2017

Exploring the Relationship Between Immediacy Behaviors and Student Motivation in Engineering Classrooms: Immediacy as a Cause of Motivation

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EXPLORING THE RELATIONSHIP BETWEEN IMMEDIACY BEHAVIORS AND STUDENT MOTIVATION IN ENGINEERING CLASSROOMS: IMMEDIACY AS A CAUSE OF MOTIVATION

BY

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A thesis submitted in partial fulfillment of the requirements for the

Master of Science

Major in Communication Studies and Journalism

Specialization in Communication Studies

South Dakota State University

2017

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This thesis is approved as a credible and independent investigation by a candidate for a Master of Science in Communication Studies and Journalism and is acceptable for meeting the thesis requirements for this degree. Acceptance of the thesis does not imply that the conclusion reached by the candidate are necessarily the conclusions of the major department.

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ACKNOWLEDGEMENTS

The first thought that crossed my mind after knowing that I needed to write a thesis was, "I think I have to learn how to write." Don't get me wrong; I knew how to write the natural, passive, and editorial type, not the research kind. Fast forwarding to this moment, after countless tears, some bad hamburgers and pizzas followed by gallons of coffee–I finished my thesis! Obviously, there is a village of people I must thank, but before that I want part of my story to be printed on paper, maybe someone ten or twenty years from now will find it inspiring.

When I was a baby -nah, I won't start there, five years ago sounds better. In 2012, I moved up to South Dakota. I had no idea Mt. Rushmore was up here, or that blue eyes were the norm (I still find them pretty). I knew I was going to an ag school -which was nice- I grew up in a big ag and farming family after all. I figured I had to have something in common with these people. Little did I know that I would find my family in the midst of these classmates. I won't go into detail but higher education offered an opportunity for a better future than I or anyone in Honduras could have imagined. Higher education is the doorway to change, and I am beyond thankful to God for this incredible opportunity. *Gracias Padre por la vida que has puesto en mis manos -es más bella de lo que pude imaginar, más grande de lo que mi corazón puede sentir, y más llena de vida de lo que espere.*

Now that I've cried a little more, here's to the village that I need to thank. Although Dr. Laurie Haleta retired, I've got to give her and Dr. Josh Westwick a shout out for taking a gamble with an engineering student whose experience with public speaking was limited to speech 101. Barb Kleinjan, you are an amazing lady that brought to memory what loving going to class felt. Thank you, Barb, for approaching me on your personal time–out in HyVee–and believing I could teach and conquer the beast of my thesis. Special thanks to my advisor, who became my gladiator trainer to the quest of thesis victory. Yes, you, Josh Westwick, you pushed harder and farther than I thought I needed to go, only because you saw beyond my self-imposed limitations. Thank you! Thank you to my committee members Dr. Karla Hunter and Dr. Jung-Han Kimn, your time and input are beyond appreciated.

Dianna, you know it all, there's little to say other than you are an amazing sister. You are truly my partner in crime, and I love you beyond these limiting words. To the WI Olson's, thank you for your support and being my adoptive fam, love you! To Eden and Louise, my black sisters, you girls are beautiful, and I loved living and sharing life with you. Faith, this thesis will not be the same without your kind and loving words. You've become a mother to me, a spiritual mother in a way. Thank you!

To K. V., A. M., E. L., A. P.1.0, K. B., you became a family to me during graduate school. You are a safe place that has my back no matter what. Although distance will soon separate us geographically, we will never be a phone call or text too far. Remember, always be fierce like Queen B!

¡Mari, yo sé que usted siempre ha estado orando por mí, gracias! Finalmente, a mi familia -madre, Max, tía- la vida cambia y mejores cosas vendrán a mi vida. Sin embargo, hoy sonrió a la vida porque mi vida está en las manos de Dios -solamente.

I am smiling as I type these last lines. I'm excited about the future: who knows, I might go out there and write a book or start a sweet blog. Whatever I end up doing, I know I'm capable and worthy of good things happening in my life.

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EXPLORING THE RELATIONSHIP BETWEEN IMMEDIACY BEHAVIORS AND STUDENT MOTIVATION IN ENGINEERING CLASSROOMS: IMMEDIACY AS A CAUSE OF MOTIVATION

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Instructor immediacy is an essential characteristic of effective instructors. Although instructional communication has done extensive research on the impact of immediacy behaviors on students, there is little available research observing immediacy behaviors as predictors of motivation on engineering students. As a result, this study examined the impact of engineering instructors' use of immediacy behaviors on engineering students' motivation. The results indicated that verbal immediacy predicted engineering student motivation. The thematic analysis revealed that when students perceived their instructors as helpful, students' motivation to learn and ask more questions increased. The thematic analysis also observed that when instructors seemed unapproachable, students were less likely to engage with them. These findings present valuable insight for engineering educators on how their immediacy behaviors can both positively and negative affect student motivation and possible retention.

Chapter 1

Introduction

Engineering professionals across the globe are in demand (Wadhwa, Gereffi, Rissing, & Ong, 2007). Companies are on the lookout for outstanding engineers, regardless of their geographic location. With unlimited access to social networks (e.g. LinkedIn) and search engines (e.g. Google), companies can search for the most qualified engineers on the market. Since companies want to outperform their competition, they are willing to offshore talent in the science and engineering fields (Manning, Massini, & Lewin, 2008).

Engineers need specialized training and education, and therefore require a college degree for their professional success. Recently, U.S. News & World Report (2017) reported that the United States is home to four of the top ten engineering institutions worldwide; of these, two rank in the top three. Rankings like these make the United States a prime destination for aspiring engineers and for companies who are on the lookout for skilled engineering professionals. As a result, the United States Department of Education has taken an active role in developing and strengthening higher education institutions to meet the new demand in science, technology, engineering, and mathematic (STEM) fields. Former President Barack Obama, in his speech at the National Academy of Sciences in April 2009, encouraged public institutions and the private sector to develop “creative methods” (The White House, 2009, para. 4), to spark and retain the interest of younger generations.

“Educate to Innovate” is one of many campaigns launched by the former Obama administration to encourage the participation of high school graduates into STEM fields

(The White House, 2009). The main objective of the “Educate to Innovate” campaign is to “move American students from the middle to the top of the pack in sciences and math achievements” (para. 1). America is known as a major global “engine of scientific discovery and technological innovation” and education is integral to the advancement of technology and science (The White House, 2009, para. 3). The former Obama administration viewed investing in STEM fields as both an economic and a leadership incentive. Thus, many individuals view investing in STEM education as capitalizing in future American scientific and technological innovation (Manning, Massini, & Lewin, 2008).

Over the last decade, an increasing number of students obtained degrees in the STEM fields (Falkenheim, 2014). Since 2005 there are fewer students pursuing law degrees, and a greater number of students enrolled in engineering graduate programs (Nisen, 2015). The enrollment increase is partially due to groups such as the National Science Foundation (NSF) scholarship, Society of Engineering Women, Girls in Engineering, Math, and Sciences (GEMS), and many others, who actively recruit high school and undergraduate students in efforts to promote engineering professions (Fairweather, 2008).

In 2009, the former Obama Administration, along with the Department of Education, allotted $4.35 billion over the course of the next decade to go toward school grants of states who commit to the “Race to the Top” program. The program is designed to increase enrollment and improve education in the STEM fields (The White House, 2009). A substantial amount of the allotted resources focused on recruitment of engineering students.

Although the recruitment efforts yielded profitable outcomes with an increase in STEM graduates (Fairweather, 2008; Falkenheim, 2014), the Race to the Top program should not stop there. After recruiting students into engineering programs, students start navigating both the professional and scholastic world of engineering education–beginning in the classroom. A critical component to the learning process hinges on classroom communication (Sidelinger & McCroskey, 1997). Thus, the next appropriate step in the pursuit of advancements and innovation in engineering education is a critical assessment on how engineers teach. Communication scholars can offer critical insight by assessing the current progress in the STEM classroom (Kuenzi, 2008) and by offering potential instructional solutions to increase student motivation and, ultimately, retention.

Alongside the increasing numbers of engineering students comes the demand for effective engineering educators (Falkenheim, 2014). Engineering educators play a crucial role in the student's learning process (Morreale, Backlund, & Sparks, 2014) and can positively influence student retention and professional success (Litzler & Young, 2012). Communication education scholars have observed that select instructional strategies, like teacher immediacy, outline effective instructional methods (Worley, Titsworth, Worley, & Cornett-DeVito, 2007). Thus, it stands to reason that engineering educators can benefit from the existing and new instructional communication research and positively impact their students.

Instructional communication is the subfield of communication dedicated to studying the teaching-learning communicative process and observes the learner, instructor, and meaning or message exchanged (Myers, 2010). Therefore, by assessing the instructional communication skills of engineering educators, suggestions can be made on where to invest some of the “Race to the Top” funds which may improve the quality of instruction and overall student experience. Also, by identifying and implementing the tools that instructional communication offers, both the instructor and the student can positively impact the learning process within the engineering classroom (Morreale et al., 2014).

Statement of the Problem

Communication research establishes a direct and positive relationship between the use of immediacy and increased student performance (Allen, Witt, & Wheeless, 2006; Andersen, 1979; Frymier, 1993; Furlich, 2014; King & Witt, 2009; Nussbaum, 1981; Richmond, Gorham, & McCroskey, 1987; Velez & Cano, 2008; Witt, Wheeless, & Allen, 2004). However, an extensive research gap exists between instructional communication research and the engineering classroom. Engineering classrooms are characterized by highly abstract and theoretical content, and instructors often feel pressure to cover more instructional content in smaller time frames (Hernandez-Martinez, 2016). These academic pressures can lead to students feeling overwhelmed, which, in turn, can lead to students dropping out (Litzler & Young, 2012). The Higher Education Research Institute (2010) observed favoring graduation rates for students enrolled in non-STEM majors among two major STEM prevalent ethnicities (e.g. Caucasian and Asian American students). For Caucasian students who started college with a STEM major only 42% graduated within five years, compared to 56% of Caucasian students who graduated from non-STEM majors. For Asian American students who started college with STEM declared majors their graduation rate is 46%, compared to 65% of the Asian American students who graduated from non-STEM majors. According to Seymour and Hewitt (as cited in Litzler & Young, 2012), most of the STEM students that decided to drop out, or opt out, did so during their first or second college year.

Strenta, Elliott, Adair, Matier, and Scott (1994) published one of the most comprehensive studies to date observing why college students from four selective institutions were opting out from the sciences. The study observed trends in pursuing the sciences (i.e., engineering, biological science, physical science) influenced by gender and academic achievement and reasons why students leave the sciences. The original research article overlooked three major areas: student abilities coupled with grades, instructional climate, and reason for choosing and leaving science. The first part of the results focused on how gender, high school grades, and initial intentions influence the decision to enter the sciences.

The second part of their study observed the instructional climate. For this part of their study a survey was used to assess student feelings towards courses, out-of-class behavior, classroom atmosphere, course interest, and faculty characteristics. Some of the items covered under the category of student feelings included the following: confidence in class and depression related to academic progress. Some of the out-of-class behavior items included studying with other students and cramming for exams. For the classroom atmosphere, some items included competition in course, class size, and opportunities to ask questions. For course interest, the items covered the perception of overall course were identified as dull or important. Finally, for the faculty characteristics items included faculty responsiveness to contributions, accessibility, dedication to teaching, and faculty effect on student motivation to learn (Strenta et al., 1994).

Overall, despite gender, students in the sciences were “more likely to question their abilities and feel less confident in the class than other students” who were enrolled in the humanities, social sciences, or were undecided (Strenta et al., 1994, p. 529). However, gender was found to be a strong independent predictor of depression for the sciences, since females were more likely to report depression triggered by their academic performance. Also, science grades had an inverse relationship to depression and confidence levels and almost no relationship was observed between academic performance in humanities and depression or confidence. Behaviorally, science students tend to study with others more often, are less prone to skip assignments, and are more prone to cram for exams (Strenta et al., 1994). Science classroom environments are perceived as competitive and unwelcoming to questions in comparison to humanity classrooms. Most science students described their basic, and some advance classes, as dull. In regards to perceptions of effective teaching, humanities had the highest scores and the engineering faculty the lowest (Strenta et al., 1994).

The third part of the study observed the reasons for choosing and leaving the sciences. In terms of choosing the sciences (particularly engineering and physical sciences), teachers and parents were the most influential group for females. As for male students science programs, toys, and computer programs were more persuasive. With regards to why students leave the sciences, students who left perceived other fields more interesting and a better fit for their talents. The main critics to the sciences were inferior instructor quality and too competitive among classmates with academic achievements (Strenta et al., 1994).

The engineering classroom of today has undergone few changes in instruction apart from the addition of technology, the instructional challenges over two decades remain the same. Today, students are still reporting inferior instructional quality in STEM classrooms (Falkenheim, 2014). This finding supports the critical value of the current study. The need for this current study is reinforced by the National Science Foundation stating that in order “to increase retention of students in STEM fields” one can “improve student learning by improving the quality of undergraduate education in S&E [science and engineering]” (Falkenheim, 2014, p. 9). An effective way to improve the quality of undergraduate education is by borrowing applicable methods from known successful fields. Instructional communication research offers years of insight into effective teaching methods that can potentially improve how engineering instructors communicate in the classroom.

Jolly (2014), writer for the Center of Teaching Quality for the STEM fields, described six characteristics of an effective STEM lesson. Effective STEM lessons focus on real world issues, follow the engineering design process, immerse students into hands-on experiences through asking open-ended questions, promote teamwork, apply rigorous math and science content, and encourage multiple answers. Many of these characteristics share the communicative process: a message is shared between sender and receiver either verbally or nonverbally, and the quality of communication influences the final outcomes and experiences (Haleta, 2009). Effective educators are characterized by building positive relationships with their students through communication (Nussbaum, 1992). Inversely, instructors who underuse effective communication behaviors negatively impact their instructional quality (Mehrabian, 1967).

Ineffective instruction can become a stressor on the students, and therefore, be the reason why some students opt to disengage from the course (Strenta et al., 1994). The phenomenon of student disengagement may also be enhanced by low student motivation. Some researchers have correlated disengagement to a low proactive personality (Major, Holland, & Oborn, 2012)–that is, individuals who don't take personal initiative. Several studies have established positive relationships between self-motivation and increased course performance (Deci & Ryan, 2000; Kerssen-Griep & Witt, 2012). Furthermore, other studies demonstrate the use of immediacy behaviors to increase student motivation (Allen et al., 2006; Frymier, 1993; Furlich, 2014; Velez & Cano, 2008). Instructional communication research supports the notion that learning is influenced by both the instructor and student (Morreale et al., 2014).

Background of the Problem

In 1999, a group of communication scholars started advocating for other disciplines to reinforce the use of communication theories in their curriculum, and titled the movement, communication across curriculum (CXC) (Dannels, 2001). Scholars who opposed the CXC movement argued that communication theories were too simplistic and "lack theoretical sophistication and depth" (Dannels, 2002, p. 254). As a result, Dannels (2001; 2002) proposed the communication in the discipline (CID) model which provides each discipline with communication practices and theories salient to the content and discipline. The CID model provides tailored content to different disciplines, as well as showcasing the complexity and depth of communication theories. Following studies like Strenta et al. (1994), the engineering discipline began to address the importance of communication for both students and instructors, however, by the early 2000s communication scholars had to yet publish research that "contribute[d] to the cross-curricular efforts in engineering" (Dannels, 2002, p. 256). Nearly a decade later, Dannels and Housley Gaffney (2009) observed that the amount of CXC scholarly research was still limited and called communication scholars to "a renewed commitment to empirical rigor" which "would allow CXC to have broader relevance outside of the communication discipline" (p. 139).

The most recent instructional communication research focusing in engineering instruction is conducted in Eastern societies (e.g. India, China) (Alemu, 2014; Shukla, 2013; Myers, Zhong, & Guan, 1998). These studies focused on the use of communication for professional development while in college (Shukla, 2013), perceived instructor's use of immediacy (Alemu, 2014), and varying implications of the use of immediacy in an Eastern culture (Myers, Zhong, & Guan, 1998). While international research can offer insight regarding the topic, the variable of cultural context is unaddressed (Alemu, 2014; Mehrabian, 1969b; Myers, Zhong, & Guan, 1998), limiting the generalizations that can be inferred from international studies. Immediacy is a construct developed with western worldviews. Western society believes that individuals have control over their own lives and highly regard views of individualism (Wike, 2016). In collectivist societies, where instructors are highly regarded, certain immediacy behaviors would be considered disrespectful or a violation of social norms (Myers, Zhong, & Guan, 1998; Wike, 2016). Therefore, students in Western societies tend to believe that regardless of their socioeconomic background they can form relationships with their instructors, whereas in other world societies students believe that this type of relationship would be impossible. Due to the cultural context of immediacy, generalizations from international studies cannot be made. However, research observing immediacy behavior in engineering classrooms within western societies successfully addresses the variable of cultural context. American higher education institutions need culturally relevant and rigorous empirical evidence on how to improve engineering instruction, and how immediacy behaviors of engineering educators can influence engineering students.

Within the United States, there are a limited number of studies that relate immediacy behaviors and engineering student success. Much of the current research in engineering classrooms focuses only on instructional techniques (Dannels, 2000; Lehman, 2014) and the incorporation of technology in the classroom (Frazee, Greene, & Julius, 2006). Even fewer studies have explored the relationship between immediacy behaviors as extrinsic motivators and student intrinsic motivation, particularly in the engineering classroom. Intrinsic motivation is innate in all humans, and is defined as the force that prompts individuals to explore and learn; extrinsic motivators are outside forces that influence people with the desire to attain a separate outcome (Ryan & Deci, 2000b).

Given that the United States houses a significant number of the highest ranked engineering universities in the world (U.S. News & World Report, 2017), additional research using a novel variable (i.e., immediacy) is needed to assess the engineering classroom. Communication is essential in the classroom regardless of the course content (Nussbaum, 1992). By using verbal and nonverbal messages, instructors share meaning with a community of pre-professionals. By observing the communication process between instructors and students, scholars may gain insight into why students label some engineering instructors as ineffective educators (Strenta et al., 1994), and how engineering educators can help retain more students and improve instructional quality through the use of immediacy behaviors.

Value of the Study

Instructional communication researchers have studied immediacy behaviors for more than four decades (McCroskey, Teven, Minielli, & McCroskey, 2014). The engineering classroom (i.e., instructors and students) can benefit from this wealth of research by understanding the relationship between immediacy behaviors and student motivation–utilizing and incorporating the behaviors that encourage student motivation in instructional methods. Instructional communication already offers models that attempt to explain the relationship between student motivation and teacher effectiveness (Morreale et al., 2014; McCroskey et al., 2014). For example, the student-mediated paradigm explains the shared responsibility between student and instructor for effective learning and teaching inside the classroom (Morreale et al., 2014). In other words, teachers can influence student behaviors, and certain student behaviors can influence teacher effectiveness. In the communication discipline, effective teachers are characterized by their use of immediacy and positive influence on students (Allen et al., 2006; Frymier, 1993; Furlich, 2014; King & Witt, 2009; Velez & Cano, 2008). Therefore, if engineering educators engage in immediacy behaviors more frequently and subsequently encourage student's self-motivation, then the instructor will positively affect the students learning process.

Summary

Over the course of the last decade, the number of engineering students has risen, along with the need for solutions on how to encourage student retention and engagement in the engineering classroom. Although instructional communication scholars studied immediacy behaviors in multiple contexts, a gap still exists between immediacy behavior and the engineering classroom. Since motivated students tend to earn higher grades (Allen et al., 2006) further research which explores the relationship between engineering instructor immediacy behaviors and engineering student motivation is necessary.

Chapter 2

Literature Review

The following chapter examines the relationship between teacher immediacy and student motivation. To further study the relationship between immediacy and student motivation, the frame of self-determination theory (SDT) is applied. This chapter covers the development of immediacy, from the conception of nonverbal immediacy to the inclusion of the verbal component. This chapter also provides and explanation of the self-determination theory (SDT) and the cognitive evaluation theory (CET), a mini-theory found within the SDT. The foundational research provides a background of the major studies and theoretical underpinnings for exploring immediacy and motivation in engineering classrooms.

Immediacy

This study examined two major concepts: immediacy and student motivation. Immediacy is any positive behavior that promotes closeness and comfort in interpersonal interactions (Richmond et al., 1987). From a psychological stance, Mehrabian's (1969b) nonverbal behavior research solidified the original construct of immediacy. Both the fields of psychology (Mehrabian, 1966a; 1966b; 1969a; 1969b; 1981) and communication (Andersen, Andersen, & Jensen, 1979; Andersen, Norton, & Nussbaum, 1981; Gorham, 1988) have conducted studies that have strengthened the development of immediacy as a behavior. Communication scholars focused their initial research of immediacy to the classroom context (Andersen, 1979; Andersen et al., 1981; Gorham, 1988; Nussbaum, 1992; Richmond et al., 1987), which established immediacy as a foundational instructional communication behavior (Frymier, 1994; Mehrabian, 1969b;

Sellnow et al., 2015). Although immediacy is a well-researched communication behavior, immediacy is culturally bound to the western context (Mehrabian, 1969b; Qin, 2011). Scholars understand that studies outside western society have varied cultural constructs, and what is applicable in western culture may not be the case for other cultures. To understand immediacy, further knowledge of nonverbal and verbal immediacy is necessary.

Nonverbal Immediacy. The study of immediacy began with Mehrabian's (1969b) study of nonverbal behaviors. Initially, Mehrabian (1969a, 1969b) categorized touching, distance, leaning forward, eye contact, and body orientation as the five primary immediate behaviors. Scholars initially observed the impact of nonverbal behaviors, and as the communication discipline grew, other scholars added to the initial list of nonverbal behaviors (Andersen, 1979). Nonverbal immediacy behaviors also include vocal expressiveness, which describe the speaker's voice as either enthused or monotone; voice inflection, which describes the audible high or low tones and inflection the speaker uses; use of gestures, which describes the movement of hands and body to emphasis or illustrate points; relaxed body positions, which describe the speakers posture; and facial expressions, such as smiling or nodding (Andersen, 1979).

Andersen's (1979) seminal study observed that nonverbal immediacy behaviors had an impact on perceived teaching effectiveness. Andersen identified nonverbal immediacy as a "meaningful predictor of teacher effectiveness" (p. 544) and a predictor of students' affect and behavioral commitment. In the same study, Andersen trained observers on how to identify nonverbal immediacy behaviors in a classroom context, and then compared the scores of the trained observers to the scores students gave to the same instructor. Andersen concluded that people who are involved in an immediate relationship with their instructors can assess their instructor's immediacy behaviors as accurately as trained objective observers. Therefore, Andersen's study supports the notion that people can naturally assess nonverbal immediacy behaviors, regardless of knowing the definition of nonverbal immediacy.

Further research also observed that instructors can effectively be trained in nonverbal immediacy behaviors and positively affect students (Richmond, McCroskey, Plax, & Kearney, 1986). Richmond et al. (1986) invited two groups of 7-12 instructors to participate in the study: (1) the trained group had recently completed training in nonverbal communication and immediacy and, (2) the untrained group had no previous communication education. The instructors who participated in the nonverbal and immediacy training were asked to apply these immediacy behaviors in their classrooms. At the end of the semester, the students reported higher scores of affective learning ($F = 5.79$, $p < 0.02$) and perceived their instructors as more immediate than those students from the instructors who did not receive the nonverbal immediacy training ($F = 10.25$, $p < 0.002$).

Also, as scholars began observing how nonverbal immediacy behaviors could influence the students, scholars questioned whether the content of a class–people-oriented or task-oriented–would affect the influence of immediacy behaviors for students. Kearney, Plax, & Wendt-Wasco (1985) speculated that students in people-oriented classrooms might be more impressionable to immediacy behaviors, because immediacy is an interpersonal skill. People-oriented courses (e.g. communication, psychology, sociology) focus on "interpersonal affect, group cohesion, persuasion, personality, and other people-oriented issues” (Kearney et al., 1985, p. 62). On the other hand, students in task-oriented courses (e.g. engineering, computer science, math) “emphasizes output, productivity, structure, and organization” (Kearney et al., 1985, p. 62) and might prioritize technical skills over interpersonal skills, therefore minimizing the influence of immediacy. The research team recruited a sample of 642 business students, due to their predisposition of enrolling in a variety of people-oriented (management) and task-oriented (accounting) courses. The students were then grouped based on the courses they were enrolled in for the semester, and by doing so the research team could isolate students exposed to task-oriented (accounting) and people-oriented (communication skills) instructors. Both student groups completed a three-part survey. The survey included students’ perception of saliency of teacher immediacy ($\alpha = 0.96$), students’ perception of teacher immediacy ($\alpha = 0.93$), and students’ affective learning ($\alpha = 0.91$).

At the conclusion of the study, Kearney et al. (1985) observed a positive relationship between nonverbal teacher immediacy behaviors and student affective learning in both people-oriented ($p = 0.50$) and task-oriented courses ($p = 0.46$). In addition, the researchers found a positive relationship between nonverbal teacher immediacy behaviors and the students perceived saliency of immediacy in both people-oriented ($p = 0.46$) and task-oriented courses ($p = 0.48$). Therefore, confirming the saliency of immediacy in the classroom regardless of the course content.

By the early-1980s, nonverbal immediacy was a well-established area of study in instructional communication (Frymier, 1994; Mehrabian, 1969b; Sellnow et al., 2015). As investigation progressed, communication scholars observed the positive influence of nonverbal immediacy behaviors on students’ feelings towards the class and instructor

(Comstock & Rowell, 1995) and encouraged scholars to expand their knowledge of verbal immediacy.

Verbal Immediacy. Immediacy can influence interactions and perceptions of closeness between individuals (Mehrabian, 1969b) and does so through implicit (i.e., nonverbal) and explicit (i.e., verbal) channels. From the early development of immediacy, scholars agreed on immediacy's nonverbal component. However, Mehrabian (1981) proposed that teaching-learning interactions are like interpersonal relationships; they use both explicit and implicit communication, and Gorham (1988) observed the impact of verbal immediacy on both student behaviors and learning.

From the conception of immediacy, based on Mehrabian's (1969a, 1969b) initial construct, scholars viewed immediacy as implicit behavior. However, after Mehrabian's (1981) proposal, scholars observed key explicit verbal components that also fostered immediacy. Some of these verbal immediacy elements include humor, complimenting students, initiating conversations in and out of class, teacher self-disclosure, asking open-ended questions that elicit student's opinions and views, following up on student-initiated topics, providing feedback on student work, and inviting students to meet outside of class to discuss questions or concerns (Gorham, 1988).

Since Gorham's work, communication scholars continued to explore the impact of verbal immediacy. Moore and Masterson (1996) observed a strong positive relationship between verbal immediacy and instructor survey ratings and found that students are more likely to perceive their instructors as caring, challenging, and helpful when their instructors use verbal immediacy. Also, scholars observed that regardless of the student's ethnic background, when instructors learned their students' names, students had a higher perception of closeness to their instructor (Sanders & Wiseman, 1990). In other words, students perceived their instructors as approachable and, therefore, more immediate. Gorham's work essentially merged both verbal and nonverbal components of immediacy. Studies that look at immediacy and motivation (Allen et al., 2006; Christophel, 1990; Frymier, 1993; Furlich, 2014; Velez & Cano, 2008; Velez & Cano, 2012), and immediacy and cognitive learning (King & Witt, 2009; LeFebvre & Allen, 2014; Richmond et al., 1987) regard verbal and nonverbal immediacy as a unified construct.

Self-Determination Theory (SDT)

While immediacy describes the behaviors of the instructor, motivation details the reasons behind student behaviors. Motivation, as well as immediacy, rooted in the field of psychology, progressively evolved and adopted into different fields (Myers, 2010). In psychology, the self-determination theory (SDT) offered a theoretical framework to study human motivation. The seminal work of Edward Deci (1971), studied the effects of rewards on motivation and marks the origin of self-determination theory (SDT). Deci (1971) hypothesized that external rewards have both a positive and negative directional relationship with internal motivation. Deci's study also established the building blocks of motivation–intrinsic and extrinsic motivation (Higgins, Kruglanski, & Lange, 2012). Through Deci's insights on motivation, psychology scholars deemed motivation as a key component of human behavior–suggesting that motivation is the fuel to behavioral engagement or disengagement (Ryan & Deci, 2000b).

SDT seeks to explain the why and how of human motivation. In short, SDT offers a clear distinction between self-determined behaviors (i.e., having the ability to choose) and controlled behaviors (Deci, Vallerand, Pelletier, & Ryan, 1991). The SDT is based on the principle that people innately have three core psychological needs, which are autonomy (also known as self-determination), competence, and relatedness (Deci & Ryan, 2000; Deci et al., 1991). The need for autonomy, or self-determination, describes the ability to be both self-regulating and self-initiating; competence describes the ability to effectively perform requested actions; and relatedness describes the need to feel secure and connected to other individuals (Deci et al., 1991). These core needs are essential nutrients for the psyche, which are obtained from our surroundings regardless of cultural context and are "essential for ongoing psychological growth, integrity, and well-being" (Deci & Ryan, 2000, p. 229). The following section will focus on the need of autonomy and the core foundation of SDT: intrinsic and extrinsic motivation (Higgins et al., 2012).

Motivation. Intrinsic motivation, the first type of motivation researched by academic scholars (Deci, 1971), is defined as doing "an activity for its inherent satisfactions rather than for some separable consequence" (Ryan & Deci, 2000a, p. 56). Intrinsic motivation can be described as the driving force behind individuals' desire to engage in new and challenging experiences. Intrinsic motivation is what prompts us to explore and learn (Ryan & Deci, 2000b). In essence, people do activities at their best when they feel free and have an inner interest (Ryan & Deci, 2000a). For example, Ryan and Grolnick (1986) and Ryan, Stiller, and Lynch (1994) observed more intrinsic motivation in elementary students with teachers that encouraged student autonomy in the classroom. In Ryan's and Grolnick's (1986) study, students in high-autonomy classes felt less forced by authoritative figures to perform, and therefore self-reported higher levels of motivation. In addition, Deci (1971) observed that college students who received monetary rewards had lower levels of intrinsic motivation regarding the assigned activity, confirming the need for autonomy.

The second element of motivation in SDT is extrinsic motivation. Extrinsic motivation is any activity completed to obtain a distinguishable outcome and that has instrumental value (Deci et al., 1991; Ryan & Deci, 2000b). Simply stated, extrinsic motivation is any outside motivator, which is not inherent in the individual. There are four types of extrinsic motivation; external regulation, introjected regulation, identified regulation, and integrated forms of regulation. External regulation describes behaviors completed based on external contingencies, that's when an external factor initiates and regulates a person's behavior; introjected regulation describes behaviors that are coerced, in other words, individuals engage in these behaviors based on someone else's values or morals, but they don't take these values or morals as their own; identified regulations describes behaviors in which individuals identify with and value specific behaviors, however, they still feel like they have a choice to either participate or not in that behavior; and integrated forms of regulation describes behaviors that are based out of a coherent view of self, an assimilation of the individual's values, needs, and identity (Deci et al., 1991).

These types of extrinsic motivation can be internalized and some are closer to the process of internalization than others (Deci et al., 1991; Gagné & Deci, 2005). External regulation is the most basic and distant from internalization, since external regulation seeks to comply with expectations based on different pre-established norms (Deci et al., 1991). External regulation is exemplified when students walk into a classroom and finding a seat, as students are expected to sit during lecture and therefore comply to the behavior. Moving closer to internalization is introjected regulation, and that is a desire to either avoid a sanction or receive a reward (Deci et al., 1991). For example, introjected regulation occurs when students complete their assignment because they will receive a grade for the assignment. Students are more likely to increase their efforts towards completing the assignments on the notion they will be rewarded with a higher grade. Identified regulations, which is two steps closer to internalization, describes when individuals identify with and value specific behaviors (Deci et al., 1991). For instance, identified regulation can be observed when an instructor expects students to ask a minimum of two questions during every lecture, and one student decides that asking at least two questions per lecture will benefit learning and begins to do so in other courses. Finally, the integrated form of regulation is the closest to internalization and is exemplified when a student receives and accepts the positive feedback from an instructor as part of their self-identity. The student ultimately believes that their life goals and needs align accordingly to the positive feedback received (Deci et al., 1991).

Extrinsic motivation is the in-between step, or liaison, between amotivation, the absence of motivation, and intrinsic motivation (Gagné & Deci, 2005). For instance, Deci & Cascio (1972) observed that punishment and threats, external reinforcements or extrinsic motivators, can affect intrinsic motivation. Also, Deci (1971) suggested that material rewards will inhibit the full development of motivation, whereas other extrinsic motivators, such as verbal reinforcement and positive feedback, will have an enhancing effect on intrinsic motivation (Deci, 1971; Harackiewicz, 1979). Since extrinsic motivation is the liaison between amotivation and intrinsic motivation, extrinsic motivation can catalyze intrinsic motivation (Ryan & Deci, 2000b). For the purpose of this study, immediacy acts as an extrinsic motivator, which positively influences students' intrinsic motivation.

Cognitive Evaluation Theory. Since SDT's original conception, six mini-theories have branched from the original conceptualization (i.e., cognitive evaluation theory, organismic integration theory, causality orientations theory, basic psychological needs theory, goal contents theory, and relationship motivation theory). Cognitive evaluation theory (CET) is the only mini theory related to the topic of this study. Deci and Ryan (1985) conceptualized CET under the assumptions that intrinsic motivation is innate, can be catalyzed, and "will flourish if circumstances permit" (Ryan & Deci, 2000b, p. 70). CET's basic premise is that "competence[s] will not enhance intrinsic motivation unless they are accompanied by a sense of autonomy" (Ryan & Deci, 2000a, p. 58). CET establishes a relationship between the need for competence and the need for self-determination and integrates the "effects of rewards, feedback, and other external events on intrinsic motivation" (p. 58). For example, if an individual is encouraged to engage in particular behaviors, she or he can experience distinct levels of motivation. The motivation levels are a positive predictor of willingness to integrate and internalize the suggested behavior. Internalization is the process of accepting and making a value or regulating one's own motivation (Ryan & Deci, 2000b). Internalization is a developing continuum (Deci, 1991; Ryan & Deci, 2000a; Ryan & Deci, 2000b) but for the purpose of this study, internalization will be limited to the process of accepting extrinsic motivators and transforming them into intrinsic motivation. Therefore, any motivation that is not innate of the individual is categorized as extrinsic and can be internalized as an intrinsic motivator.

CET observes how social environmental factors can affect intrinsic motivation. For this study, immediacy will be categorized as a social environmental factor that acts as an extrinsic motivator on the student and can catalyze their intrinsic motivation. Through the lens of CET, psychology scholars have observed that students in autonomy-supportive classrooms–that is, classrooms wherein students perceived they have freedom to make their own decisions–had higher levels of intrinsic motivation (Higgins et al., 2012). In autonomy-supportive classrooms, the instructor is responsible for fostering the autonomy-supportive environment which operates as an extrinsic motivator for students. Once the students internalized the autonomy-supported environment, the students reported higher levels of intrinsic motivation (Higgins et al., 2012). Scholars also used the CET framework to observe the enhancing effect of positive feedback on intrinsic motivation (Deci, 1971; Harackiewicz, 1979). These studies exemplified the influencing ability of instructor behaviors on student motivation.

The most widely used scale to measure motivation is Christophel's state motivation scale (1990). This scale has been used in multidisciplinary research for measuring the motivation levels of students when SDT is applied (Deci & Ryan, 2000; Furlich, 2014; Miller, Katt, Brown, & Sivo, 2014). The state motivation scores are determined by summing the student's self-reported frequency scores. Christophel (1990) develop the motivation scale to observe the relationship between immediacy and motivation in the classroom and observed a high correlation between immediacy and state motivation, $r = 0.60$, $p = .0001$. Recently, the state motivation scale was used in Furlich's (2014) research which observed the relationship between verbal immediacy and student motivation at community and research colleges using the framework of SDT.

Furlich's (2014) study presented a valuable framework for the relationship between immediacy and motivation, particularly for the college student population.

Christophel's (1990) motivation scale includes scales for state and trait motivation. This study will only use state motivation because trait motivation asks students to indicate "their feelings […] about taking classes in general" (p. 327) and therefore, trait motivation is outside the scope of the current study. On the other hand, state motivation focuses on how motivated students feel while taking a specific course (Christophel, 1990), which, similar to intrinsic motivation, describes the inner motivation state of an individual, in this case, the engineering student.

Immediacy and Student Motivation

Under the frame of CET, scholars have observed the enhancing effect of positive feedback (Deci, 1971; Harackiewicz, 1979), a part of verbal immediacy (Gorham, 1988), on intrinsic motivation. Communication scholars have already observed that non-immediate communicators, communicators who don't engage in any immediate behaviors and tend to be overly direct and intense, are more likely to elicit negative audience attitudes (Mehrabian, 1967). In contrast, a positive relationship exists between instructors who do engage in both verbal and nonverbal immediacy (Mehrabian, 1967). Immediacy also has a positive relationship with student learning (Richmond et al., 1987; Witt et al., 2004), and teacher effectiveness (Andersen, 1979; Nussbaum, 1981).

Andersen (1979) offered an operational definition of teacher effectiveness by defining an effective teacher as influential "in all three domains of learning: positive student affect, behavioral commitment to the course content, and student cognitive learning" (p. 543). Andersen considers immediacy as a "meaningful predictor of teacher effectiveness" (p. 544) and a predictor of students' affect and behavioral commitment. Nussbaum (1981) observed that the effectiveness of an instructor is a function of communicative style, instructor age, and gender. Furthermore, the communicative style of an instructor can be assessed by the instructor's relaxed and dramatic behavior, which are nonverbal immediacy behaviors (Andersen, 1979).

Instructor immediacy has a significant impact on affective and cognitive learning as demonstrated by Richmond et al. (1987), who observed that the most influential instructor behaviors on student learning were vocal expressiveness, smiling in class, having a relaxed body position, using gestures, and giving positive feedback on assignments. Instructor behaviors, such as moving around the room and looking at the class while writing notes, have a positive relationship with student learning outcomes. In contrast, instructor behaviors, such as standing with tense body positions, sitting behind their desks during lecture, standing still behind podiums, and making little eye contact when writing notes, have negative relationships with student learning (Richmond et al., 1987). Further research identified a correlation between increased use of immediacy behaviors and increased student motivation (Frymier, 1994), which in turn augmented material comprehension (Allen et al., 2006). Recently, Furlich (2014) studied the relationship between SDT and immediacy behaviors within community and research universities and suggested that immediate behaviors can be taught and learned in order to promote student motivation.

Communication scholars tend to agree that immediacy is a core component of instructional communication related to teacher effectiveness (Andersen, 1979; Shukla, 2013), learning (Allen et al., 2006; King, Witt, 2009; Richmond et al., 1987; Witt, Wheeless, & Allen, 2004), and motivation (Allen et al., 2006; Frymier, 1993; Furlich, 2014; Velez & Cano, 2008). In retrospect, although both immediacy (Mehrabian, 1969b) and SDT (Deci, 1971) were conceptualized in the psychology field, both fields became significant subjects of study and reference within the communication discipline.

Engineering Classrooms

Students in STEM degrees experience higher dropout rates compared to students pursuing non-STEM majors, with less than half of STEM students graduating within the five-year mark (Higher Education Research Institute, 2010). In an academic study focused on attrition, students reported that their main reason for leaving the sciences is inferior instructor quality (Strenta et al., 1994), and as a response to strengthen instruction, regulating agencies such as the Accreditation Board for Engineering and Technology (ABET) have revisited their regulatory standards to strengthen instruction.

ABET is the regulatory accreditation agency for applied sciences and engineering programs in secondary education across and the United States and throughout the world (ABET, 2015). Yearly, ABET revisits their established criteria for accreditation which includes student outcomes, professional program criterion, and faculty criterion. The 2016-2017 revised criteria (ABET, 2015) stated that students enrolled in ABET-accredited programs should communicate appropriately "with a range of audience[s]" (p. 28) and faculty should be competent in their "ability to communicate, [and] enthusiasm for developing more effective programs" (p. 5). ABET is expecting STEM instructors to engage in and teach effective communication behaviors and skills to students. If the standards are not met, a college program can lose ABET accreditation. The loss of ABET accreditation may push students to transfer institutions, change majors, or turn away incoming students who wish to attend on ABET accredited institutions.

However, ABET can only offer recommendations to improve a program: the instructional practices are still unique to each institution instructor. Freeman et al. (2014) published one of the most comprehensive meta-analyses regarding STEM education, which compared student test scores and dropout rates in traditional and active lectures styles. The study categorized traditional lectures as a one-way lecture with limited discussion time and active learning lectures as discussion and activity-based instruction. Students sitting in traditional lectures "were 1.5 times more likely to fail" (p. 8410) compared to those sitting in active learning courses. According to the National Science Board (2015), a critical goal for the STEM fields is to increase academic achievement. Incorporating active learning activities in the classroom helps support successful academic environments for all students. Immediacy can influence both student motivation (Allen et al., 2006; Frymier, 1993; Furlich, 2014; Velez & Cano, 2008), retention (Andersen, 1979), and academic achievement (Richmond et al., 1987).

Freeman et al. (2014) looked at the implications of conducting further controlled research in engineering classrooms and concluded that other fields like psychology and cognitive science (e.g. communication studies) already had strong frameworks to strengthen the current course design. Immediacy, as a communication behavior, can inspire course design in engineering classrooms and consequently, motivate students to increase their academic achievement. CET is the bonding agent between immediacy and motivation and will offer a framework to observe how instructor behaviors can influence engineering students.

Summary

The review of literature exanimated the SDT framework and application to observe the process of internalizing immediacy behavior. Under SDT, the sub-theory of CET offers the most concise operational description to study the motivation climate in STEM students. Under CET, instructors act as extrinsic motivators for students by engaging in immediate behaviors, and students can internalize extrinsic motivators (instructor immediacy), into intrinsic motivation. Previous research has observed a positive relationship between immediacy and motivation (Allen et al., 2006; Frymier, 1993; Furlich, 2014; Velez & Cano, 2008). Also, previous studies (Allen et al., 2006; Christophel, 1990; Frymier, 1993; Furlich, 2014; King & Witt, 2009; LeFebvre & Allen, 2014; Richmond et al., 1987; Velez & Cano, 2008; Velez & Cano, 2012) follow the established model of immediacy (Gorham, 1988) which considers both verbal and nonverbal immediacy behaviors as unified constructor. The present study hopes to extend these previous finding to STEM students thus postulating the following hypothesis:

H1: Instructor verbal immediacy and nonverbal immediacy are positive predictors of student intrinsic motivation.

Furthermore, current available research has also observed how the frequency of immediate behaviors affects student motivation and attitudes toward the course (Harackiewicz, 1979; Deci & Cascio, 1972). To explore this behavior further the following research questions are proposed:

RQ1: How does the use of immediacy behaviors affect student's state motivation?

RQ2: How does the instructor's behavior impact student motivation?

Chapter 3

Methodology

This study examined the relationship between the use of immediacy and student motivation. The purpose of the study was to observe the impact of engineering instructors use immediacy on student motivation in the engineering classroom. Findings from this study can be used to train engineering instructors on how to incorporate or strengthen the use of immediacy within the classroom, and potentially improve student success and retention. Although enrollment in engineering fields has increased, student retention remains a challenge for many universities across the country. Former President Barack Obama publicly addressed the problems with retention and recruitment in science technology engineering and math (STEM) fields, and designated funds to do so (The White House, 2009). New recruitment and retention programs will partially aid the retention of students in STEM; however, a look inside engineering classrooms is also necessary. One way to examine these classrooms is through instructional communication lens which observes communication behaviors and phenomena that occur in the classroom and can offer valuable data regarding effective instructional practices. Consequently, to assess the current state of the engineering classroom, an observation of the use of immediacy behaviors (as a fundamental piece of instructional communication) in the engineering classroom is necessary. Therefore, this study proposed the following hypothesis and research questions:

H1: Instructor verbal immediacy and nonverbal immediacy is a positive predictor of student intrinsic motivation.

RQ1: How does the use of immediacy behaviors affect student's state motivation?

RQ2: How does the instructor's behavior impact student motivation?

This chapter includes a description of the subjects, methodology, instrumentation, data collection, and data analysis.

Sample

This study used a volunteer sampling method. Participants were asked to complete a 10 to 15-minute online survey which was sent to the participants via email. The sample was limited to undergraduate students in engineering classes enrolled at a mid-sized, Midwestern public university. To help reduce duplicate student survey responses, this study requested the dean of the engineering college to send the email including the survey link to enrolled undergraduate engineering students (approximately 1350 students). One-hundred and thirty-nine students participated in the study. For samples of 1000 students, Nulty (2008) recommends a 3% response rate under liberal conditions, (e.g. 10% sampling error and 80% confidence level) and a 41% response rate under stringent conditions (e.g. 3% sampling error and 95% confidence level). These recommend rates are based on confidence level and sampling error, and will be referenced later in the design section. The survey was open to participants ages 18 years and older. The following demographic data were requested: current major, year in school, current enrollment statues (e.g. full-time or part-time), if an international student, biological sex, age, and racial/ethnic group.

Design

This study collected data using a QuestionPro© online survey link. An initial survey link was sent via email, including a brief description of the study and participant consent information. After the initial email sent from the dean's office two follow up emails were distributed reminding participants to complete the survey. Reminder emails are a useful method to boost online survey response rate (Nulty, 2008). For design rational and replication purposes, online surveys help manage large volumes of data and increase ease of accessibility for study participants.

The survey was comprised of four unique sections: state motivation scale (Christophel, 1990), nonverbal immediacy scale (Richmond et al., 1987), verbal immediacy scale (Gorham, 1988), and two open-ended questions. Survey participants initially accessed the IRB cover letter explaining both the protection of their confidentiality and their right to end participation at any time during the survey, followed by the previously mentioned demographic questions. Next, the participants were asked to recall their first engineering class of the week, and with that engineering instructor in mind participants were to complete the survey questions. With that instructor in mind they completed the state motivation scale (Christophel, 1990), the nonverbal immediacy scale (Richmond et al., 1987) scale, and verbal immediacy scale (Gorham, 1988). Finally, the students were asked two open-ended questions. The first question asked the participants to describe an instance where their instructor was approachable, friendly, and helpful and how did that experience affect their motivation levels. The second question asked the participants to describe an instance where their instructor was unapproachable, unfriendly, and not helpful towards them.

Instrumentation

The survey instruments used in this study include the nonverbal (Richmond et al., 1987) and verbal (Gorham, 1988) immediacy scales, and the state motivation scale (Christophel, 1990). This study observed the frequency of engineering educators' immediacy behaviors as an extrinsic motivator (independent variable) and the levels of student state motivation (e.g. dependent variable). Students completed a series of questions using multiple choice format, a Likert-type scale, and a bipolar scale. Multiple choice questions were exclusive to demographic data responses. The survey concluded with two open-ended questions to assess the impact of instructor behavior on student motivation.

Christophel's State Motivation Scale. Christophel's state motivation scale is an upgrade to Beatty, Forst, and Stewart's (1986) motivation scale -a three-item bipolar scale. Christophel added nine more items to develop a more comprehensive and reliable scale (α = 0.96, p = .0001; 1990). Christophel's state motivation scale (1990) uses twelve bipolar items to describe student self-reported motivation level immediately after taking a specific course. The scale ranges from one to seven, in which one is closest to the positive item. Items one, two, three, six, ten, and eleven are reverse scored due to their negative valence on the bipolar scale. The state motivation score is determined by summing the bipolar scores. Examples of the items include motivate or unmotivated, unchallenged or challenged, and fascinated or not fascinated (Christophel, 1990). The levels of state motivation (low, moderate, and high) will be determined by using a theoretical median-split of 48 plus or minus twelve, where less than 36 is low state motivation; between 37 to 60 is moderate state motivation; and greater than 61 is high state motivation (Frymier, 1993). The current study observed the state motivation scale reliability at α = 0.87.

Immediacy Scale. The nonverbal and verbal immediacy scale is a 34-item instrument that measures the student's perception of instructor immediacy behaviors. The scale scores each behavior by the frequency of use, using a five-score Likert-type scale. The verbal and nonverbal immediacy score is determined by summing the frequency scores (4 = very often; 3 = often; 2 = occasionally; 1 = rarely; and 0 = never). The thirty-four statements describe immediate instructor behavior such as, "uses humor in class", "calls on students to answer questions even if they have not indicated that they want to talk", and "praises students; work, actions or comments" (Richmond et al., 1987; Gorham, 1988). For this study, the levels of immediacy (low, moderate, and high) will be determined using a theoretical median-split. For verbal immediacy scale the theoretical median-split will be 40 plus or minus fourteen, where less than 26 is low verbal immediacy; between 27 to 53 is moderate verbal immediacy; and greater than 54 is high verbal immediacy. For the nonverbal immediacy scale the theoretical median-split will be 28 plus or minus ten, where less than 18 is low nonverbal immediacy; between 19 to 37 is moderate nonverbal immediacy; and greater than 38 is high nonverbal immediacy. Gorham's (1988) verbal immediacy behaviors scale showed strong statistical significance, $p < .0001$, and a strong simple linear correlation between variables, $r = 0.51$. The nonverbal immediacy behaviors scale (Richmond et al., 1987) also showed a strong simple linear correlation between variables and strong statistical significance, $p < .0001$, $r = 0.59$. Christophel (1990) used the nonverbal and verbal immediacy scale relating immediacy, motivation, and learning. In the same study, a high scale reliability was observed for both the verbal ($\alpha = 0.88$ for the first study, and $\alpha = 0.89$ in the second study) and nonverbal scale ($\alpha = 0.83$ for the first study, and $\alpha = 0.80$ in the second study). The current study observed similar scale reliability with the verbal, $\alpha = 0.84$, and nonverbal, $\alpha = 0.80$, immediacy scale.

Robinson and Richmond (1995) observed that some correlation values for the nonverbal immediacy scale were too low to assume any connections with the described nonverbal immediacy behaviors. Their suggestion was to remove or rephrase some of the described nonverbal immediacy behaviors with the lowest values of correlation. Nevertheless, researchers like Furlich (2014), and many other studies observing immediacy behaviors, report high reliability on the scale (LeFebvre & Allen, 2014; Velez & Cano, 2008, 2012) and continue to use the nonverbal and verbal immediacy scale. The suggested changes by Robinson and Richmond (1995) did not offer enough data or a more accurate alternative to consider the development of a new scale. Regardless, the nonverbal and verbal immediacy continued to be widely used in communication research (LeFebvre & Allen, 2014; Velez & Cano, 2008; 2012).

Data Analysis

This mixed-methods study analyzed the data collected from the close-ended questions using a multiple linear regression analysis and the data from the open-ended questions using an interpretive thematic analysis. A multiple linear regression analysis can explain how an independent variable (i.e. instructor verbal and nonverbal immediacy) can predict the scores of the dependent variable (i.e. student state motivation) by yielding a multiple correlation coefficient (R), a coefficient of multiple determination (R^2), and a regression coefficient (β). The multiple correlation coefficient (R) states the relationship between student motivation and verbal and nonverbal immediacy as predicting variables. The coefficient of multiple determination expresses the amount of variance in the state motivation scale explained by the predictor variables (i.e. verbal and nonverbal immediacy) working together (Frey, Botan, & Kreps, 2000). The regression coefficient

(β), otherwise known as the standardized regression coefficient, indicates the relative weight of each predictor variable and controls for other predictor variables. Since the original hypothesis states that the use of immediacy can predict motivation, a multiple linear regression analysis is the appropriate statistical tool for data analysis (Frey et al., 2000). The statistical package, SPSS Statistics, was used to perform the regression analysis.

Thematic Analysis. To analyze the open-ended questions a thematic analysis was conducted. Thematic analysis is a widely used qualitative method that identifies, analyses, and reports patterns, or themes, within a set of data (Braun & Clarke, 2006). Interpretive thematic analysis seeks “to describe patterns across qualitative data” (Braun & Clarke, 2006, p. 80) and captures salient patterns of information in the collected data, providing a summary of key insights into the data. The researcher, and in this case the coder, has an active role in deciding what parts of the data they want to focus on (Frey et al., 2000). Researchers are to document any assumptions and the decision-making process when defining the coding guidelines (Braun & Clarke, 2006; Frey et al., 2000).

In thematic analysis, researchers are recommended to follow the six-phase analytical process. The first stage is to familiarizing with the data, which can be done by transcribing, reading, and re-reading the data. The next stage is to generate the initial code, here is where the parameters and definitions of the theme are established. Once the initial coded is set, the coder or research team start searching the data for themes. In some cases, familiarity with the data will prompt adjustments in the initial code. This is an iterative process to define the most concise and applicable code. A coder will know when to stop when a point of saturation is reached, meaning the coder will start observing similar themes with an overwhelming frequency. The point of saturation leads the coded into the reviewing phase. All themes need to be reviewed and rechecked to assure adhesion to the established code. For this study, an additional coder was used to check for reliability of the code and analysis. The results of the researcher and coder were comparable and similar. After doing so, the next phase includes defining and naming the found and reviewed themes, and the final phase is producing the report (Braun & Clarke, 2006). The final report should include vivid examples — "extracts to demonstrate the prevalence of the theme" (p. 93)–and illustrations that exemplify the argument. Although there is no pre-established way to conduct an interpretive analysis, Braun and Clarke (2006) offer the most methodical approach to do so. The following chapter will discuss in detail the results from the multiple regression analysis and thematic analysis.

Chapter 4

Results

The purpose of this study was to observe the effects of instructors' use of immediacy on student motivation. To test the hypothesis and answer the research questions, an online survey was distributed to STEM students at a mid-sized, Midwestern university. This chapter presents the results of the data gathered from the online survey responses collected from January 27, 2017, to February 20, 2017. First, data on the response rate are presented; next, the demographic data is discussed; finally, the findings from the data analysis are explained. The results are based on the hypothesis and research questions that guided this study.

Hypothesis and Research Questions

This study answered the following hypothesis and questions:

H1: Instructor verbal immediacy and nonverbal immediacy are a positive predictor of student intrinsic motivation.

RQ1: How does the use of immediacy behaviors affect student's state motivation?

RQ2: How does the instructor's behavior impact student motivation?

Response Rate

Approximately 1350 students were sent an email asking them to participate in a research project. One-hundred and thirty-nine students completed the electronic survey. This resulted in a response rate of 10%.

Demographic Information

Students enrolled in STEM fields at a mid-sized, Midwestern university were invited to participate in the study. The survey included 139 responses (76.3% male, 23.7% female). The study participants' age ranged from 18 to 39 (*M* = 20.9, *SD* = 2.76). Most survey responses came from first-year students (39, 28.1%), with a semi-uniform distribution of participation between sophomores (33, 23.7%), juniors (28, 20.1%), and seniors (36, 25.9%). Non-traditional or fifth-year seniors submitted the least number of responses (3, 2.2%). Most participants, 115 (82.7%), identified as Caucasian (non-Hispanic), ten as Asian or Pacific Islanders, five as Arab, five as Latino or Hispanic, two as Black or African American, two as multiracial, and one as Native American or Aleut. Additionally, international students (21, 15.1%) had a notable participation in the study. The following STEM majors contributed in the study: Agriculture and Biosystems Engineering (2, 1.4%), Civil Engineering (23, 16.5%), Computer Science (22, 15.8%), Construction Management (5, 3.6%), Electrical Engineering (24, 17.3%), Mathematics (12, 8.6%), Mechanical Engineering (49, 35.4%), and Operations Management (2, 1.4%).

Instrumentation

In addition to the demographic data that was collected the study also used the state motivation scale (Christophel, 1990), the verbal immediacy scale (Richmond, Gorham, & McCroskey, 1987), the nonverbal immediacy scale (Richmond, Gorham, & McCroskey, 1987) and asked two open-ended questions. The state motivation uses twelve bipolar items using a seven-point scale to describe student self-reported motivation level immediately after taking a specific course; lower scores reflect low state motivation and higher scores reflect high state motivation (Christophel, 1990). The verbal and nonverbal immediacy scale is a 34-item instrument that measures the student's perception of instructor immediacy behaviors using a five-score Likert-type scale; lower scores describe an absence of instructor use of immediate behaviors and higher scores represent a greater frequency of immediate behaviors (Richmond et al., 1987; Gorham, 1988).

Data Analysis

A multiple linear regression was used to analyze the relationship between the state motivation scale and verbal and nonverbal immediacy scale. Thematic analysis facilitated the examination of responses for the two open-ended questions. The first question asked students to describe an instance where their instructor used immediacy behaviors and the effect of that event on their motivation levels towards the class they were taking. The second question elicited the opposite and asked students to describe an event when their instructor used non-immediate behaviors and the effect of that event on their motivation levels towards the class they were taking. Four sub-sections were created to classify the observed themes: immediate instructor behavior, positive student response, non-immediate instructor behavior, and negative student response. In the thematic analysis, forty-two responses from the study participants linked verbal immediate instructor behavior with positive student response.

Findings

Table 1 depicts the means and standard deviation scores on state motivation, verbal immediacy, and nonverbal immediacy. Most students scored moderate levels of state motivation. Students also perceived their instructors to moderately use both verbal and nonverbal immediacy behaviors.

Table 1

Means and Standard Deviation of Measures Employed

Scale	*M*	*SD*
State motivation	55.70	11.8
Verbal immediacy	41.85	11.3
Nonverbal immediacy	35.43	7.8

Instructor Use of Immediacy and Student's Intrinsic Motivation

To predict whether verbal and nonverbal instructor behaviors are greater predictors of student motivation a multiple linear regression analysis was conducted. The results of the multiple linear regression indicated that verbal and nonverbal immediacy explained 18.3% of the variance with an R^2 of .195 (F (2, 135) = 53.25, $p < .001$). Therefore, the hypothesis was partially supported. Verbal immediacy predicted increased student motivation ($\beta = .312$, $p < .001$), whereas nonverbal immediacy did not contribute to the multiple linear regression model ($\beta = .181$, $p < .01$). Table 2 represents the regression of verbal immediacy, nonverbal immediacy, and state motivation.

Table 2

Results from Multiple Linear Regression Analysis

	b	*β*
State motivation	32.44	
Verbal immediacy	.325***	.312
Nonverbal immediacy	.273*	.181

Note: β = Standardized beta and b = Unstandardized beta from regression equations. * $p < .05$, ** $p < .01$, ***$p < .001$

Immediacy Behaviors and Effects on Student State Motivation

The first research question asked, “How does the use of immediacy behaviors affect student state motivation?” A thematic analysis identified four categories for the observed themes: immediate instructor behavior, positive student response, non-immediate instructor behavior, and negative student response. The following themes in each category became apparent in the analysis.

Immediate Instructor Behavior. Participants overwhelmingly reported instructors’ use of helping strategies as the primary immediate instructor behavior. One student wrote, “I can always go their [instructor’s] office with questions about class materials or other things in my life” and shared that their instructor offers “advice for my own business that I operate.” A student shared how their instructor was very helpful to all students and “he points out their mistakes in a friendly manner.” Another student described how their computer science instructor shared about their new pre-ordered gaming console and “made it easier to approach him and more friendly” and afterward perceived him as “much more welcoming and optimistic.”

Other students reported having an approachable instructor who’s flexible with dates and course content as another immediate instructor behavior. A couple of students shared anecdotes of either traveling or being late for homework assignments and their instructors willingly help them through the situation. A student wrote, “I was late for one homework once because of a silly reason. I talked to him about it, we laughed a bit, and he accepted my late homework. It made me respect him more.” Another student wrote, “My professor calmed me down when I was late to an exam and allowed me to take it in his office. This motivated me to get an A.”

Positive Student Response. Students reported that when the instructor engages in immediate behaviors, students want to do well in class and are more willing to learn and ask questions. One student indicated that since their instructor made themselves available for questions, in turn, made “it super easy and much more comfortable to approach him and talk to him.” Another student wrote, “because he [instructor] showed compassion… I did not want to let him down.” A third student stated, “he [instructor] is just very helpful and informative and makes me want to learn more.”

Non-Immediate Instructor Behavior. The prevalent non-immediate instructor behaviors occurred when instructors either seemed unapproachable or were unavailable to meet with students. One student shared, “[I] went to ask a question late in the day to their [instructor’s] office and were asked to leave to come back during office hours” and “felt like you couldn’t have one on one conversations with them.” Another student shared how their instructor “come[s] into the classroom shortly before the class is scheduled to start and they leave shortly after excusing the class” and therefore, “do not feel inclined to participate in class.” The second non-immediate instructor behavior identified was when instructors were perceived to be unfriendly and annoyed at students. One student wrote, “she [instructor] seemed annoyed that I didn’t understand the material” and described how she felt less inclined to participate in class. Another student said, “[my instructor] told me I was going to fail a test because I was asking questions so late to the upcoming test” which made this student less likely to approach their instructor. In another instance, another student related how their professor “laugh[s] if someone makes a silly mistake” and makes them “less likely to answer or ask questions.”

Negative Student Response. Students identified the most common negative student responses to be less likely to approach their instructors, followed by sharing the low rapport of the instructor with other students. One student shared, “I highly dislike going to his class. The class, I think, could be more useful and interesting if it were taught by a different instructor.” A second student shared, “my professor will laugh if someone makes a silly mistake, which, in my opinion, can be harmful because it makes students less likely to answer or ask questions.” Another student stated, “[my instructor] is the worst at trying to approach” along with that they “have heard this from too many students too.”

Instructor’s behavior impact on student motivation

The second research question asked, “How does the instructor’s behavior impact student motivation?” From the previous thematic categories, forty-two participants associated instructor verbal immediacy with positive student response. One student stated, “when I answered a question in class correctly, he [instructor] met my response with praise, which motivated me.” Another student shared, “[the instructor] always seems friendly which keeps me motivated.” One student stated, “[the instructor] approached me and called me by name… [d]efinitely made me feel welcomed and cared about.” A fourth student shared an anecdote of their instructor taking extra time to help a group of students with a project and stated: “[t]his event increase[d] my motivation levels towards the class and made me felt heard.”

Chapter 5

Discussion

This study examined the association between immediacy and motivation in the engineering classroom. Previous studies established a positive relationship between the use of instructor verbal and nonverbal immediacy and student motivation (Allen et al., 2006; Frymier, 1993; Furlich, 2014; Velez & Cano, 2008). This study observed that instructor verbal immediacy of engineering instructors was a significant predictor in engineering student motivation compared to previous research. This chapter provides a comprehensive discussion of the results and elaborates on the implications of the study findings. The chapter is divided into four sections. The first section offers supporting material on how immediacy can predict student motivation. The following section explores why verbal immediacy resulted in a weightier predictor. The third section offers insights on how instructor immediacy and behaviors can affect student motivation. The final section discusses on future research opportunities and limitations of this study.

Previous research established a positive relationship between verbal and nonverbal immediacy and student learning (Richmond et al., 1987; Witt et al., 2004), teacher effectiveness (Andersen, 1979; Nussbaum, 1981), and student motivation (Frymier, 1994). However, there is a limited amount of recent instructional communication research that examines instructor immediacy behaviors in engineering classrooms (Alemu, 2014; Myers, Zhong, & Guan, 1998; Shukla, 2013), and no previous research was found that observed instructor immediacy behavior as a predictor of student motivation with engineering students. The following hypothesis and research questions were proposed and analyzed using self-report surveys.

H1: Instructor verbal immediacy and nonverbal immediacy are positive predictors of student intrinsic motivation.

RQ1: How does the use of immediacy behaviors affect student's state motivation?

RQ2: How does the instructor's behavior impact student motivation?

The researcher recruited undergraduate students enrolled in STEM fields at a Midwestern university (N = 139). The Dean's office of the college that houses engineering programs agreed to send two emails, a week apart each, to encourage voluntary participation from the students. A third reminder email was forwarded to increase survey participation. The results of the collected data were analyzed to provide information regarding the role of instructor verbal and nonverbal immediacy behaviors on student motivation.

Predicting Student Motivation

Hypothesis one stated that "instructor verbal immediacy and nonverbal immediacy is a positive predictor of student intrinsic motivation." The results initially supported verbal immediacy as a significant predictor of student motivation. The researcher based this prediction on previous research that found positive relationships between instructor immediacy behavior and increased student performance (Allen, Witt, & Wheeless, 2006; Andersen, 1979; Frymier, 1993; Furlich, 2014; King & Witt, 2009; Nussbaum, 1981; Richmond, Gorham, & McCroskey, 1987; Velez & Cano, 2008; Witt, Wheeless, & Allen, 2004) and motivation (Allen et al., 2006; Frymier, 1993; Furlich, 2014; Velez & Cano, 2008).

Hypothesis one proposed that the use of both verbal and nonverbal immediacy in the engineering classroom could predict student motivation. Instructor verbal immediacy refers to educators using vocal expressiveness, calling students by their names, asking questions and giving positive feedback on assignment (Richmond et al., 1987). Instructor nonverbal immediacy refers to those educators who use relaxed body position, gestures, move around the room and look at the class while writing notes (Richmond et al., 1987). SDT defines motivation as the fuel to behavioral engagement or disengagement (Ryan & Deci, 2000b). Motivation describes the ability to be both self-regulating and self-initiating (Deci & Ryan, 2000; Deci et al., 1991). Once individuals report higher levels of motivation, they tend to perform activities to the best of their abilities (Ryan & Deci, 2000a). Therefore, if an instructor engages in the continual use of both verbal and nonverbal immediacy behaviors student motivation would be expected to increase.

Although the available literature links both nonverbal and verbal behaviors as influential variables in student motivation (Allen et al., 2006; Frymier, 1993; Furlich, 2014; Velez & Cano, 2008), the results of this study provided empirical evidence to only support verbal immediacy behavior as a significant predictor of student motivation. This study found verbal immediacy had a higher weight in predicting student motivation over nonverbal immediacy. One explanation may be that nonverbal immediacy behaviors such as including hand gestures and facing students when sharing information are commonly cited as effective instruction methods. In other words, instructors are prone to include these nonverbal immediacy behaviors, potentially reducing the number instructors who don’t uses them, and therefore making nonverbal immediacy an expected behavior. Communication research from scholars like Mehrabian (1969a, 1969b), Andersen (1979), Kearney, Plax, and Wendt-Wasco (1985), and Richmond, McCroskey, Plax, and Kearney (1986) have provided instructors with foundational evidence on impactful nonverbal instructional practices. Therefore, educators today are more self-aware to include nonverbal immediate behaviors in class.

Another reason that verbal immediacy behaviors were more influential to the students is due to the course perception of students in engineering classrooms. STEM courses are commonly classified as task-oriented (e.g. engineering, computer science, math), focusing on “output, productivity, structure, and organization” (Kearney et al., 1985, p. 62). Subsequently, task-oriented courses center around the course content. Thus, the instructor-student relationship becomes a secondary component and can lead students to feel distant from their instructors (Micaria & Pazos, 2016). In other words, student learning is impacted when instructors hyper-focus on covering content and adding more course material, rather than fostering environments where students feel welcomed to ask questions and have open discussion (Freeman et al., 2014; Richmond, 1986). Therefore, when the instructor engages in verbal immediacy behaviors, the students are more receptive of verbal behaviors, more likely to join the discussion and ask questions, and in turn begin perceiving their instructors as approachable. Instructors who are perceived as approachable smile at students, offer positive feedback, ask students questions (Gorham, 1988), expand on course content beyond the syllabus if the instructor sees greater benefit to the student (Jolly, 2014; Gorham, 1988), and use appropriate humor (Mehrabian, 1981). Thus, communication research defines approachable instructors as verbally immediate instructors.

Previous research established that among students the most influential instructor behaviors are vocal expressiveness, smiling, relaxed body position, gesturing, and giving positive feedback (Gorham, 1988; Richmond et al., 1987). Instructors can readily implement these immediacy behaviors in the classroom. Instructor immediacy workshops are a cost effective and efficient method that allow instructors to learn about and quick ways to incorporate immediate behaviors in their classrooms (Bouwma-Gearhart, 2012). For example, a simple way to increase verbal immediacy behaviors is by learning students' names and asking the students detailed questions regarding the content. Another simple way to incorporate nonverbal behaviors in the classroom is to smile at students and adopt a relaxed body position. The communication in the discipline (CID) model offers a framework for the communication community to provide other disciplines, in this case STEM fields, with relevant communication practices and theory to strengthen the current course design (Dannels 2001; 2002; Freeman et al., 2014).

Recent research has observed that verbal immediacy is a greater predictor of student motivation to learn compared to nonverbal immediacy (Furlich, 2016). This evidence supports the current study’s results but it also differs from previous research (Witt, Wheeless, & Allen, 2004). However, Furlich (2016) and the current study results might present a reflection of the college student evolution. The introduction of the internet and prevalence of social media outlets have altered the way college students interact with their instructors (Mahmud, Ramachandiran, & Ismail, 2016). Millennial college students are the youngest generation to have had the longest internet and social media exposure during their developmental years. The interaction and effects of internet use among college students is a phenomenon to further study and gather empirical evidence on why nonverbal behaviors are losing their influence on college students.

Impact of Immediacy Behaviors on Student Motivation

Research question one asked, “how does the use of immediacy behaviors affect student state motivation?” The thematic analysis identified four categories for the observed themes: immediate instructor behavior, positive student response, non-immediate instructor behavior, and negative student response. These categories emerged based on the student reactions to their instructor immediacy behaviors.

Immediate Instructor Behavior. Students agreed that the two major immediate instructor behaviors were approachability and helpfulness, followed by friendliness and caring. These immediacy characteristics mirror the same characteristics that Gorham (1988) used to define verbal immediacy. Many of the participants identified their instructors as helpful when they "go to their [instructor's] office to ask questions," or the instructor helps them "figure out a what the problem was" in applied design assignments. Other students described their instructor as approachable when their instructor is "available outside of class," "easy to talk to," or the instructor "encourages students to come in and ask questions." Students also recognized instructors who were more caring and friendly because the instructor called them by name, showed interest in their personal lives, and self-disclosed personal stories that related back to the students.

For engineering students, helpfulness was identified as a prevalent instructor verbal immediacy behavior. Engineering educators are more likely to be perceived as helpful when they provide feedback on student work and invite students to meet outside of class to discuss questions or concerns (Gorham, 1988). When instructors provide feedback on student work, students can develop a greater sense of control over their grades (Deci & Ryan, 2000; Deci et al., 1991). If students have specific information on the areas they need to strengthen or are doing well on, they can tailor their course work by keeping their instructor feedback in mind. Secondly, when instructors invite students to meet outside of class to further discuss ideas, instructors are facilitating the growth of interpersonal relationships with students. Research has established that a major component of teaching-learning interactions is interpersonal communication and that immediacy can enhance that teaching-learning relationship (Mehrabian, 1981).

Positive Student Response. In general, study participants wanted to learn and interact more with their instructors. Students explained how their instructors' helpfulness made it "more comfortable going and seeing" them during office hours and for some they wanted to "do more research on the subject." Previous literature supports the notion that students are more likely to perceive instructors as caring and helpful when the instructor uses verbal immediacy (Moore & Masterson, 1996). Also, students are more likely to give higher instructor survey ratings to those instructors who continually use verbal immediacy behaviors (Moore & Masterson, 1996). One student explained how his professor recognized his family last name and knew the student's grandfather, which made the student "feel better about the class because my professor seemed to genuinely care about me." Previous research has established that when the instructor learns the names of their students, the students have a heightened perception of closeness to their instructor (Sanders & Wiseman, 1990).

For the engineering students in this sample, one instructor immediacy behavior (e.g. helpfulness, learning student's names, asking questions, approachable) was enough to catalyze a positive student response. Instructors can elicit positive student responses by incorporating flexible office hours and learning student names (Gorham, 1988). Students will more readily approach their instructor with course content questions, which in turn can facilitate the assessment of content comprehension to the instructor. If an instructor is receiving questions from students who couldn't grasp fundamental concepts, instructors can reinforce material and tailor the class according to the students' needs. This will lead to fewer engineering students reporting ineffective instructor quality (Strenta et al., 1994).

Non-immediate Instructor Behavior and Negative Student Responses. The primary non-immediate instructor behavior recognized was an instructor who appeared unapproachable or unavailable for students. Students viewed the inability to approach their instructor as a non-immediate behavior. Students described that when instructors don't "give a time outside class or office hours…[to] get help from [their instructor]" they feel less motivated to learn. Another example of non-immediate instructor behaviors occurs when instructors appeared to be in a hurry before and after class and when instructors were only willing to help students during specific office hours. In the latter case, instructors were described as overly direct with the students by asking the students to return only during office hours, and in some cases not willing to answer questions before or after class. Research identifies instructors who are overly direct and intense in their communication as non-immediate verbal communicators (Mehrabian, 1967). Non-immediate communicators frequently elicit negative attitudes from the audience, and in this case their communication behavior causes student to distance themselves from their instructor (Mehrabian, 1967). Therefore, one of the primary negative student responses was students stating that they were less likely to approach their instructor.

The results of the open-ended questions suggest that self-confidence might be playing a more significant role in student motivation and instructor behaviors than was initially perceived. Student and instructor self-confidence may be another explanation as to why some instructors choose overly direct communication styles and why students choose to refrain from seeking out their instructors. Previous research has suggested that low self-confidence in students leads to students doubting their cognitive abilities to complete a course and may also impact their career (Kassaee & Holmes Rowell, 2016). Students are strongly influenced by their social environments such as competition, personal difficulties, and financial stress (Tucker & Winsor, 2013). Therefore, when some students experience a combination of the previously mentioned environmental influences self-confidence begins to decrease.

STEM students typically report low self-determination levels during their college career (Kassaee & Rowell, 2016), meaning STEM students often feel like they have very limited control over their courses, time, or academic performance. Students feel like most of their time is already taken up by their classes and struggle with time management (Kassaee & Rowell, 2016). Instructors can reinforce the motivation of their students by giving clear directives on their grade performance and expectations. Also, instructors can choose to self-discloses on how they learned to balance their work and social life. Students can then benefit from their instructor insight and develop a greater sense of autonomy. In other words, students will feel that they have a better control of their time management if they have similar life examples. If a STEM student feels that they have more control, i.e. autonomy, specifically with their grades, they are more likely to put forth greater effort (i.e. internalize behaviors of motivation) (Guloy, Salimi, Cukierman, & McGee Thompson, 2017).

Self-confidence also affects instructors. STEM instructors usually carry both an educator and research workload. While most report high self-confidence in their research skills, others reported feelings of incompetence in certain aspects of instruction (Bouwma-Gearhart, 2012). However, instructors can experience heightened levels of self-confidence by participating in teaching professional development workshops (Bouwma-Gearhart, 2012). Workshops can provide educators with a safe atmosphere to share any negative and positive experiences with a group of similar individuals (Bouwma-Gearhart, 2012).

Impact of Instructor Behaviors on Student Motivation

Research question two asked, “how does the instructor’s behavior impact student motivation?” The purpose of this question was to observe how an instructor behavior, whether positive or negative, impacted the student’s motivation. Research question two offered insight on how friendly and caring instructors elicit positive student reactions. For some students, an instructor calling them by their name was motivation enough to learn. Other students, after perceiving their instructor’s behavior as friendly, became motivated. The caring and friendly attitudes from the instructor act as the liaison between the absence of student motivation and intrinsic motivation (Gagné & Deci, 2005). Cognitive evaluation theory (CET) explains integrated forms of regulation as the closest step to internalizing outside behaviors and integrating these behaviors as part of their self-identity (Deci et al., 1991). In other words, students continue to interact with their instructors and desire to ask more questions not only because they believe that is what the instructor would want them to do, but because the students want to do so as well (Ryan & Deci, 2000b). CET describes the internalization process of intrinsic motivation (Deci & Ryan, 1985) and in this case, instructor immediate behavior (i.e. extrinsic motivation) is what catalyzed positive student response (Ryan & Deci, 2000b). Previous research illustrates that verbal reinforcement and positive feedback had an enhancing effect on intrinsic motivation (Deci, 1971).

A side note should be made on the intercultural impact on students' perceptions of instructor's immediacy behaviors. Verbal and nonverbal immediacy behaviors vary across cultures (Alemu, 2014; Mehrabian, 1969b; Myers, Zhong, & Guan, 1998). Which means that depending on the students' worldviews–western or eastern–, the students' perception of their instructor's immediacy behavior can differ in impact and saliency. Also, the instructor's cultural background can also offer insight on the reasons why certain immediacy behaviors are or are not included in the classroom (Myers, Zhong, & Guan, 1998). In this study, the researcher chose the western worldview interpretation of immediacy as Mehrabian (1969a, 1969b) and Gorham (1988) initially conceptualized.

Although immediacy behaviors can seem overly simplistic at first, they convey to the student that their instructor cares for them holistically. In other words, through immediacy students can see how their instructors actively relates back to them by getting to know their names, hobbies, and including relevant examples that can help the students grow in their professional development. By using immediacy behaviors, instructors seem more approachable which offers opportunities for students to ask questions and allows instructors to encourage those students who have lower motivation levels. Instructors should not feel obligated to incorporate all verbal and nonverbal immediacy at once.

Rather, instructors should focus on those immediacy behaviors that are more reflective of their personality. As a result, the use of these behaviors will help increase student motivation (Frymier, 1994) and enhance material comprehension (Allen et al., 2006). Those students who understand the course material are more likely to stay in the STEM fields and not doubt their cognitive abilities (Strenta et al., 1994). Instructor's immediacy is recognized as an essential characteristic of an effective educator (Allen et al., 2006; Frymier, 1993; Furlich, 2014; King & Witt, 2009; Velez & Cano, 2008). Effective educators positively influence student motivation (Morreale et al., 2014; McCroskey et al., 2014), and foster environments of autonomy (Ryan & Grolnick, 1986) -where students feel comfortable asking questions and sharing input. In other words, instructor immediacy enables students to share uncertainties related to course content and consequently promote increased content retention (King & Witt, 2009; LeFebvre & Allen, 2014; Richmond et al., 1987). When students increasingly doubt their cognitive comprehension, the probability of that student dropping out from their STEM program increases (Strenta et al., 1994).

Instructor immediacy behavior can affect students beyond motivation. For instance, self-efficacy for students defines the student's belief that given their own capabilities they can successfully perform a given task, in this case the given task is the completion of their selected field of study (Bandura, 1997). Research suggested that when instructors increase the distance between them and the students by not making themselves available (i.e. a non-immediate behavior), that can impact students' sense of self with adverse effects on academic competency and self-efficacy (Vogt, 2008). In contrast, the instructor can also have a positive impact on students' self-efficacy and, in turn, increase the levels of students' reported survey satisfaction (Micaria, & Pazos, 2016). Instructors who use immediacy behaviors also higher student survey ratings (Moore & Masterson, 1996). Engineering instructors can also increase their instructional effectiveness by incorporating immediacy behaviors as part of their personality (Alemu, 2014). For example, instructors can be more flexible to meet with students after hours or come earlier to class to get to know about their students. Instructors can positively impact students through the development of a continual teaching relationships, where students feel interconnected with their peer and instructors (Micaria, & Pazos, 2016; Nussbaum, 1992). From there, students can begin integrating into their departments, and are less likely to drop out.

The self-determination theory (SDT) states that individuals, regardless of age or cultural context, require autonomy, competence, and relatedness (Deci et al., 1991). Autonomy describes the individual ability to be both self-regulating and self-initiating (Deci et al., 1991). Self-efficacy theory (SET) expands on the personal beliefs of individuals to have the capability to perform well with a given task (Bandura, 1997). Together, SDT and SET illustrate both sides of motivation. Motivation has two axioms, the reasoning that goes behind internalizing a requested activity (Deci et al., 1991), and the belief that one can complete the requested behavior by following through with it (Bandura, 1997). The current study only explored a fraction of the multifaceted construct of motivation. Students shared how instructor helpfulness, an immediate behavior, promoted students’ sense of autonomy and increased student self-efficacy. Students shared that when the instructor helped them solve a complicated math problem or assignment, they felt motivated to learn more. More specifically, students experienced a heightened self-efficacy by believing they could complete the assignment at hand and learn new content.

Beyond incorporating immediacy behaviors, strengthening instructor-student relationships may also facilitate the internalization of motivation for students. In the classroom context, students bring different schemata of experiences and environmental backgrounds. The schema theory offers a process based framework on how individuals interpret the possible specifications of a given case–a case, defined by the schema theory, is a “specific instance in time” (Axelrod, 1973, p. 1250). In other words, when a message is received the individual filters the message through a series of questions that allow the person to determine if the incoming message should be accepted or rejected. Accepting a message means that the person changes their initial interpretations, while rejecting a message means that the individual retains the old interpretations (Axelrod, 1973). Part of the challenge for many educators is trying to understand what will most likely motivate each student, based on the students’ schemata. Motivation is not explicitly one factor or a short list of behaviors, and can be different among personalities; however, the core process of internalization remains consistent across individuals (Deci & Ryan, 1985; Ryan & Deci, 2000b). Educators need to prioritize building relationships with their students to create interconnectedness with the students (Micaria & Pazos, 2016). Instructor-student relationships will provide the instructor with background on their students and possible examples to help tailor content that aligns with the students' pre-established belief systems. As a result of instructors engaging in a process of interconnectedness with their students (Micaria & Pazos, 2016), instructors will also be facilitating the process of motivation internalization for students (Deci & Ryan, 1985).

Ultimately, students have different catalysis for motivation (Ryan & Deci, 2000b) but verbal immediacy, the way that we commonly connect and form interpersonal relationships (Mehrabian, 1981), is the doorway to developing these student-teacher relationships.

Limitations and Future Directions

Limitations. The results of this study must be viewed in light of the limitations placed on the study. First, this study was limited by the sample size (N = 139) due to the nature of volunteer sampling. Students tend to experience survey overload because of the popularity of survey use within university settings. Therefore, many students can either forget to participate or become overwhelmed by the large volume of surveys they receive. Also, the engineering department at the Midwestern university included in this study had a limited number of undergraduate students (N = 1350) and lacked diversity. Study participants identified primarily as male (76.3%, 136) and non-Hispanic Caucasian (82.7%, 115), which limits the conclusions that can be drawn (Nulty, 2008). Also, the generalizations of this study are specific to STEM fields, since engineering students were the predetermined subset.

This study observed a small and limited number (i.e. verbal and non-verbal instructor immediacy) of variables that can potentially influence student motivation. Student motivation is affected by different components such as student sense of autonomy (Higgins et al., 2012) and positive feedback (Deci, 1971; Harackiewicz, 1979). Although this study offered insight on how instructor verbal immediacy behaviors predict student motivation, the results only offer a partial explanation toward understanding the paradigm of student motivation.

Another limitation of this study was the use of self-reported data and open-ended questions. Self-reported data facilitated the data collection and offered a variability in perception of instructor immediacy behaviors. However, students base their answers on their past and present experiences. Sometimes survey participants may have had a heightened positive or negative perception of an instructor based on previous occurrences. Other times students' perceptions of their instructors were influenced by the rigor in course content. Secondly, open-ended questions are exposed to the readers' interpretation and the reader may misinterpret the meaning of the question. The open-ended question inquired about the instructor's immediate or non-immediate behaviors and the perceived impact on student's motivation. Some survey participants might have interpreted the question to require only general examples of the immediate or non-immediate instructor behavior, while others might answer the question with detailed examples. Some students tended to focus on describing instructor behavior, but unsuccessfully described the relationship to their instructor's behavior and their motivation.

Future Directions. Future research is required to broaden the methodology and generalizability of this study. The current study provided empirical evidence that verbal immediacy behaviors can predict student motivation in an engineering course. One way to expand the method of this study is to conduct a pre- and post-test that will allow researchers to set a datum for both instructor immediacy behaviors and student motivation. An initial survey on instructor immediacy behaviors will offer insight on changes in perceptions of immediacy throughout the semester. Also, an initial survey on student motivation will aid in identifying students who experience higher levels of motivation compared to those with lower levels of motivation before taking the class. By setting a student motivation baseline, the researcher can observe the impact of verbal and nonverbal immediacy on student motivation throughout the semester. Another procedure to expand the methodology of this study is to further research the phenomenon of nonverbal immediacy losing part of its saliency in today's college classroom. A bigger study including art and humanities students will offer more generalizable conclusions on how millennial college students are evolving and on their perceptions of effective instructor characteristics.

By expanding the study to include a greater number of STEM-focused institutions, the results could be generalized across broader contexts. By increasing the sampling frame to include students from a variety of universities the sample would encompass a greater variety of cultural contexts (e.g. East coast, West coast, Midwest culture) and ethnicity participation, which in turn can help with generalizations of the study. Although STEM fields are characteristically male prevalent (Higher Education Research Institute, 2010), previous communication research has observed that neither the biological sex of the instructor or student affects the student's perception of immediacy behaviors (Moore & Masterson, 1996). However, STEM fields continually struggle with the retention of minority groups (e.g. women, Hispanic, African-American, Native American) (Higher Education Research Institute, 2010) and, therefore, more research on the matter will be beneficial to identify how communication can benefit these subsets of students.

Conclusion

In the current study, the researcher set out to observe the relationship between instructor immediacy behaviors and student motivation in the engineering classroom. The study found supporting evidence that verbal immediacy was a predictor of student motivation. Also, the study provided insight on how the use of instructor immediacy behaviors motivate students to learn more. Based on the survey design the hypothesis was confirmed–immediacy behaviors can predict student motivation. Further findings included verbal immediacy–among verbal and nonverbal immediacy–as the primary predictor of student motivation. Through a thematic analysis, the research questions were answered using the responses to two open-ended questions. The results confirm that having a helpful and approachable instructor (i.e. immediate behaviors) elicits positive student responses such as being motivated by wanting to learn and participate more in class. Also, the thematic analysis found that instructors who are perceived as unapproachable or unavailable to meet with the student are more likely to elicit negative attitudes from students, such as students becoming less inclined to ask questions during and out of class. These findings have potential implication for STEM instructors and departments and communication research. By understanding the role of immediacy behaviors in the engineering classroom, instructors can influence students' motivation, which can lead to increased cognitive comprehension and ultimately student retention.

Appendices

Appendix A

IRB Approval Letter

South Dakota State University
SDSU

Office of Research Assurance
and Sponsored Programs

Box 2201, SAD 200
SDSU
Brookings, SD 57007-1998
Phone: 605-688-6696
FAX: 605-688-5530

Dianne.Nagy@sdstate.edu

To: Andrea Barahona Guerrero, Department of Communication Studies and Theatre

Date: December 5, 2016

Project Title: Exploring the relationship between immediacy behaviors and student motivation in engineering classrooms: Immediacy as a cause of motivation

Approval #: IRB-1612002-EXM

Thank you for bringing your project to the Human Subjects Committee. Your project is approved as exempt from the Common Rule. The basis for your exempt status (from 45 CFR 46.101 (b)) is:

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:
(i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

If there are any unanticipated problems involving risks to subjects or others or changes in procedures during the study, please contact the SDSU Research Compliance Coordinator. At the end of the project please inform the committee that your project is complete.

If I can be of any assistance, don’t hesitate to let me know.

Sincerely,

Dianne Nagy

Dianne Nagy
Acting IRB Coordinator

Appendix B

Survey Cover Letter with Implied Consent

Dear Participant:

I Andrea Barahona am conducting a research project entitled "Exploring the relationship between immediacy behaviors and student motivation in engineering classrooms: Immediacy as a cause of motivation" as part of a master's thesis at South Dakota State University.

The purpose of the study is to observe the impact of the use of instructor immediacy on student motivation in the engineering classroom.

You, as a student, are invited to participate in the study by completing the following survey. We realize that your time is valuable and have attempted to keep the requested information as brief and concise as possible. It will take you approximately 20 to 25 minutes of your time. Your participation in this project is voluntary. You may withdraw from the study at any time without consequence.

There are no known risks to you for participating in this study, and there are no direct benefits for you as a participant. Your responses are strictly confidential. When the data and analysis are presented, you will not be linked to the data by your name, title or any other identifying item.

Please assist us in our research by completing the following online survey. If you decide to stop participating at any time, please close the browser window. You are also free to not answer specific questions on the survey.

Your consent is implied by the completion of the survey. If you have any questions, now or later, you may contact me at the number below. Thank you very much for your time and assistance. If you have any questions regarding your rights as a research participant in this study, you may contact the SDSU Research Compliance Coordinator at 605-688-6975, SDSU.IRB@sdstate.edu.

Sincerely,

Andrea Barahona Guerrero

Communication Studies & Theatre

SDSU Pugsley Continuing Education Center

Box 2218

Brookings, SD 57007

Andrea.BarahonaGuerrero@sdstate.edu

(605) 688-6131

This project has been approved by the SDSU Institutional Review Board, Approval No.: 1612002-EXM

Appendix C

Demographic Data to Collect from Surveyed Students

DIRECTIONS: Please respond to the following questions.

1. Please select your major:

   ____ Agricultural & Biosystems Engineering

   ____ Civil Engineering

   ____ Computer Science

   ____ Construction Management

   ____ Electrical Engineering

   ____ Electronics Engineering Technology

   ____ Mathematics

   ____ Mechanical Engineering

   ____ Operations/Industrial Management

   ____ Other: ____________

2. What year are you in college?

   ____ Freshman

   ____ Sophomore

   ____ Junior

   ____ Senior

   ____ Other: ____________

3. Current student status

   ____ Full-time (12 credits or more)

   ____ Part-time (less than 12 credits)

4. Are you an international student? If yes, please enter country.

____ No

____ Yes: _______________

5. What is your biological sex?

____ Female

____ Male

6. What is your age?

_____

7. To which racial or ethnic group(s) do you most identify? Select all that apply.

____ Arab

____ Asian/Pacific Islanders

____ Black

____ Caucasian (non-Hispanic)

____ Latino or Hispanic

____ Multiracial

____ Native American or Aleut

____ Other: __________

Appendix D

State Motivation Scale

DIRECTIONS: Recall the first class in *your major* that you attended this week. Now, answering the following question with that particular instructor and course in mind.

Below are a series of bipolar adjectives to represent *your feelings* about the *first class in your major that you attended this week.*

Please select the frequency closest to the adjective that best represents *your feelings*.

Table 3

State Motivation Scale (Christophel, 1990).

	Very often	Often	Occasionally	Neutral	Occasionally	Often	Very often	
Motivated	1	2	3	4	5	6	7	Unmotivated*
Interested	1	2	3	4	5	6	7	Uninterested*
Involved	1	2	3	4	5	6	7	Uninvolved*
Not stimulated	1	2	3	4	5	6	7	Stimulated
Don’t want to study	1	2	3	4	5	6	7	Want to study
Inspired	1	2	3	4	5	6	7	Uninspired*
Unchallenged	1	2	3	4	5	6	7	Challenged
Uninvigorated	1	2	3	4	5	6	7	Invigorated
Unenthused	1	2	3	4	5	6	7	Enthused
Excited	1	2	3	4	5	6	7	Not Excited*
Aroused	1	2	3	4	5	6	7	Not aroused*
Not fascinated	1	2	3	4	5	6	7	Fascinated

* Presumed to reflect unmotivated behaviors; reverse scoring required.

Appendix E

Verbal Immediacy Scale

The following section will cover immediacy behaviors. Immediacy is any positive behavior that promotes closeness and comfort in interpersonal interactions (Richmond, Gorham, & McCroskey, 1987).

DIRECTIONS: Recall the first class in *your major* that you attended this week. Now, answering the following question with that *particular instructor* and course in mind. The following section includes a series of statements about your *particular instructor*. Please select the number that represents the frequency of the following statements based on your experiences.

Table 4

Verbal Immediacy Behavioral Scale (Gorham, 1988).

	Very often	Often	Occasionally	Rarely	Never
1. Uses personal examples or talks about experiences she/he has had outside of class.	4	3	2	1	0
2. Asks questions or encourages students to talk	4	3	2	1	0
3. Gets into discussions base on something a student brings up even when this doesn't seem to be part of his/her lecture plan.	4	3	2	1	0
4. Uses humor in class.	4	3	2	1	0
5. Addresses students by name.	4	3	2	1	0
6. Addresses me by name.	4	3	2	1	0
7. Gets into conversations with individual students before or after class.	4	3	2	1	0

8. Has initiated conversations with me before, after, or outside of class.	4	3	2	1	0
9. Refers to class as “my” class or what “I” am doing.*	4	3	2	1	0
10. Refers to class as “our” class or what “we” are going to do.	4	3	2	1	0
11. Provides feedback on my individual work through comments on papers, oral discussions, etc.	4	3	2	1	0
12. Calls on students to answer questions even if they have not indicated that they want to talk. *	4	3	2	1	0
13. Asks how students feels about an assignment, due date or discussion topic.	4	3	2	1	0
14. Invites students to telephone or meet with him/her outside of class if they have questions or want to discuss something.	4	3	2	1	0
15. Asks questions that have specific, correct answers. *	4	3	2	1	0
16. Asks questions that solicit viewpoints or opinions.	4	3	2	1	0
17. Praises students; work, actions or comments.	4	3	2	1	0
18. Criticizes or points out faults in students’ work, actions or comments.*	4	3	2	1	0
19. Will have discussions about things unrelated to class with individual students or with the class as a whole.	4	3	2	1	0
20. Is addressed by his/her first name by the students.	4	3	2	1	0

*Presumed to be *non*immediate. Item scoring reflected for analyses.

Appendix F

Nonverbal Immediacy Scale

The following section will cover immediacy behaviors. Immediacy is any positive behavior that promotes closeness and comfort in interpersonal interactions (Richmond, Gorham, & McCroskey, 1987).

DIRECTIONS: Recall the first class in <u>*your major*</u> that you attended this week. Now, answering the following question with that <u>*particular instructor*</u> and course in mind. The following section includes a series of statements about your <u>*particular instructor*</u>. Please select the number that represents the frequency of the following statements based on your experiences.

Table 5

Nonverbal Immediacy Behavioral Scale (Richmond et al., 1987)

		Very often	Often	Occasionally	Rarely	Never
1.	Sits behind desk while teaching. *	4	3	2	1	0
2.	Gestures while taking to the class.	4	3	2	1	0
3.	Uses monotone / dull voice when talking to the class. *	4	3	2	1	0
4.	Looks at the class while talking.	4	3	2	1	0
5.	Smiles at the class while talking.	4	3	2	1	0
6.	Has a very tense body position while talking to the class. *	4	3	2	1	0
7.	Touches students in the class.	4	3	2	1	0
8.	Moves around the classroom while teaching.	4	3	2	1	0
9.	Sits on a desk or in a chair while teaching. *	4	3	2	1	0
10.	Looks at board or notes while talking to the class. *	4	3	2	1	0
11.	Stands behind podium or desk while teaching. *	4	3	2	1	0
12.	Has a very relaxed body positon while talking to the class.	4	3	2	1	0

13.	Smiles at individual students in the class.	4	3	2	1	0
14.	Uses a variety of vocal expressions when talking to the class.	4	3	2	1	0

*Presumed to be *non*immediate. Item scoring reflected for analyses.

Appendix G

Final Open-Ended Questions

DIRECTIONS: Recall the first class in *your major* that you attended this week. Now, answering the following question with that *particular instructor* and course in mind.

1. Describe an instance where your instructor was approachable, friendly, and helpful towards you, and how did that event affected your motivation levels towards that class?
2. Describe an instance where your instructor was unapproachable, unfriendly, and not helpful towards you, and how did that event affected your motivation levels towards that class?

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