of the class, whether virtual or in person (Brown et al., 2017). The

relationship between the behavioral and the emotional component, if supported through active learning strategies, can increase student performance (Brown et al., 2017). Students have reported a preference to an active learning style classroom, but there are other students who prefer a traditional setting (Brown et al., 2017). Whether in a lecture or active learning session, lecture capture and the use of an active learning platform can promote better study habits and increase the emotional commitment to the content (Brown et al., 2017).

Student engagement was an appropriate theory for this study because skills engagement could possibly determine the decision to adopt specific study habits by students. Students use specific study methods that they feel will lead to successful academic results. Lecture capture is adopted to give student more resources, but to also increase the student's level of engagement.

Assumptions of the Study

This particular study assumed students had consistent access to recorded lectures through the study university's Blackboard system. Each participant had a working computer and it was assumed the students were able to use a stable network connection to view the recordings. Students at the study university's School of Pharmacy were required to attend class, so it was assumed that students were viewing the lectures asynchronously and not for the first time. Students were expected to complete the questionnaire during class and it was assumed they could complete the questionnaire.

One major assumption was that students had prior experience with Zoom and lecture capture. Most students were in school at the study university during the 2020-2021 school year and experienced most of their classes being held online.

Limitations of the Study

The student sample size was limited to 97. The study was also limited by the particular course of study. Students were enrolled in one required course in the professional pharmacy curriculum. This course met once a week throughout the semester. This limited the available recorded content to nine sessions. The initial data collection procedure required participants to complete the SCEQ to record the individual participant's level of engagement prior to beginning the course. Since participants were self-reporting their engagement score, this was also considered a limitation. The methods section outlines the statistical analyses performed during the study. Not factoring in another variable, such as grade point average, could be considered a limitation.

Students were broken down into four groups based on the percentage of the total recorded lectures they watched during the semester. These groups had similar numbers but were not equal and also contributed to the small sample size issue. The group could have been broken down into five groups, but that would have further reduced the sample size. This study can be generalized just to pharmacy students due to the small sample size.

Operational Definition of Terms

Lecture capture or recorded lectures—A video file created from recording lectures using Zoom or the total amount of video files recorded during a course over a semester and made available on a single platform.

Active learning—Active learning is a method of learning in which students are actively or experientially involved in the learning process and where there are different levels of active learning, depending on student involvement.

Student engagement—The "degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education" (The Glossary of Education Reform, 2016).

Summary

Lecture capture is an ever-growing and evolving technology. Products such as Zoom have enhanced how we operate in higher education. This form of technology has the ability to enhance the engagement of students during a course and promote student success. Chapter I introduces the study. Chapter II provides a review of the literature and Chapter III explains the methodology. Chapter IV provides the study findings and Chapter V discusses those findings, implications, and future recommendations.

CHAPTER II

REVIEW OF RELATED LITERATURE

Lecture capture technologies have become increasingly common in many colleges and universities across the country. This is especially true at various schools of pharmacy (Marchand et al., 2014). The Accreditation Council of Pharmacy Education (ACPE) details in their "Standards 2016" document (2015) that colleges and schools are required to support faculty and staff in their use of distance learning technologies and to provide opportunities and space that can facilitate interaction between faculty, staff, and students. Lecture capture technologies, such as Zoom, provide faculty, staff, and students that opportunity (Zoom, 2020).

Technologies such as Zoom provide enhanced collaboration features and content sharing that give users the space to encourage learning in a variety of locations. The recorded and transcribed sessions provide students the opportunity to review material at their own pace (Zoom, 2020). These technologies are integrated into the school's learning management system to provide users equitable access to content that could enhance student performance (Zoom, 2020). Zoom is a video-conferencing platform that is being used to enhance distance learning, but also face-to-face learning.

Lecture-style teaching has been a common feature in college classrooms for close to 1000 years (Freeman, 2014). However, research is supporting the need to increase active learning in the classroom. Countries across the globe are seeing a trend that less than 40% of entering freshman are going into a field that is not considered STEM (Science, Technology, Engineering, and Mathematics) (Freeman, 2014). Results have illustrated an increase in student performance if

an instructor includes some form of active learning in their classroom. Other studies have shown that students have a 55% greater chance of failing a course that is strictly lecture-based learning (Freeman, 2014). There are many disciplines that are considered STEM. These include, but are not limited to, biology, chemistry, physics, and engineering (Freeman, 2014). Pharmacy is considered a STEM major due to its connection to biology and chemistry (Vanruki et al., 2015).

Introduction to Lecture Capture

The implementation of lecture capture has been a welcomed addition by students for various reasons (Marchand et al., 2014). Students appreciate the ability to readily access recorded lectures to review content prior to the exam date (Bennett, 2018). Trends in higher education and medical education are signaling a transition from face-to-face courses to the concept of blended learning (Marchand et al., 2014). Students are participating in courses that are hybrid, online, or face-to-face courses that utilize various learning strategies and current educational technology (Bennett, 2018). Students enrolled in medical and pharmacy education courses are asked to master a large amount of content in a short period of time. Lecture capture enables students to be engaged in the process (Bennett, 2018). For this reason, lecture capture is becoming a common addition in many classrooms on college campuses (Marx et al., 2016).

Data supporting student achievement and lecture capture have been scarce and limited. However, students have reported several reasons to support the continued use of lecture capture. Lecture capture has given students the ability to review complex material and to elucidate content (Bennett, 2018). Second, schools are able to accommodate English as second language students and students with learning disabilities. This category of student requires the use of lecture capture to be able to access many of the accessibility features that will support their achievement (Bennett, 2018).

Lecture Capture Data

Strategic use of lecture capture is a growing priority for many schools, especially professional schools. Lecture capture is not intended to promote the use of learning by consumption (Topale, 2016). Lecture capture is intended to be integrated with active learning strategies to accommodate multiple learning styles and to promote deep learning during the live lecture. However, lecture capture does give students the ability to review material during the lecture and explanation portion of the recording (Topale, 2016). The ability to pause, fast forward, and rewind allows students to reduce the stress on their working memory by filling in the gaps created when absorbing the large amount of information during the lecture (Bennett, 2018). Reducing the load on working memory has proven to increase learning and promote student success (Bennett, 2018). Reviewing video lectures also supports multisensory learning, which students have found more enjoyable, and research has shown this type of learning has greater success to transferring knowledge and skills to long-term memory (Bennett, 2018).

Research regarding the use of lecture capture and the effects on the students' performance has been quite limited. Many professors have not supported lecture capture due to the presumed negative effect on attendance (Schnee et al., 2019). According to research, attendance has not been drastically affected due to the implementation of lecture capture (Schnee et al., 2019). Many students have admitted that having the availability of lecture capture was helpful when they did miss class due to an illness or other cause (Schnee et al., 2019). A possible solution to the class attendance issue is to create an active learning community within the classroom that will promote and reward class attendance (Schnee et al., 2019). Lectures that create an active dialogue with students will ensure that class attendance is not an issue with lecture capture implementation. Pharmacy professors are viewed as role models for this social

profession that uses active discussions and consultations as a part of their practicing techniques. For this reason, attending pharmacy lectures is a requirement for students to understand how to relate to a patient regarding their prescriptions and overall health (Schnee et al., 2019).

Access to recorded lectures and lecture material is being reported as a common request by students. Students have reported an added benefit to having access to recorded lectures prior to exams (Marchand et al., 2014). Research has shown that giving students access to these materials does not necessarily increase the likelihood of success in all classroom environments (Marchand et al., 2014). However, many of these studies limited the amount of time students were given to access these materials (Marchand et al., 2014). According Bollmeier et al. (2010), a significant limitation to their study was the limiting of student access to 3 days after the lecture. This finding suggests future studies to review the effect of unlimited access to these videos.

Through focus groups, students have expressed their concerns and positive experiences with lecture capture technology (Al Nashash & Gunn, 2013). Students reported that having access to recorded lectures gave them the ability to study as efficiently as possible and instead of having to bother the professor with minor questions, they could make a note to go back and review that part of the lecture to determine whether they needed to meet with the professor at a later time (Al Nashash & Gunn, 2013). Absenteeism has been reported to be a concern of many professors (Al Nashash & Gunn, 2013). However, students have suggested that having access to the recorded lectures promoted their consistent attendance in class (Al Nashash & Gunn, 2013). The videos allowed students to review what was possibly missed during a class, especially a class that lasted over 1 hour. Students reported that having the lectures available after an attended classes allowed them to grasp more information as compared to students who only listened to the recording (Al Nashash & Gunn, 2013).

Lecture Capture and Active Learning

Lecture capture is included in the greater scope of educational technology called the active learning platform (Zawilinski et al., 2016). Teachers are using the active learning platforms to engage students during their lectures and promoting the platform's use for studying prior to an exam (Van Hof, 2016; Zawilinski et al., 2016). Research has shown that the viewing of recorded lectures, with an active learning platform, has a significant impact on student achievement (Bosshardt & Chiang, 2016). This finding was especially significant for students who reported a higher degree of engagement in the course (Van Hof, 2016). Other factors, such as grade point average and major were also considered in this study and should be considered relevant to the discussion. However, there seems to be a strong connection between the level of engagement, student views of recorded lectures, and student success (Van Hof, 2016).

The use of an active learning platform and lecture capture technology can have a positive impact on a student's academic career (Bosshardt & Chiang, 2016). Students have reported that having access to recorded lectures gave them the ability to focus on the lecture as opposed to taking notes during the lecture (Bosshardt & Chiang, 2016; Van Hof, 2016). Afterward, the students are able to watch the lecture a second and third time to ensure understanding or to add another layer of notes. Many active learning platforms give the option of taking digital notes along with the video to match the written notes taken during the lecture (Zawilinski et al., 2016). According to research related to lecture capture, students are reporting that having recorded lectures gave them the opportunity to improve their note taking and, ultimately, their study behavior (Bosshardt & Chiang, 2016; Elliot & Neal, 2016; Van Hof, 2016). Students who take detailed notes or have difficulty taking those notes during lecture are able to complete that task by controlling the pace of their video session in the active learning platform (Elliot & Neal,

2016; Zawilinski et al., 2016). This is another positive for the pairing of the active learning platform and lecture capture technology (Bosshardt & Chiang, 2016; Van Hof, 2016). Studies have shown that the implementation of repeated views of recorded lecture has positively impacted student success and improved the study habits of students (Bosshardt & Chiang, 2016; Van Hof, 2016).

Although the pairing of the active learning platform and lecture capture technology has produced results that would indicate a positive relationship with student academic success, there are many factors that contribute to those results (Elliot & Neal, 2016; Van Hof, 2016). The classroom environment and instructional conditions are believed to make a significant contribution to those results (Elliot & Neal, 2016; Van Hof, 2016). Students enrolled in courses taught by professors who encourage the use of the active learning platform and the recorded lecture videos are going to either benefit from them in their courses or their academic development (Elliot & Neal, 2016; Van Hof, 2016).

Overall, the use of an active learning platform and lecture capture gives students an extra resource to use as study material for exams (Bosshardt & Chiang, 2016; Van Hof, 2016). This is especially true in classroom environments where the instructor promotes the use of the system. Students have reported that using lecture capture has increased their performance in a course or made them feel more confident in their mastery of the material (Elliot & Neal, 2016; Van Hof, 2016).

Studies have shown that student academic performance is coupled with the instructor's use of lecture capture and other active learning strategies using other forms of technology (Elliot & Neal, 2016; Van Hof, 2016). Research has suggested students will adopt any technique that will assist them in their study habits (Van Hof, 2016; Zawilinski et al., 2016). However,

instructors must frequently advocate for the use of technology by students for them to consider adopting said technology (Elliot & Neal, 2016). Teachers who use the active learning technology in classroom activities may see engagement and course grades increase over time (Elliot & Neal, 2016; Van Hof, 2016; Zawilinski et al., 2016).

Categories of Lecture Capture Users

Adoption of lecture capture technologies has increased due to reduction in costs, the emergence of remote learning, and increased access to high-speed internet (Terry et al., 2015). Research has slowly been expanding on how students are using lecture capture technology and, more specifically, how often or how long they watch the recorded lectures. Students can be categorized into pedagogically motivated groups based on how they interacted with the lecture capture technology (Brooks et al., 2011; Ebbert & Dutke, 2020). These groups are identified as minimal activity learners, high activity learners, disillusioned activity learners, differed learners, and just-in-time learners (Brooks et al., 2011; Ebbert & Dutke, 2020). Minimal activity learners are aware that the tool exists but have not included the lecture capture technology in their regular study routines (Brooks et al., 2011; Ebbert & Dutke, 2020). These students have made use of the technology at least once. High activity learners have adopted the lecture capture technology as a regular strategy in their study routines (Brooks et al., 2011; Ebbert & Dutke, 2020). Disillusioned learners did not use the lecture capture technology; they found the tool did not assist in their learning or did not become a strategy in their regular routine (Brooks et al., 2011; Ebbert & Dutke, 2020). This learner's use of the technology will dwindle after the beginning of semester. Differed learners will begin using the lecture capture technology towards the end of the course (Brooks et al., 2011; Ebbert & Dutke, 2020). They will add this tool to their study routine to review previously assessed content. The final category of learners, just-in-time learners, will

decide to use this tool in their study routine to prepare for midterm or final exams (Brooks et al., 2011; Ebbert & Dutke, 2020).

How Are Students Using Lecture Capture?

Students have reported a positive impact of lecture capture adoption in classrooms. Gosper et al. (2010) indicated that number could be as high as 76%. According to Gosper et al. (2010), 66.7% of students conveyed that lecture capture assisted them in achieving positive results in their course. Around 80% of students voiced that lecture capture made their learning easier and more accessible (Gosper et al., 2010). Elliot and Neal (2016) found that students were able to review material that they found difficult, or they did not understand during the live lecture. Lecture capture technology was found to promote independent study by students (Elliot & Neal, 2016).

Lecture capture is being used by students in multiple ways. According to Gosper et al. (2010), 78.6% of students agreed that the lecture capture videos helped them pick up on something they missed in class and 76% of students reported that lecture capture videos helped them review complex material and prepare for exams. Elliot and Neal (2016) found that 87.8% of the students accessed the lecture recordings during the 1st year of the study and 84.2% watched at least 2 minutes of the recordings. During the 2nd year of the study, those numbers rose to 99.7% and 95.6%, respectively. Students also reported that lecture capture allowed them the opportunity to expand their notes on a subject and to find possible exam hints (Elliot & Neal, 2016; Gosper et al., 2010).

Identifying how students are using lecture capture technology is the key to understanding how this technology can be effective. The majority of students (71%) in the Gosper et al. (2010) study found themselves watching the entire recorded lectures, as opposed to specific segments.

Elliot and Neal (2016) reported that students were watching an average of 30 minutes of recorded lectures, which promoted the idea that students are selecting which concepts to review during their study routine. Having the ability to only watch specific segments multiple times was a habit of many students (56%) (Gosper et al., 2010). Interestingly, only about half the respondents agreed that they used the technology regularly throughout the semester (Gosper et al., 2010). This was not the case in the later Elliot and Neal (2016) study, where 95% of students were accessing videos regularly throughout the semester.

Student characteristics and demographics also have a significant impact on how students use lecture capture technology (Gosper et al., 2010). Age and generation play a role in how students strategically make use of lecture capture (Ebbert & Dutke, 2020; Gosper et al., 2010). Typically, younger students are more strategic in their use of lecture capture (Ebbert & Dutke, 2020; Gosper et al., 2010). This is due to their connection with technology and their social nature (Ebbert & Dutke, 2020; Gosper et al., 2010). Common characteristics and general connections to learning were different based on age groups. The older generation particularly valued the idea of being present for the lecture and the interactions with the lecturer. The younger generation valued the idea of being participants in a social network all seeking the same goal (Ebbert & Dutke, 2020; Gosper et al., 2010).

Lecture Capture and Multimedia Learning

Mayer (2002) defined multimedia learning as learning from pictures and words. Pictures can include graphics, video, animation, or illustrations. The use of video and the web is connected through the communication of video and text. Multimedia-rich items are uploaded to learning management systems to support active learning. This can include PowerPoints and lecture capture videos (Mesfin et al., 2018). Multimedia learning is grounded in the cognitive

load theory (Dey et al., 2009; Yang et al., 2018). Cognitive load theory attempts to establish the requirements for committing information or skills to memory based on three factors: sensory, working, and long-term memory (Dey et al., 2009; Yang et al., 2018).

According to the cognitive load theory, sensory memory filters out unnecessary information and passes the information on to the working memory (Dey et al., 2009; Yang et al., 2018). Multimedia learning takes place when students are presented instruction with an integration imagery (video, graphs, pictures) and text (Dey et al., 2009; Yang et al., 2018). Humans will select the images and text and transfer them to working memory. Working memory will process or discard the information. In working memory, learners will organize the information and integrate the new knowledge with information stored in long-term memory (Dey et al., 2009; Yang et al., 2018). The processed information will be stored into long-term memory (Dey et al., 2009; Yang et al., 2018). Overloading or putting stress on working memory will limit the amount of information that is processed into long-term memory. Due to the limited capacity of working memory, instructors must be creative with their instruction to ensure concepts are migrated to long-term memory (Dey et al., 2009; Yang et al., 2018). An instructor's attempt to engage students is, in effect, an attempt to reduce the load on working memory (Dey et al., 2009; Yang et al., 2018). Mayer (2001) suggested that multimedia learning relieves the stress placed on working memory and allows information to be optimized.

Mayer (2001) based his theory on three assumptions. The initial assumption is the dual channel assumption. Humans can receive and process information across separate audio and visual channels. Due to this, humans can receive information through multiple inputs (Dey et al., 2009; Yang et al., 2018). For example, students can watch a recorded lecture progressing through a PowerPoint and still be able to reduce the stress on cognitive load (Dey et al., 2009; Yang et

al., 2018). Humans can only process a limited amount of information in each channel according to the limited processing assumption (Dey et al., 2009; Yang et al., 2018). Although humans are able to interpret multiple inputs, they are still limited in the volume of information (Dey et al., 2009; Yang et al 2018). Multimedia learning is a natural function of human cognitive capacity due to the active processing assumption (Dey et al., 2009; Yang et al., 2018). Humans are "active processors" and our cognitive capacity is actively seeking to understand multimedia presentations (Dey et al., 2009; Yang et al., 2018).

Mayer (2001) introduced seven design principles and many of these can be found in lecture capture of instruction through Zoom (Mesfin et al., 2018). These principles are influenced by the split-attention effect (Dey et al., 2009). Students who are engaged by two sources of learning will not receive effective instruction (Dey et al., 2009; Yang et al., 2018). According to Mayer (2001), one source of learning and, ideally, a live instructor is the most effective source of learning. This is true even if the source of learning is virtual (Dey et al., 2009; Yang et al., 2018). Students have expressed positive feedback when the learning agent was a life-like character or a human themselves (Dey et al., 2009; Yang et al., 2018). Results have shown that having an on-screen agent, such as a presenter using Zoom, did not contribute to split attention effect (Dey et al., 2009; Yang et al., 2018). This situation will decrease cognitive load and increase motivation. Studies illustrated that having an on-screen agent or narrator increased student achievement (Dey et al., 2009; Yang et al., 2018).

Online agent narration, whether real or animated, has been shown to have a positive impact on student achievement (Dey et al., 2009; Yang et al., 2018). Social cues and presence that allow students to identify with the agent increases engagement and student achievement (Dey et al., 2009; Yang et al., 2018). Having the image of a professor does not distract students

from learning. However, previous studies could not find out the effect of quality images on the performance of students (Dey et al., 2009; Yang et al., 2018).

Live participants in studies have been documented to only focus on the instructor rather than the slides (Dey et al., 2009; Yang et al., 2018). Instruction that has been prerecorded has been shown to have participants that focused on the explanation on the slides (Dey et al., 2009; Yang et al., 2018). This suggested that online instruction requires a quality video image of the professor (Dey et al., 2009). In one study, courses and programs that were heavy on equations, graphs, or charts may have increased student achievement when providing on-line narration of explanations using PowerPoint slides (Dey et al., 2009; Mesfin et al., 2018; Yang et al., 2018).

Lecture Capture and Engagement

Research has shown that student engagement is directly linked to student success in a course or program (Alicea et al., 2016; Garrett, 2011; Roberts et al., 2018). Several factors contribute to overall engagement of a student during a course (Alicea et al., 2016; Tas, 2016). The environment of a classroom and, more importantly, the physical space can affect student engagement. Classrooms that are designed to promote collaboration will increase engagement of students throughout their time in the room and course (Alicea et al., 2016; Garrett, 2011; Tas, 2016).

Another primary factor in student engagement is the teacher (Alicea et al., 2016; Danielson et al., 2014; Tas, 2016). The relationship between a teacher, the environment, and the student cannot be overstated (Alicea et al., 2016; Danielson et al., 2014; Garrett, 2011; Tas, 2016). This relationship between learning and the learning environment is a strong predictor of student engagement (Alicea et al., 2016; Danielson et al., 2014). Studies have shown an increase in student engagement in courses that exhibit a high degree of teacher-student interaction (Alicea

et al., 2016; Danielson et al., 2014; Garrett, 2011; Tas, 2016). A teacher's immediacy behavior, communication cues, and their use of the classroom environment can determine the level of engagement by students (Alicea et al., 2016; Danielson et al., 2014; Tas, 2016). Lecture capture is a means for teachers to increase engagement in the classroom by creating a platform that will strengthen those relationships between student learning and the teacher (Bennett, 2018; Danielson et al., 2014; Van Hof, 2016).

The student's level of engagement can have an effect on student success. Research using the SCEQ has produced results that suggest that students with a higher SCEQ score more than likely be successful in a course. Course engagement contains four subscales according to Handelsman et al. (2005). Skills engagement can have a positive impact on student performance. The higher the skills engagement score, the more likely a student will be successful in their courses and they will adopt strategies, such as viewing recorded lectures, to be successful or increase their learning (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018).

Emotional engagement scores, measured by the SCEQ, can also predict student performance. Student performance can be positively impacted by the student's level of emotional engagement (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018). A student's attempt to apply content to real-word or personal examples can increase the student's chance of success in a course and has been shown to increase student learning (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018).

Participation and interaction engagement can be different for students depending on the course or instructional format. Students who prefer or are in courses that are predominantly lecture may not have a particularly high participation and interaction engagement (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018). For this reason, participation and interaction

engagement may not always have an effect on student performance or the students' attempt to use strategies to encourage interaction (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018).

Performance engagement is the determination of the student to perform well in a course or program based on their goals. This engagement subscale has been found to be a strong predictor of student performance (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018). Students who illustrated a high-performance engagement score were more likely to perform better in a course or program (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018).

Summary

Lecture capture technology and active learning platforms have given students the extra resources that enhance students' probability of success (Bosshardt & Chiang, 2016; Van Hof, 2016). Students now have a resource that will give them further exposure to their teacher's instruction. Students are more engaged in the course by teachers who insert active learning strategies into their instruction, and effectively use multimedia learning and positive immediacy behavior (Bosshardt & Chiang, 2016; LeFebvre & Allen, 2014; Van Hof, 2016). Lecture capture allows teachers to enhance their social presence through digital means. Students are able to review material in their own time which will enhance their study methods (Ebbert & Dutke, 2020; Elliot & Neal, 2016; LeFebvre & Allen, 2014). The ability to review lectures through an online platform will reduce the cognitive load on students and promote the transfer of knowledge and skills to long-term memory (Ebbert & Dutke, 2020; Elliot & Neal, 2016; Yang et al., 2018).

Pharmacy is a practice that relies on communication to counsel the patients or consult with local physicians. Pharmacy education is also a very social form of learning. Lecture capture ensures students can be exposed to this form of instruction through role models: their professors

(Marchand et al., 2014). Professors will be able to make use of humor and gestures to connect with their students. With unlimited availability of the lecture recording, students will have more opportunities to be exposed to the teacher's immediacy behavior (LeFebvre & Allen, 2014). This will enhance the engagement of the student and, ultimately. the success of the student (Garrett, 2011).

CHAPTER III

METHODS

The purpose of this study was to examine the impact of lecture capture use and student engagement on 1st year pharmacy students' exam scores and to explore the relationship between engagement and the time students spent watching recorded lectures. This study is a quantitative study because the data being collected were numerical in nature. Numerical data included results of a Likert-style questionnaire, the time students spent using recorded lectures, and student exam scores.

Setting

The study took place at a School of Pharmacy at a university located in the southeast. Subjects were enrolled as 1st year pharmacy students (P1). The university is an R1 Research university and includes 16 academic divisions.

The pharmacy course for this study was held in a room that has the capacity for 257 people and is designed for lecture-style instruction. The room has a stage with large projection system. The room has been configured to support hybrid and remote instruction. The main lectern contains the Extron system that manages the inputs. Primarily, users in this room use the room PC during instruction. This was the case throughout this entire course. The Extron system also controls the projector screen. The Tesira-forte, inside the lectern, controls the ceiling microphones. The lectern also contains three receivers that control the lapel and handheld microphones. Connected to the PC is an interactive monitor. This monitor is used by professors to draw on or highlight information on PowerPoint slides. For this course, the professor typically

used the projector screen, the room PC, one lapel microphone, the Zoom client application, and PowerPoint slides downloaded from Blackboard. Remote instructors or guest speakers were able to answer questions from the audience using the ceiling microphones.

All class sessions were recorded through the Zoom application of the desktop computer. The Zoom application was used to record lectures and for connecting remote presenters to the classroom. The microphone input was set to the Tesira forte and the output was set to the speakers in the room. The room possesses a device called an inogeni that allows for dual camera inputs. Each recorded session had both the presenter and audience view of the room during the lecture. During each session, a live transcript was enabled. Each recorded lecture was downloaded from Zoom and transferred to Panopto by a teaching assistant, within this course's dashboard on the study university's Blackboard learning management system.

Participants

Participants were enrolled as 1st year pharmacy students (P1) in the School of Pharmacy at the study university. P1 students have either graduated with a 4-year degree or completed the prerequisites to pursue a bachelor's of science in pharmaceutical sciences. A typical P1 class will enroll 115 students. The 2021 P1 class had an enrollment of 102 people. The average Pharmacy College Admissions Test (PCAT) score is a 395.0385. Sixty-nine percent of the class is female and 67% of the class was from the southeast state where the study university is located. Fifty members of the class were considered "regular entry." Regular entry students have completed the prerequisites for entry into Pharmacy School and/or they have earned a Bachelor's degree. Of those 57 members, 6% had earned a previous degree. The majority (99%) of the class had completed one or more courses at the study university prior to being admitted to the Pharmacy

School. The diversity percentage was the largest of any class prior to this year. Thirty-one percent of the class was represented by minorities.

Instrumentation

The Student Course Engagement Questionnaire (SCEQ) was used to measure engagement of students in the P1 class. The SCEQ (Handlesman et al., 2005) is a 23-item instrument designed for use with undergraduate students enrolled in traditional, on-campus courses. The SCEQ was found to measure four dimensions of college student engagement with their courses: Skills Engagement, Performance Engagement, Participation/Interaction Engagement, and Emotional Engagement. Skills engagement was represented with nine items on the questionnaire. Participation/Interaction engagement was represented with six items on the questionnaire. Emotional engagement was represented by five items on the questionnaire. Finally, performance engagement was represented by three items on the questionnaire. The SCEQ has been used in multiple studies to identify the engagement style of students enrolled in traditional, online, and hybrid courses (Brown et al., 2017; Handlesman et al., 2005; Mohd et al., 2020; Mosholder & Tolman, 2012; Sweet, 2018).

According to Handlesman et al. (2005) all factors showed reasonable reliability that ranged from 0.76 to 0.82. The correlation between all factors was also moderately low. The Mohd et al. (2020) study revealed the highest correlation of all factors was .44, which mirrored the Handlesman et al. study (2005). Both of these studies also concluded a distinct and unique difference between the four factors used in this assessment (Handlesman et al., 2005; Mohd et al., 2020).

Research Questions

1. What effect does the total amount of time students view recorded lectures have on students' exam scores?
2. Is there a relationship between student engagement scores and exam scores?
3. Does engagement score predict use of recorded lectures?

Data Collection

Permission to perform this study was requested by the researcher from the School of Pharmacy Office of Academic Affairs and from the professor of the course. The request was approved. The use of student data for this study was requested and granted by the university's Institutional Review Board (IRB) (see Appendix B). The Student Course Engagement Questionnaire (SCEQ) was uploaded in the University of Alabama Qualtrics system for deployment to students and collection of the initial data. A training session was conducted by the researcher with the teaching assistant to review protocol for recording the lectures and transferring the .mp4 files to Panopto in Blackboard.

The researcher posted the research information sheet and the informed consent form in the Content section on the course's Blackboard site. During the first class session, the researcher presented the research information sheet and consent form to the potential participants. After receiving consent, the participants went to a link (also in the content section on Blackboard) to complete the SCEQ on Qualtrics. A waiver of documented consent was requested by the researcher and granted by the University's Institutional Review Board (IRB). The waiver of documented consent was put in place to eliminate any breach of confidentially since there would be no way to link the participants to the study if consent was waived. Participants completed the Qualtrics survey with SCEQ items in class. The answers were transferred to a Microsoft Excel

spreadsheet for easy insertion into SPSS. Data were stored in UA Box. Participants were not identified by name, but by a unique identifier to keep track of data responses and the participants' eventual exam scores (see Appendix C).

No other data were collected until the course concluded with a final exam. Participants were involved in this study for the duration of a semester. After the final exam, aggregate data from Panopto were collected. The researcher was able to download the total time that participants watched the recorded lectures. Each participant's total time watching the recorded lectures was uploaded into the spreadsheet that contained the participant responses to the SCEQ. The final exam score of each participant was uploaded into the spreadsheet containing the SCEQ responses and the total time.

Data Analysis

After participants completed the SCEQ questionnaire, an exploratory factor analysis was used to identify each construct within engagement. According to Brown et al. (2017), the previous factors were identified as *Skills Engagement*, *Emotional Engagement*, *Participation/Interaction Engagement*, and *Performance Engagement*. A multiple regression analysis of the SCEQ indicated the degree to which each factor contributed to the participants' exam grades.

Data collected from Panopto analytics provided the total time participants viewed the lecture recordings. The overall times were categorized into groups and each group's scores were used to calculate a median exam score for each group. A simple regression analysis was performed to identify whether the total skills engagement predicted recorded lecture usage and overall time. Table 1 details the research questions and statistical test for each research question.

Table 1

Research Questions and Statistical Analyses

Research Question	Statistical Test
What effect does the total amount of time students view recorded lectures have on students' exam scores?	Groups created based on median time watching videos were compared to the overall group exam score median.
Is there a relationship between student engagement scores and exam scores?	Multiple regression analyses of the SCEQ indicate the degrees to which each factor contributes to the students' exam grades.
Does engagement score predict use of recorded lectures?	A simple regression analysis was performed to identify whether the total skills engagement can predict recorded lecture usage and overall time.

CHAPTER IV

RESULTS

This study served to study the effect of student engagement and the amount of time spent watching recorded lectures on students' final exam scores. The study also was conducted to identify whether student engagement can predict how long students watch the recorded lectures. Third, the study was conducted to identify any relationship between the amount of time students watch the recorded lectures and their performance on the final exam.

Context of the Study

The current study targeted professional students enrolled in a 1st year pharmacy course offered at a 4-year, public research university in the southeastern United States. The students enrolled in the course were chosen as a convenience sample, which was a known limitation of the research. The course enrolled 98 students and 97 chose to participate in the study.

The course is a 2-hour elective through the university's School of Pharmacy. All the students enrolled in the course were enrolled in the School of Pharmacy seeking a B.S in Pharmaceutical Sciences. The students in the course were either college graduates or considered to have Junior status based on the courses they had completed. The Qualtrics survey software was used for data collection. Identifiable data were collected and then coded. The identifiable data were the student's name and email address. The identifiable information and deidentified data were stored in UA Box.

After presenting the research information and consent forms, 97 students agreed to participate in the study. The participants completed the Student Course Engagement Questionnaire (SCEQ). This questionnaire allowed participants to scale their level of engagement based on statements that relate to their own engagement. Due to the evaluation tool involving participants self-reporting this information, this type of practice was reported as a limitation.

The SCEQ data were then analyzed using an exploratory factor analysis. An exploratory factor analysis was used to identify the factor structure of the engagement tool and to determine the questionnaire items that loaded onto each factor. A multiple regression analysis was conducted to determine which engagement factor had a significant effect on the exam scores.

Calculations from the aggregate data revealed that the total time for recorded lectures in this course was 716.93 minutes. Of the 97 participants, 45 participants included the recorded lectures in their study routines. The total time of the 45 participants was divided among three categories and their group percentage time was compared to the median exam score. A simple regression analysis was then conducted to determine whether the total skills engagement could predict the total time participants used the recorded lectures.

Instrument Descriptive Statistics

This study used the SCEQ to determine the engagement level of each participant prior to the course. The SCEQ consisted of 23 Likert-type questions; *1* identified a statement that was not at all characteristic of the participant and *5* identified a statement as very characteristic of the participant. One hundred percent of the participants completed

the SCEQ. Three of the statements were removed from the SCEQ due to them not being relatable to the standards at the School of Pharmacy. For example, students are required to be present in class and to do all homework assigned.

Mean responses for the 20 items ranged from 2.47 for Item 6 (*Going to the professor's office hours to review assignments or tests, or to ask questions.*) to 4.42 for Item 13 (*Putting forth effort*). Standard deviations were highest for Item 10 (s = 1.299) (*Looking over class notes between classes to make sure I understand the material*), and lowest for Item 13 (s = 0.814) (*Putting forth effort*). When considering all participants' ratings, the 20 items collectively yielded a mean score of 3.494 (s= 1.039).

Findings

Research Question 1

The first research question asked, *what effect does the total amount of time students view recorded lectures have on students' exam scores?* Groups were created based on the percentage amount of recorded lectures students watched out of the total recorded lectures available. In total, 716.93 minutes of recorded lectures were available to students. The following groups were created using this method: 30% or greater, 10% to less than 30%, 10% or less, and 0. The group categories illustrate the percentage of the total recorded minutes participants in that group watched throughout the semester. Table 2 summarizes the results of this analysis.

Table 2

Percentage Categories, Median Time, and Median Exam Score

Percentage of Total Time Students Watched Available Recorded Lectures (716.93 min)	Median Time (min)	Mean Time (min)	Median Exam Score (/100pts)	Mean Exam (/100pts)	Standard Deviation	Range
30% or + (n=12)	284.95	394.06	83	80.33	181.55	224.24-736.09
10%- <30% (n=10)	103.16	112.24	78	76.40	38.43	72.52-188.22
Less than 10% (n=23)	6.15	11.83	82	79.74	11.94	0.15-36.40
0 (n=52)	0	0	81	81.08	0	N/A
Total watched	36.40	136.07	81	79.16	186.98	0.00-736.09

Descriptive Statistics for Instrument Questions

First, it was determined that the dataset for the SECQ was suitable for exploratory factor analysis (EFA). It was observed that Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.724 and Bartlett's Test of Sphericity had a significance of <.001.

Principal axis factoring was performed to extract variables from the correlation matrix. Initially, the EFA isolated five meaningful factors. However, one of the factors had an extraction sum of square loadings below 1%. This factor was removed and the factors were restricted to four. Four factors were consistent with previous research using the Student Course Engagement Questionnaire (SCEQ) (Brown et al., 2017; Handelsman et al., 2005).

The extraction commonalities between factors ranged between 0.310 and 0.856. The Rotated Component Matrix (see Table 3) determined that four meaningful factors existed.

Four factors accounted for 48.723% of the variance. The component loadings are according to statistical standards. The component plot in rotated space (see Figure 1) shows the component loadings in three-dimensional space.

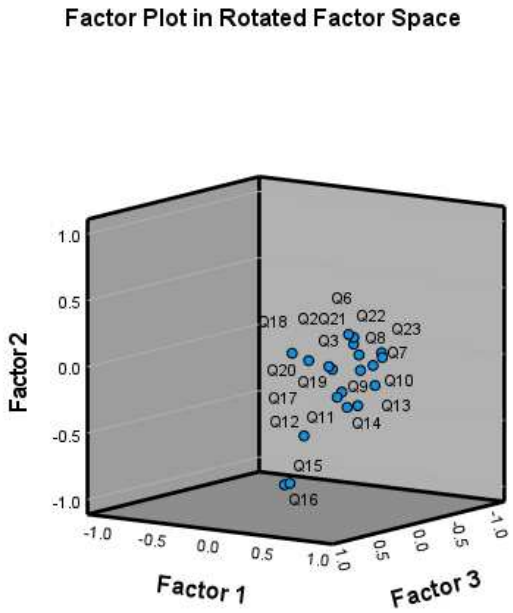
Table 3

Rotated Component Matrix Resulting From Factor Analysis

	Factor			
	Skills	Emotional	Performance	Participation
Item2				.518
Item3	.384			.455
Item6	.467			
Item7	.524	.479		
Item8		.737		
Item9	.638			
Item10	.567			
Item11		.458	.331	
Item12			.559	
Item13	.573		.330	
Item14	.606			
Item15			.903	
Item16			.919	
Item17	.328			.338
Item18				.571
Item19		.302		.446
Item20	.535			
Item21		.830		
Item22		.748		
Item23	.618	.340		

Figure 1

Factor Plot in Rotated Space



It was expected, based on previous SCEQ and engagement research (Brown et al., 2017; Handelsman et al., 2005), that the 20 items in the SCEQ instrument would load as shown in Table 4. As expected, seven items loaded into Skills Engagement, which Handelsman et al. (2005) described as student engagement while practicing study skills. Skills engagement accounted for 25.416% of the variance. Examples of skills engagement (according to the SCEQ) include taking good notes in class and being organized.

Table 4

Expected Versus Actual Factor Loadings

	Actual Factor Loading	Expected Factor Loading
Taking good notes in class	Skills Engagement	Skills Engagement
Looking over class notes between classes to make sure I understand the material	Skills Engagement	Skills Engagement
Putting forth effort	Skills Engagement	Skills Engagement
Being organized	Skills Engagement	Skills Engagement
Staying up on the readings	Skills Engagement	Participation Engagement
Making sure to study on a regular basis	Skills Engagement	Skills Engagement
Listening carefully in class	Skills Engagement	Skills Engagement
Thinking about the course between class meetings	Emotional Engagement	Emotional Engagement
Finding ways to make the course interesting to me	Emotional Engagement	Emotional Engagement
Really desiring to learning the material	Emotional Engagement	Emotional Engagement
Finding ways to make the course material relevant to my life	Emotional Engagement	Emotional Engagement
Applying the course material to my life	Emotional Engagement	Emotional Engagement
Participating actively in small group discussions and/or online activities	Participation Engagement	Participation Engagement
Asking questions when I don't understand the instructor	Participation Engagement	Participation Engagement
Going to the professor's office hours to review assignments or tests, or to ask questions	Participation Engagement	Skills Engagement

Table 4 (con't)

	Actual Factor Loading	Expected Factor Loading
Having fun in class	Participation Engagement	Participation Engagement
Helping fellow students	Participation Engagement	Participation Engagement
Being confident that I can learn and do well in class	Performance Engagement	Performance Engagement
Getting a good grade	Performance Engagement	Performance Engagement
Doing well on tests	Performance Engagement	Performance Engagement

The second factor according to the exploratory factor analysis was emotional engagement. Emotional engagement accounted for 9.882% of the variance. As expected, five items loaded onto emotional engagement, which can mean emotional involvement with the class material (Handlesman et al., 2005). Examples of emotional engagement, according to the SCEQ, include really desiring to learn the material and finding ways to make the course relevant to my life.

The third factor according to the exploratory factor analysis was performance engagement. Performance engagement accounted for 7.635% of the variance. As expected, three items loaded onto performance engagement (Handlesman et al., 2005). Items 15 and 16 recorded the largest component loadings on the rotated factor matrix with 0.903 and 0.919, respectively. Performance engagement can be described as engagement through levels of performance in a class (Handlesman et al., 2005). Examples of performance engagement, according to the SCEQ, include getting a good grade and doing well on the tests.

The fourth factor according to the exploratory factor analysis was participation/interaction engagement. Participation/interaction engagement accounted for 5.790% of the variance. As expected, five items loaded onto participation/interaction engagement (Handlesman et al., 2005). This form of engagement can be described as engagement through participation in class and the interaction with the professor and other

students (Handlesman et al., 2005). Examples of participation/interaction engagement, according to the SCEQ, include asking questions when I do not understand the instructor and having fun in class.

Unexpectedly, two factors loaded onto different components during the exploratory factor analysis. *Staying up on the readings* loaded onto participation/interaction engagement and *Going to the professor's office hours to review assignments or tests, or to ask questions* loaded on skills engagement. Three of the original 23 questionnaire items were removed from the analysis. Students enrolled in the professional program at the School of Pharmacy are required to come to class. Item 5, *Coming to class every day in person or over zoom* was removed for that reason. Item 1, *Raising my hand in class* and Item 4, *Doing all the homework assignments (optional or required)* did not load onto any factors. These items do not relate to the professional students, so these items were also removed.

Research Question 2

To answer the second research question, whether there was a relationship between student exam scores and student engagement scores, a multiple regression analysis was performed. The results showed that performance engagement was the only factor that contributed to student exam scores. The result of the multiple regression suggests that the predictor is 25.1% of the variance and that performance engagement is a significant predictor of student's exam scores in this course ((F 4,92) = 7.705, p= <.001, with an R^2 of .251).

Research Question 3

To answer the third research question, whether skills engagement can predict recorded lecture usage, a simple regression analysis was performed. According to the simple regression results, skills engagement is not a predictor of recorded lecture usage. Simple

regression analyses were also performed using the other three engagement factors. The results showed that none of the remaining engagement factors were predictors of recorded lecture usage (see Tables 5 and 6).

Table 5

Descriptive Statistics From the SCEQ and Exam Scores

Engagement Factor	Mean	Median	Standard Deviation	Coefficients (β)	Significance (p)	Range
Skills	24.21	25	4.97	-.103	.273	8-33
Emotional	18.35	19	3.89	-.100	.287	8-25
Participation/ Interaction	11.78	12	2.32	-.166	.070	6-15
Performance	15.56	15	3.53	2.25	<.001	7-24
Exam Scores	80.19	82	11.12			48-98

Table 6

Engagement Scores Predicting Lecture Capture Usage

Engagement Factor	Mean	Median	Standard Deviation	Coefficients (β)	Significance (p)	Range
Skills	24.21	25	4.97	-4.360	0.425	8-33
Emotional	18.35	19	3.89	3.441	0.651	8-25
Participation/ Interaction	11.78	12	2.32	-0.414	0.990	6-15
Performance	15.56	15	3.53	3.404	0.687	7-24

Summary

The purpose of the study was to identify a relationship between engagement and recorded lecture usage and determine whether either of those variables had an effect on student exam scores in a semester course. After further analysis, watching the recorded lectures using lecture capture, the median score of participants who incorporated the videos into their study routines had higher overall median scores than participants who did not incorporate the videos into their study routines. An exploratory factor analysis was conducted to identify and confirm the four factors (Skills, Emotional, Participation/Interaction, and Performance) that influenced overall student engagement. Second, a multiple regression analysis suggested that performance engagement is a significant predictor of student exam scores. Finally, a simple regression analysis was performed to determine whether skills engagement or another type of engagement could predict how long students were watching the recorded lectures. The results suggested that none of the engagement factors produced by the exploratory factor analysis could predict student usage.

CHAPTER V

DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

The purpose of this quantitative study was to determine the effects of engagement and the use of recorded lectures on exam grades. The Student Course Engagement Questionnaire (SCEQ) was incorporated into this study to determine the level of student engagement. The SCEQ was based upon the framework established by Astin (1984), Brown et al. (2017), and Handelsman et al. (2005). Engagement can be categorized into four unique factors: Skill, Emotional, Participation/Interaction, and Performance (Brown et al., 2017; Handelsman et al., 2014).

A student's level of engagement has been shown to be a result of latent factors and can have a direct link to student success (Roberts et al., 2018). Further research was needed to determine whether a student's level of engagement could determine student outcomes.

Students have expressed a desire to continue the availability of lecture capture recordings due to the increasing addition of the recording to their study habits (Bennett, 2018). According to Elliot and Neal (2016), further research is needed to determine the effect of using the lecture recordings on a student's exam grades. Much of the current research did not attempt to explore or did not have access to exam grades following previous studies (Bennett, 2018; Brown et al., 2017).

Chapter V includes a discussion of the findings of this study as described in Chapter IV, including implications and conclusions. It also includes recommendations for future research.

Evaluation of Findings

Research Question 1

The first research question examined the relationship between the amount of time participants viewed the recorded lectures and their performance on the final exam. There are many variables that determine success on the final exam (Nordmann et al., 2019). However, students who are considered high performing and attend class regularly are known to have higher exam scores if they are making use of the recorded lectures through lecture capture (Nordmann et al., 2019). There are several variables that could have been involved in this result. However, the current study's findings suggested that participants are making use of these recorded lectures in a variety of ways to achieve success in the classroom. Unlike the Nordmann et al. (2019) study, no other variables, such as GPA, were introduced into the current study.

In the current study, the median score for participants who made use of the recorded lectures was not overwhelmingly in favor of the addition of this study tool, but the results did suggest that students benefit for the incorporation and their exams scores can justify this claim (Akimov et al., 2018; Bosshardt & Chiang, 2016; Marchand et al., 2014; Van Hof, 2016).

For the current study, participant groups were created based on the average amount of time the participants spent watching the recorded lectures. After analyzing the amount of time participants watched the videos, it was confirmed that four distinct groups existed as shown in previous studies (Brooks et al., 2011; Ebbert & Dutke, 2020). The group that watched 30% or more of the total recorded lectures would represent the high activity group that was identified in previous studies (Brooks et al., 2011; Ebbert & Dutke, 2020).

According to previous research, these students used lecture capture in most or all of their study routines (Brooks et al., 2011; Ebbert & Dutke, 2020). The groups that watched 10-20% and less than 10% would be classified as differed or "just in time" as compared to previous studies (Brooks et al., 2011; Ebbert & Dutke, 2020). As noted in previous studies, these participants either did not understand how to incorporate the recorded lectures into their study routine or waited until the end of the semester to start using the recorded lectures (Brooks et al., 2011; Ebbert & Dutke, 2020). The 10-20% group had the poorest performance on their exam, which could be a product of not understanding how to use the recorded lectures as study material or an attempt to perform better on the exams, as explained by previous studies (Brooks et al., 2011; Ebbert & Dutke, 2020). The less than 10% group had the second highest median score, which could be a result of using the recorded lectures to clarify specific content as noted in other studies (Brooks et al., 2011; Ebbert & Dutke, 2020). The final group did not use lecture capture throughout the semester and could be classified as disillusioned learners. These participants did not incorporate the recorded lecture into their study routines or they did not understand the value in using the material to study, as described in previous studies (Brooks et al., 2011; Ebbert & Dutke, 2020).

The SCEQ and Exploratory Factor Analysis

The SCEQ was incorporated in this study for determining the effect of each engagement factor on student achievement and to identify whether engagement is a predictor of how long participants watched the recorded lectures. Overall, these participants can be considered an engaged group of students, due to the mean of the responses being 3.5 as described by Handelsman et al. (2005). The exploratory analysis confirmed four factors that were isolated using the original SCEQ studies (Brown et al., 2017; Handelsman et al., 2005). Although Item 10

(*Looking over class notes between classes to make sure I understand the materia*l) was not directly related to this study, this is a study skill much like the review of recorded lectures (Brown et al., 2017; Handelsman et al., 2005). This item produced the largest standard deviation and possibly could have been used as a predictor of lecture capture usage. The findings reported in the SCEQ were used in the multiple regression and simple regression analyses.

Research Question 2

A multiple regression analysis of engagement factors was performed to determine which factors had an effect on the participants' exam scores. According to the analysis, performance engagement scores directly affected the participants' exam scores. Pharmacy students are highly motivated and for this sample, performance engagement was a strong variable that determined their grades **(**Rizvi, 2022). Performance engagement has been proven to be a strong predictor in student success (Liu et al., 2020). Intrinsic motivation is dependent upon the individual student, but students who are in pharmacy school would mostly be comprised of students who have a high degree of intrinsic motivation (Marchand et al., 2014).

Research Question 3

A simple regression analysis was performed to determine if there is a predictable relationship between the engagement factors, determined during the exploratory factor analysis, and the overall usage of recorded lectures. According to the analysis, none of the engagement factors were significant predictors of the participants' usage of recorded lectures. In answering the research question, these findings suggested that although engagement in a course can predict success in a course, skills engagement cannot predict how students will choose to study for a particular course (Sweet, 2018). According to literature, the higher the SCEQ score or subscore, the greater the chance the student performs well in the course (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018). However, these

results suggested that engagement does not necessarily determine how a student will master the material throughout a semester (Sweet, 2018).

Implications

The outcome of this research provided more validation for the implementation of lecture capture into higher education courses. This is accurate even in courses that enroll highly motivated students, such as courses offered at a pharmacy school (Marchand et al., 2014). The current study suggests that the availability of lecture capture provided participants the necessary resources to produce a higher score on the final exam as opposed to not having the recorded lectures available for review (Elliot & Neal, 2016; Van Hof, 2016; Zawilinski et al., 2016). Students who fully implemented lecture capture into their study routines or used the service to review specific content were more likely to receive a higher score (Elliot & Neal, 2016; Topale, 2016; Van Hof, 2016; Zawilinski et al., 2016).

Lecture Capture and Study Skills

The current study also confirmed that students were using lecture capture differently based on their needs and preferences in regard to their study routine (Ebbert & Duke, 2020; Elliot & Neal, 2017; Gosper et al., 2010). Participants had the freedom to choose how they wanted to incorporate the recorded lectures and to what length they reviewed the material. However, from these results it could possibly be determined that not all students understand or have discovered the value in using the recorded lectures as a source of study material (Ebbert & Duke, 2020; Elliot & Neal, 2017; Gosper et al., 2010). One of the many facets of higher education is the eventual development of proper study habits to succeed in a program of choice. Students need a development of study skills that go beyond reviewing notes. Modern education gives students a vast array of materials and methods to master content, but

many students are not equipped with the skills to use all the resources that are available (Johnson et al., 2018).

SCEQ and Engagement

Using the data from the SCEQ, this research confirmed the existence of four factors that contribute to overall engagement (Brown et al., 2017; Handelsman et al., 2005). However, a few questionnaire items loaded onto other factors, which suggests engagement is rather fluid regarding this particular questionnaire. In other words, items listed as skills engagement could be identified as participation engagement. Although this current SCEQ meets the needs of the current educational landscape, there is a possibility that this instrument may become outdated with the current digital innovations in classrooms. Items that produced the strongest factor loading (0.7 or greater) resided in the performance and emotional engagement categories. This suggests that for professional students, performance and emotional engagement are strong components of their overall engagement (Danielson et al., 2014; Sweet, 2018). Specifically, two items in the performance engagement category scored in the 0.9 + range. This result suggests that one of the primary and motivating factors for this student sample was the goal of doing well in the course (Sweet, 2018).

Success in the course or program is a motivating factor for many students in a professional program (Danielson et al., 2014; Sweet, 2018;). The results of the multiple regression analysis revealed that performance engagement score was a predictor for exam performance. This suggests that if students are determined to do well on the exam or in the course, they ultimately will seek out resources and methods to earn the grade they desire (Brown et al., 2017; Handelsman et al., 2005). Encouragement and motivating students to do well in a course can help students develop their performance engagement who are lacking in

that category. Highly motivated students should be given opportunities to grow by giving them the freedom to choose how to further develop their performance engagement.

Skills Engagement vs. Recorded Lecture Usage

Another outcome to this research was the realization that skills engagement cannot predict how students will use the recorded lectures. This suggests that a student's level of skill engagement does not determine what tool they will use to review and understand material or how often the student will use the tool. The linear relationship between skills engagement and total time (see Appendix D) does possibly suggest that there is a higher usage of lecture capture with students who produce a high score on the SCEQ, but that is purely an observation and not something that can be confirmed at this time.

Mayer, Cognitive Load, and Multimedia Learning

This study further supports lecture capture based on Mayer's cognitive load theory of multimedia learning (Dey et al., 2009; Mesfin et al., 2018; Yang et al., 2018). Multimedia learning, such as the use of recorded lectures, can relieve the stress placed on working memory and allows information to be optimized (Dey et al., 2009; Mesfin et al., 2018; Yang et al., 2018). Adding the review of recorded lectures to a study routine can enhance the amount of knowledge transferred to long-term memory. This study indicates that students can receive information across the multiple inputs being used during a recorded lecture and still relieve stress on cognitive load (Dey et al., 2009; Mesfin et al., 2018; Yang et al., 2018).

Humans can only process a certain volume of information, even across multiple inputs (Dey et al., 2009; Mesfin et al., 2018; Yang et al., 2018). Lecture capture and the use of recorded lectures in a study routine can alleviate this issue. This study indicates that having the recorded lectures readily available shortly after the lecture was presented and throughout

the semester gives students the opportunity to review and assimilate the information at a rate that is conducive to the individual (Dey et al., 2009; Mesfin et al., 2018; Yang et al., 2018). Students can be successful when given the opportunity to learn at their own pace.

The visual of the professor in the recorded lectures does not negatively affect the stress on cognitive load (Dey et al., 2009; Mesfin et al., 2018; Yang et al., 2018). This study could be used to validate the necessity to include a quality image of the professor when using lecture capture to create recorded lectures. The visual recording of the instruction can increase engagement and enhance student achievement (Dey et al., 2009; Mesfin et al., 2018; Yang et al., 2018). During the live lecture, students will focus on the instructor or the slides. Using lecture capture, students can focus on both inputs while using the recorded lectures during their study routines (Dey et al., 2009; Mesfin et al., 2018; Yang et al., 2018). As suggested in previous studies, having the narration and visual instruction available simultaneously enhanced the achievement of students enrolled in classes that make use of equations, graphs, or charts in their instruction (Dey et al., 2009; Mesfin et al., 2018; Yang et al., 2018). These elements are commonly found throughout instruction in many pharmacy school courses.

This study could promote the evaluation of lecture capture in a department's courses. Identifying the best practices of lecture capture use and how they positively impact students could enhance students' usage of these lectures. An evaluation could produce the need for more instructional support to work with teachers on editing videos or moving to only recording complex/important material.

Recommendations for Future Research

There are a number of recommendations for future research based upon the review of the related literature, results, conclusions, delimitations, and limitations of this study. In the future,

this study could be replicated with a larger population of pharmacy students, across multiple courses and levels in the professional program.

Course Selection and Faculty Best Practices

The course selected did not contain a full semester of traditional instruction. The first month of the semester was spent completing hands-on immunization training in a lab-based setting. Future studies should choose a traditional Monday, Wednesday, Friday course that allows for access to many recordings across a full semester and comparison of results to other courses that semester. Alternatively, future studies could compare results in P1 courses to results in P2 courses. This would provide information on how students at different levels of the program make use of lecture capture and how their different levels of engagement effect their performance and usage of the recorded lectures. Lecture capture usage can vary depending upon the level of interaction by the professor with the students. Lecture capture usage could possibly be higher in courses that are predominantly lecture and lack student-teacher interactions (Danielson et al., 2014).

Another possible variable change would be the use of the overall course grade as opposed to the exam grade. The course grade would be impacted by the overall course performance instead of one exam. Another possible alternative would be to only provide specific portions of the lecture to students through lecture capture. This could include important, detailed concepts or processes that possibly require further review.

Lecture capture maybe more effective if teachers would only record specific portions of the lecture as opposed to the entire class. A good portion of many lectures can be considered useless due to dead space or lack of valuable instruction. Recording complex subject matter could lead to better usage of the recorded lectures. Another concept would be to prerecord the

complex material and post those before or after the lecture. A teacher could edit the video using various tools and isolate the main points in the lecture. At this study's school, the transcript is always available, but these practices do add extra preparation time that the professor may not have throughout the week. The addition of instructional support could be needed in this situation.

Student Course Engagement Questionnaire

The SCEQ has proven to be a valid questionnaire to measure the engagement of students (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018). For this reason, a suggestion for future research would be to identify whether there is a relationship between total engagement and student usage of lecture capture. A 2-semester or 2-year course study following the same student sample could also monitor gains in student engagement and possible relationships with lecture capture usage. As students progress through a program, they will discover study routines that yield the most success.

The SCEQ is a self-reporting instrument. Future research may incorporate an alternative method of quantifying student engagement that does not require a self-report. This could possibly include "time on task" observations. Observers could measure how often students look at their phone or use applications on their computer that are not related to the instruction. A qualitative addition could be the measurement of student's emotional attachment to the recorded lectures. This could be done in focus groups. Another angle away from the SCEQ would be the inclusion of a learning preferences inventory. This could be another tool to possibly predict exam score or recorded lecture usage.

This study has contributed to the literature of the field by concluding the SCEQ did effectively measure the four components of engagement as originally intended. However, this researcher would suggest the further enhancement of this questionnaire to reflect post-covid

levels of instruction. The current instrument possibly does not support the current form of hybrid learning.

Sample Size and Variables

Future research should incorporate a larger sample size. The sample size for this study was 97. A larger sample size, such as the entire pharmacy school (all of whom are taking traditional classes) could provide results that are not seen in this study. Alternatively, future studies could use the same methodology, but across all of the sample's courses. Pharmacy students are enrolled in multiple classes each semester. Researchers could ascertain whether there is a difference in lecture capture usage across different subject areas during the same semester. Other variables, such as grade point average (GPA), age, or undergraduate major could be important factors in future studies.

Mayer, Cognitive Load, and Multimedia Learning

A separate qualitative study could boost the results of a future study to further confirm the effects of lecture capture on cognitive load. Cognitive load is positively supported through the proper mixture of audio and visual inputs (Dey et al., 2009; Yang et al., 2018). Lecture capture provides this support for students who may be overwhelmed with only one source of review material, whether that is written notes or the audio recording of the lecture (Dey et al., 2009; Yang et al., 2018). A future quantitative study could possibly determine the effectiveness of lecture capture on cognitive load by estimating the effects on cognitive load by identifying the difference between students who review the audio or visual versions of the recorded lecture. In other words, does the image of an instructor enhance the achievement of students, as suggested by multimedia theorists (Dey et al., 2009; Mesfin et al., 2018; Yang et al., 2018)?

Conclusion

The main emphasis of this study's investigation of lecture capture was to examine the validation of including lecture capture in pharmacy school courses. These results will contribute to overall research further proving the necessity of the inclusion of lecture capture technologies in higher education, especially professional education (Bosshardt & Chiang, 2016; Ebbert & Duke, 2020; Van Hof, 2016).

The motivation behind this research was due to the rapid increase of lecture capture throughout all courses in the sample's pharmacy school. This study was used to provide further validation of the necessity of incorporating lecture capture as a required component of learning resources provided to students. The study also intended to predict which students were more likely to make use of lecture capture as a regular method of reviewing material. The backbone of the study was composed of two main ideas: the idea that engagement cannot only predict the outcome of a course, but also predict how students will use the resources provided to them and that incorporation of lecture capture can have a positive impact on the final exam grade (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018).

The results of the study determined that student engagement has an effect on student performance in a course. Specifically, this sample size produced results that showed that performance engagement had a significant relationship with the final exam grade for the course (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018). This further validated the research that students who exude a higher engagement score will produce better results on an exam or in a course (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018).

Engagement was shown to be a strong predictor in performance, but engagement was not determined to be a predictor for lecture capture usage. Using lecture capture was suggested to be a *study skill* that can be categorized under the engagement component *skills engagement*. This

study's results showed that the relationship between skills engagement and lecture capture usage was not significant, even though the line graph illustrates that the higher the skills engagement the more likely the student used the recorded lectures to study throughout the semester.

The final component of this study was the validation of lecture capture in professional school instruction. Through the analysis of lecture capture usage by the participants in this study, the results determined that participants who used the recorded lectures produced by lecture capture throughout the semester performed better on the final exam than participants who did not use the recorded lectures to review material. This confirms the results from previous studies (Akimov et al., 2018; Elliot & Neal, 2016; Van Hof, 2016; Zawilinski et al., 2016).

It is important to note that generalizations of this study's findings must be made with caution due to the small sample size. Future research studies with larger sample sizes, across multiple courses and levels within the program could be carried out to derive more generalizable results. This study determined that the availability of recorded lectures through lecture capture has positive benefits for professional students, which confirms previous research (Elliot & Neal, 2016; Marchand, 2014; Van Hof, 2016; Zawilinski et al., 2016). The primary benefit is scoring better on the final exam. Second, this study determined that student engagement, especially performance engagement, is a significant predictor of student success in a classroom, even though engagement may not be able to predict what methods are used to reach that success (Brown et al., 2017; Handelsman et al., 2005; Sweet, 2018;).

In conclusion, this study has contributed to the practice of the field by recommending future studies to expand upon these results. The researcher suggests future research determine the effectiveness of this study's methodology on larger sample sizes, longer data collection periods, and with the inclusion of other variables, such as GPA or undergraduate major.

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APPENDIX A

STUDENT COURSE ENGAGEMENT QUESTIONNAIRE (SCEQ)

STUDENT ENGAGEMENT QUESTIONNAIRE

To what extent do the following behaviors, thoughts, and feelings describe you, in this course. Please rate each of them on the following scale:

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

1. _____ Raising my hand in class or answering questions in class
2. _____ Participating actively in small group discussions and/or online activities
3. _____ Asking questions when I don't understand the instructor
4. _____ Doing all the homework assignments (optional or required)
5. _____ Coming to class every day in person or over zoom
6. _____ Going to the professor's office hours (virtual or in person) to review assignments or tests, or to ask questions
7. _____ Thinking about the course between class meetings
8. _____ Finding ways to make the course interesting to me
9. _____ Taking good notes in class
10. _____ Looking over class notes between classes to make sure I understand the material
11. _____ Really desiring to learn the material
12. _____ Being confident that I can learn and do well in the class
13. _____ Putting forth effort
14. _____ Being organized
15. _____ Getting a good grade
16. _____ Doing well on the tests
17. _____ Staying up on the readings
18. _____ Having fun in class
19. _____ Helping fellow students
20. _____ Making sure to study on a regular basis
21. _____ Finding ways to make the course material relevant to my life
22. _____ Applying course material to my life
23. _____ Listening carefully in class or carefully reading online discussion posts

[Source: Handelsman, M. M., Briggs, W. L., Sullivan, N., & Towler, A. (2005). A measure of college student course engagement. *Journal of Educational Research, 98,* 184-191.]

APPENDIX B

INSTITUTIONAL REVIEW BOARD (IRB) CERTIFICATION

THE UNIVERSITY OF ALABAMA | Research & Economic Development
Office for Research Compliance

January 27, 2022

William Sanders
Department of ELPTS
College of Education
The University of Alabama
Box 870302

Re: IRB # 22-01-5273: "The Effects of Lecture Capture Use and Student Engagement on the Exam Scores of First Year Pharmacy Students"

Dear Mr. Sanders:

The University of Alabama Institutional Review Board has granted approval for your proposed research. Your protocol has been given exempt approval according to 45 CFR part 46.104(d)(2) as outlined below:

(2) Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:

(iii) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by §46.111(a)(7).

The approval for your application will lapse on January 26, 2023. If your research will continue beyond this date, please submit the annual report to the IRB as required by the University policy before the lapse. Please note, any modifications made in research design, methodology, or procedures must be submitted to and approved by the IRB before implementation. Please submit a final report form when the study is complete.

Please use reproductions of the IRB approved informed consent form to obtain consent from your participants.

Good luck with your research.

166 Rose Administration Building | Box 870127 | Tuscaloosa, AL 35401 | 205-348-8461 | rscompliance@ua.edu

APPENDIX C

SCEQ: STUDENT ENGAGEMENT SCORING

[Source: Handelsman, M. M., Briggs, W. L., Sullivan, N., & Towler, A. (2005). A measure of college student course engagement. *Journal of Educational Research, 98,* 184-191.]
For the total score, simply add up the answers. For each subscale, simply add up the answers for the questions in each subscale.

SKILLS ENGAGEMENT SUBSCALE

4. _____ Doing all the homework assignments (optional or required)
5. _____ Coming to class every day in person or over zoom
9. _____ Taking good notes in class
10. _____ Looking over class notes between classes to make sure I understand the material
13. _____ Putting forth effort
14. _____ Being organized
17. _____ Staying up on the readings
20. _____ Making sure to study on a regular basis
23. _____ Listening carefully in class

EMOTIONAL ENGAGEMENT SUBSCALE

7. _____ Thinking about the course between class meetings
8. _____ Finding ways to make the course interesting to me
11. _____ Really desiring to learn the material
21. _____ Finding ways to make the course material relevant to my life
22. _____ Applying course material to my life

PARTICIPATION/INTERACTION ENGAGEMENT SUBSCALE

1. _____ Raising my hand in class or answering questions in class
2. _____ Participating actively in small group discussions and/or online activities
3. _____ Asking questions when I don't understand the instructor
6. _____ Going to the professor's office hours (virtual or in person) to review assignments or tests, or to ask questions
18. _____ Having fun in class
19. _____ Helping fellow students

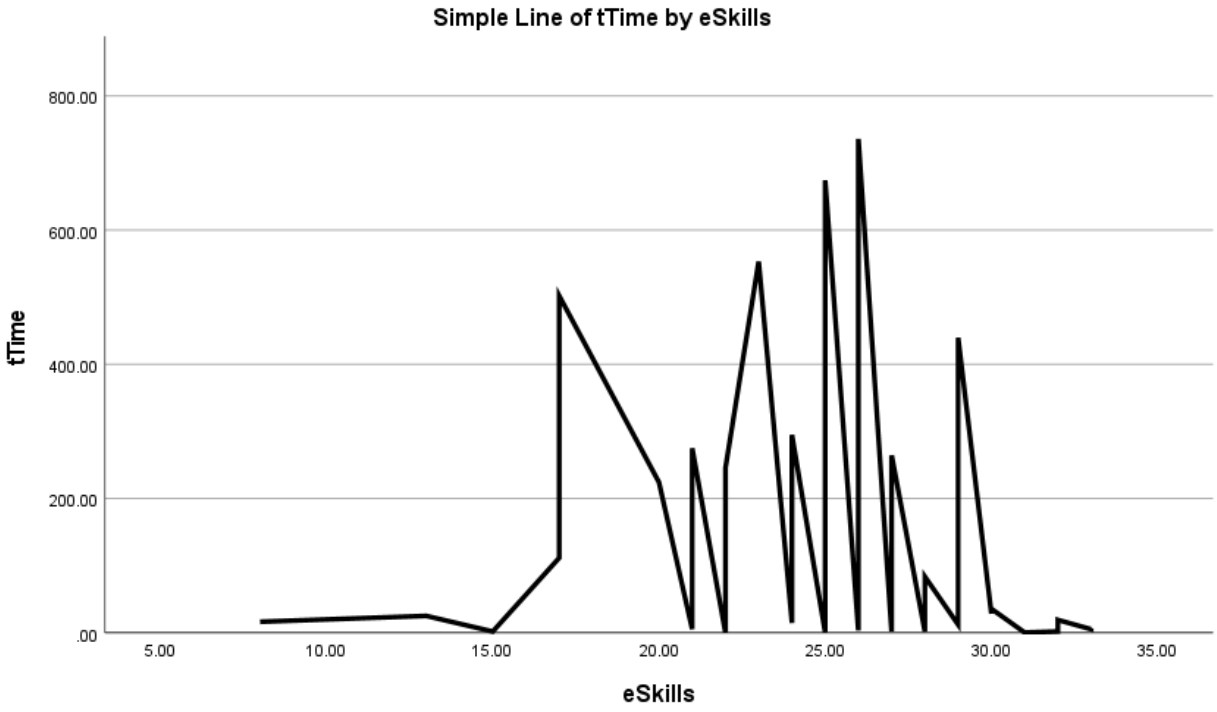
PERFORMANCE ENGAGEMENT SUBSCALE

12. _____ Being confident that I can learn and do well in the class
15. _____ Getting a good grade
16. _____ Doing well on the tests

Scoring this questionnaire is a simple matter of summing the values of each student's responses. To find the values in each of the subscales measuring the four factors of engagement, the totals of the following questions are summed:
Skills: questions 4, 5, 9, 10, 13, 14, 17, 20, 23
Emotional: questions 7, 8, 11, 21, 22
Participation: 1, 2, 3, 6, 18, 19
Performance: 12, 15, 16

APPENDIX D

TOTAL TIME VS. SKILLS ENGAGEMENT


Simple Line of tTime by eSkills
800.00
600.00
400.00
200.00
.00
tTime
5.00
10.00
15.00
20.00
25.00
30.00
35.00
eSkills