ACADEMIC HELP-SEEKING AS A METACOGNITIVE ACTION: AN EMPIRICAL STUDY OF EXPERIENCES AND BEHAVIORS IN ENGINEERING STUDENTS INCLUDING GENDER AND ETHNIC IMPLICATIONS

by

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(Under the Direction of Joachim Walther)

ABSTRACT

A majority of contemporary research investigating academic help-seeking behavior is quantitative in nature and K-12 in focus. Academic help-seeking is typically viewed as a subordinate behavior under the umbrella of social cognitive theory and self-regulated learning. The purpose of this research was a qualitative study to investigate gaps in the knowledge base regarding help-seeking behavior at the college level in highly competitive majors such as engineering. The focus of the study was the initial help-seeking decision of undergraduate engineering students. Help-seeking behavior was viewed through the theoretical framework of self-efficacy and the self-theory of intelligence as guiding tenets to formulate questions for the study. Help-seeking was considered as a metacognitive action taken by an individual based on influences described by the research framework. Purposeful sampling ensured maximum variation of ethnic background and a 50/50 gender ratio for a participant sample comprising twenty

undergraduate students from the University of Georgia College of Engineering. Semi-structured interviews provided experiential data from the students.

Discussion of the research results is in the context of the literature and contextual framework. A theoretical model and two manuscripts are included. A meta-analysis of prior literature provides the framework for the theoretical model. The first paper, *Engineering academic help-seeking: An empirical study of experiences and behaviors in undergraduate engineering students,* culminates with an empirical model of academic help-seeking behavior. Results suggest students grapple with the initial help-seeking decision in the face of self-conflict. If the student chooses to seek help, help-seeking is recursive until resolved. Adding to the difficulty of the initial decision is the need for some students to learn how to seek help. The second manuscript, *Engineering academic help-seeking: An empirical study of gender and ethnic influences in undergraduate engineering students,* examines the self-conflict construct identified in the first manuscript in light of gender and ethnicity. Findings widen the scope of prior theory to include stereotype threat as a compelling factor in the initial help-seeking decision. Stereotype threat explains much of the self-conflict in the decision for minority students within the domain. Implications and recommendations are discussed as well as future recommendations for research.

INDEX WORDS: Academic help-seeking; stereotype threat; self-efficacy; self-theory of intelligence; self-conflict; gender; ethnicity; engineering education

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DEDICATION

To Reby.

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INTRODUCTION

ñA little boy was having difficulty lifting a heavy stone. His father came along just then. Noting the boyôs failure, he asked, ñAre you using all your strength?ò ñYes, I am,ò the little boy said impatiently. ñNo, you are not,ò the father answered. ñI am right here just waiting, and you havenôt asked me to help you.òï Anon

> In 1978, the Perkin-Elmer Corporation won the NASA contract to manufacture the mirror for the Hubble Space Telescope. The success of the Hubble Space Telescope rested on Perkin-Elmerôs ability to create a one-of-a-kind mirror with maximum smoothness and precise curvature ï it was a technological challenge for the team of engineers entrusted with the Hubble project. To ensure the success of the project, Perkin-Elmer hired renowned technical experts and optical engineers as consultants to assist the Hubble team. However, even though the Hubble team faced many problems during the mirror production process, it resisted seeking help from the experts. For example, when one of the consultants, Roderic Scott, would come by, team members said to each other, ñHey, Rod is out there. Donôt let him in. Turn up the radioò (Capers & Lipton, 1993). As a result of not seeking help, the engineers failed to resolve serious problems that emerged from the production of the mirror, which in turn led to the installation of a seriously flawed mirror into the telescope (Sandoval & Lee, 2006, p. 151).

Richard Branson, commenting on his career start, reflected on the role of help-seeking.

> The career path of an entrepreneur is tough -- it involves a lot of hard work, sacrifice, and risk, and it can be very lonely. When you hit a rough spot or encounter a problem you don't know how to solve, it can be difficult to figure out where to find information and who to ask for help, and you can get into trouble. This was the essence of a problem I ran into in 1969, when at the age of 19 I started a mail-order record business. I did not ask my family, friends or mentors for advice on how to carry out a business plan. I thought I knew it all -- until I stupidly decided to take a shortcut and smuggle records through customs to avoid paying taxes. I was caught by British customs officials and spent a night in jail, not knowing what the outcome would be. (Luckily, customs agreed not to press charges as long as I paid back three times the tax that had not been paid.)
> We all make silly mistakes from time to time, but the bottom line is that entrepreneurs should seek input from the start (Branson, 2012).

Three personal experiences relate to academic help-seeking. I volunteered at a local high school to teach SAT math preparatory classes. I focused the content of the course toward more challenging questions. It interested me that the students in the class rarely, if ever, asked for help from their peers or from me. I remember one particular class where I gave an especially difficult problem for the students to individually solve. After adequate time had passed, I asked if there were any questions or did anyone need help. I could see no one had completed the problem; however, not one student asked for

help. When I requested a volunteer to solve the problem on the board for the class, hands shot up asking for help.

A second experience occurred with my older son when he was taking a second-semester college calculus class. He lived at home with his mom (a high school chemistry and physics teacher) and I (experienced electrical engineer)ð a living arrangement which gave him the unique opportunity to ask for help on a wide array of subjects, especially relating to math and science. We did not expect certain grades; however, we did expect him to utilize all resources available so that whatever grades he received would, in theory, exemplify work relating to his best efforts. He received a ñCò in the class. When I asked him if he had utilized all resources available to him including asking for help from peers, his instructor, or his parents, he reluctantly admitted he had not sought assistance from any of these sources. Why had he handicapped himself so?

Finally, my wife and I are members of the United States Air Force Academy Georgia parentôs club. We visited our son during parentsôweekend, Labor Day 2016, and attended a meeting with the Superintendent of the Academy, Dean of Students, and Dean of Faculty. One of the parents asked for a discussion of causes for the average 24% attrition rate of cadets from the Academy. The response from the three USAFA leaders began with ñShock of being in a military cultureò. However, the response quickly turned to matters related to academic performance and help-seeking (I am representing a co-created response from the three officers that follows).

> The cadets are in a high-pressure environment academically and physically. We know cadets have difficulties, but they do not ask for help. We encourage them to seek help and give many opportunities and examples; however, unless we place

them on close supervision with detailed expectations including required tutoring and academic restrictions, we do not see the cadets utilizing the help available to them in ways we would expect.

Background and Context

Most parents look back on the toddler years as the ñWhy?ò years. This help-seeking behavior comes at a time when cognitive abilities are forming, connections are being made, and communication skills are growing-- everything is new and exciting. Vygotskian theorists would say the child is growing his or her zone of proximal development (ZPD). Vygotsky defined ZPD as ñ... the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peersò (Vygotsky, 1978). Through asking questions, interacting with people, and in cooperation with peers, ñwhat a child can do with assistance todayò she can do by herself tomorrow (Vygotsky, 1978). Based on the definition, increasing oneôs ZPD requires interaction with people, cooperation with peers, and assistance ï all are aspects of help-seeking. This process does not wither away after the toddler years; expanding oneôs ZPD continues through adolescence and throughout adulthood. It is truly how we ñstretchò ourselves. However, each of us, when placed in a position of doubt or lack of understanding, has faced the internal dilemma, ñDo I ask for help, or do I just let it go?ò

As previously noted, I observed this struggle firsthand in students taking a SAT math class for which I was the instructor. My younger son was in the class. I asked him, ñWhy doesnôt anyone in your class ask questions? I know there are questions. The

material is new to you guys and challenging.ò He responded, ñWhatôs the point? Most teachers donôt really care; besides, nobody wants to look dumb, dad.ò Due to motivational, classroom context and social factors in the classroom, help-seeking often becomes help-avoidance (Carraccio, 2014; Inda, Rodríguez, & Peña, 2013; Ryan, Gheen, & Midgley, 1998). Asking for help may be perceived as lack of mastery, ñNo matter how hard I try, there is some schoolwork Iôll never understandò (Ryan et al., 1998, p. 530), or help seeking may be perceived as lack of ability, ñé other students may think that I am stupid if I ask for help in mathematics lessonsò (Skaalvik & Skaalvik, 2005, p. 292). A paradoxical result is those in most need of help are those most likely to avoid asking for help (Karabenick & Knapp, 1988; Richard S. Newman, 2012; Ryan et al., 1998; Ryan & Shin, 2011). These issues become more pronounced when gender, ethnic background (Collins & Sims, 2006; Schenke, Lam, Conley, & Karabenick, 2015; Vogt, Hocevar, & Hagedorn, 2007), and competitive environments (e.g., help-seeking behavior in organic chemistry (Horowitz, Rabin, & Brodale, 2013) or pharmacy school students (Payakachat et al., 2013)) are applicable factors. The focus of this study is to understand academic help-seeking behavior of engineering students enrolled in the University Of Georgia College Of Engineering.

This paper will present help-seeking as a stand-alone, metacognitive process which involves planning and interaction with others. The results of the paper will generate an overall model of help-seeking behavior and examine help-seeking from gender and ethnic perspectives. This model will describe the help-seeking decision, a personal decision to avoid help (help-seeking avoidance) or seek proper help (adaptive help-seeking) (Karabenick, 2011; Karabenick & Berger, 2013). Prior theory informs the

modelôs framework and is briefly described here and more thoroughly in the literature review.

Self-regulated learning (SRL) strategies theorize learning as self-directed in which learners transform mental abilities into academic skills. It is a proactive, metacognitive process wherein the individual actively engages in learning as opposed to passive or covert means in which outside influences direct the learning process (Richard S. Newman, 2002; Zimmerman, 1990; Zimmerman & Kitsantas, 2014; Zimmerman & Martinez-Pons, 1990). A Vygotskian framework under SRL (Aleven, Stahl, Schworm, Fischer, & Wallace, 2003; Nelson-LeGall, 1985; Puustinen, 1998) proposes the following steps for help-seeking behavior: awareness of need, decision to act, identification of helper, elicitation of help, and evaluation of results. For this study, self-regulated learning does not get to the heart of help-seeking behavior; instead, it looks at the processes and strategies an individual uses to attain goals. However, when one views help-seeking as a purposeful action directed by the individual, self-regulated learning theories are of interest as an influence on the studyôs interview questions and to frame the model. The Vygotskian framework is lacking since it does not adequately pursue its climax at step two-- decision to act-- which is the seek-versus-avoid crux in the help-seeking process.

A theoretical framework closely aligned with aspects of both self-regulated learning theory and Vygotskyôs ZPD is social cognitive theory. Social cognitive theory, an agentic view, proposed by Bandura (1986, 2006) subscribes to triadic codetermination (personal determinates, behavior determinates, and social determinants) in which ñhuman functioning is a product of the interplay of intrapersonal influences, the behavior individuals engage in, and the environmental forces that impinge upon themò (Bandura,

2012, p. 11). Within social cognitive theory, self-efficacy is a constituent, key element of interpersonal influences. According to (Bandura, 1977a), self-efficacy determines ñwhether coping behavior will be initiated, how much effort will be expended, and how long it will be sustained in the face of obstacles and aversive experiencesò (p. 191). Key aspects of self-efficacy are derived from performance accomplishments (personal mastery experiences), vicarious experience (seeing others perform without adverse consequences), verbal persuasion (suggestions of expectations), and physiological states (fear, excitement, relaxation) (Bandura, 1977a). Self-efficacy is closely related to Vygotskyôs ZPD. The most effective efficacy self-evaluations are those that slightly exceed the capabilities of what a person can do at a moment in time. Measuring self-efficacy against known unachievable capabilities (playing the piano without practice) or already mastered techniques (simple addition for most college students) does not affect self-efficacy evaluations (Bandura, 1986).

A related social cognitive theory construct concerns the idea of intelligence as either fixed, called entity theory, or malleable, called incremental theory (C. S. Dweck & Leggett, 1988). A person with a fixed view would need to ñlook smart and, at all costs, not look dumbò (Dweck, 2000, p. 3). A person with a fixed view would tend to retire early in the face of difficulty and accept failure; therefore, the fixed/entity view may lead to help-avoidance when confronted with a help-seeking situation. Dweckôs ñfixed viewò happens to match my younger sonôs response described earlier. Conversely, a person with a malleable view perceives intelligence as something to be increased in the moment and ñwill readily sacrifice opportunities to look smart in favor of opportunities to learn something newò (Dweck, 2000, p. 3). A person with an malleable view would

actively face difficulty and disregard failure; therefore, the malleable/incremental view may lead to proactive, adaptive help-seeking.

Banduraôs and Dweckôs perspectives define the lens for this study. It is Banduraôs view of self-efficacy and Dweckôs view of intelligence that constitutes a component of the theoretical framework for this study. Finally, for purposes of this study, help-seeking behavior is considered in the light of a metacognitive strategy, an internal decision and action or process (an agentic response), which the individual actively chooses to do properly (adaptive) or improperly (avoidant). The literature review includes a theoretical model representing help-seeking in light of the framework. The studyôs results based on the lived experiences of the students are discussed in two manuscripts culminating with an empirical model representing help-seeking behavior including gender and ethnic concerns.

Statement of the Problem

From cradle to grave, each of us has the capacity for growth in learning through experience with new situations, overcoming obstacles, interaction with others, and just going through our day-to-day lives; however, we cannot do this alone. Mastering new material requires grappling with topics previously foreign to us which can engender feelings of excitement, vulnerability, doubt, or embarrassment. It is at these moments when help is needed to reach the next plateau. It is at these moments when a help-seeking ñfight-or-flightò response may occur.

What, then, either persuades or dissuades a person to seek help? The literature is replete with studies examining help-seeking behavior in young children and adolescents with fewer studies focused at the college-level. Primary approaches are quantitative,

exploring cause-and-effect relationships rather than trying to understand the process from the individualôs perspective. College context studies often focus on help-seeking as part of an overall, higher-level objective such as better grades. Since help-seeking behavior can affect academic performance, it is particularly important to understand the decision process for a college student who, when faced with an obstacle, either embraces the help available to break through or allows the obstacle to overcome him or her by not seeking help. The help-seeking decision is especially pertinent to highly competitive college majors like engineering.

Studies specifically attempting to understand help-seeking behavior in engineering students appear to be silent. The lack of gender and ethnic studies due to engineering demographics leaves a gap in understanding minority perspectives. With the importance ABET places on student capabilities for lifelong learning, problem solving, and retention, understanding help-seeking behavior in engineering students is especially opportune.

Purpose Statement and Research Questions

The purpose of this qualitative study is to understand the academic help-seeking behavior in engineering students attending the University Of Georgia College Of Engineering. Gender and ethnic background provide additional insight; therefore, sampling methods ensure gender and ethnic constituencies are represented in the study to answer the research questions.

1) Why do engineering students make the decision to seek or avoid help?
2) What are the gender and ethnic dimensions to help-seeking?

Overview of Methodology

While ample research exists investigating help-seeking behavior in education, the majority is quantitative in nature and focused at the K-12 level (Butler, 1998; C. S. Dweck, 2000; Hong & Hwang, 2012; Kessels & Steinmayr, 2013; Nelson-LeGall, 1981; R. S. Newman & Schwager, 1995; Puustinen, Bernicot, Volckaert-legrier, & Baker, 2015; Ryan, Allison M., Hicks, L., & Midgley, 1997) with fewer examples at the college level (Holt, 2014; Horowitz et al., 2013; Karabenick, 2003; Payakachat et al., 2013). A qualitative perspective will shed light on help-seeking behavior not fully illuminated by previous quantitative endeavors, especially in an engineering context. Gender and ethnic concerns widen the gap due to the typical demographics of an engineering major. In fact, many quantitative studies specifically recommend more qualitative inquiry in order to expand on questions left unanswered by other methods (Concannon & Barrow, 2012; Gonida, Karabenick, Makara, & Hatzikyriakou, 2014; Inda et al., 2013; Nelson-LeGall, 1985; Pajares, 1996; Schenke et al., 2015; Schunk, 1991; Thompson & Dahling, 2012; Usher & Pajares, 2009; Zusho & Barnett, 2011). These studies are replete with statistical data based on Likert scale surveys, GPA results, pre-test/post-test, and the like; however, they are ultimately limited because the data reveal little about the individual and lack the voices of the students explaining in their own words the feelings and internal processes associated with the help-seeking decision (Workman & Bodner, 1996). In summary, the methodology of this research is an interpretive, qualitative, empirical study using the voices of the students garnered through one-on-one interviews through the lens of the theoretical framework.

Rationale and Significance

This study will expand what we know and illuminate what we do not know about help-seeking behavior in engineering. Currently, very little research examining help-seeking behavior has targeted engineering majors. The most pertinent research in engineering education has examined aspects of social cognitive theory and self-efficacy in context with broader issues related to academic achievement, defined by GPA; related to persistence or retention, defined by starting and completing an engineering course of study; or related to multiple of these factors (Besterfield-Sacre, Moreno, & Shuman, 2001; Concannon & Barrow, 2012; Hutchison, Follman, Sumpter, & Bodner, 2006; Hutchison-Green, Follman, & Bodner, 2008; Inda et al., 2013; H.-S. Lee, Flores, Navarro, & Kanagui-Munoz, 2015; Lent et al., 2013; Marrs & Brammer, 2012; Navarro, Flores, Lee, & Gonzalez, 2014; Raelin, J. A., Bailey, M. B., Hamann, J., Pendleton, L. K., Reisbert, R., & Whitman, 2011; Stout, Dasgupta, Hunsinger, & McManus, 2011; Stump et al., 2011).

Help-seeking behavior is of particular importance when evaluated against the requirements for ABET (Accreditation Board for Engineering and Technology). Graduates from ABET accredited institutions must have: ñan ability to apply knowledge of mathematics, science, and engineering; an ability to identify, formulate, and solve engineering problems; an ability to function on multi-disciplinary teams; é and an ability to engage in life-long learningò (Shuman, Besterfield-Sacre, & McGourty, 2005, p. 41). In order to achieve these objectives, it is incumbent upon engineering education programs to be concerned with all aspects of a studentôs performance and well-being. Finally, retention and participation in engineering and other STEM-related fields by

underrepresented demographics based on gender, SES, or ethnic background is of particular interest to ABET (2014) and the NSF (Committee on Equal Opportunities in Science and Engineering, 2012). Given help-seeking behavior is correlated to academic achievement (Horowitz et al., 2013; Karabenick, 2003), help-seeking becomes significant not only to ABET but to the engineering student and to the engineering profession.

Definition of Terms

2x2 Achievement goal framework. A ñ2x2ò achievement goal matrix is defined by the crossing of Mastery/Performance goals with Approach/Avoidance behavior giving mastery approach, mastery avoidance, performance approach, and performance avoidance (Elliot & McGregor, 2001).

Achievement goal. ñAchievement goals are viewed as the purpose (Maehr, 1989) or cognitive-dynamic focus (Elliot, 1997) of competence-relevant behavior, and throughout most of the achievement goal tradition, the primary emphasis has been on two goal types: mastery goals and performance goals (C. S. Dweck, 1986; Nicholls, 1984)ò (A. J. Elliot & McGregor, 2001, p. 501).

Adaptive help-seeking. With constructs and sequences from (Nelson-LeGall, 1981, 1985), Newman (2006) defined adaptive help-seeking as needing three critical decisions contingent to help-seeking:

> (a) necessity of the request (i.e., is it necessary that I ask another person for help?); (b) content of the request (i.e., is it necessary that I ask another person for help?); and (c) target of the request (i.e., whom should I ask?). Adaptive help seeking involves the child matching, to the best of his or her ability, the content and target or a request to the specific needs at hand (p. 227).

With this definition, adaptive help-seeking is an active, metacognitive process engaged in by the person making the decision to seek help.

Fixed view of intelligence. Intelligence is a fixed trait which is internal to the individual. Personôs with an entity or ñfixedò view of intelligence are concerned with how they look in social situations especially if they feel that they may be perceived ñas dumbò by others. A person with a fixed view considers perceptions of others as threatening (C. S. Dweck, 2000).

Help-seeking avoidance. According to Butler (1998),

> reasons for help avoidance in the classroom are multidimensional and can be conceptualized in terms of three orientations: an autonomous orientation, whereby help avoidance is attributed to striving for independent mastery; an ability-focused orientation, whereby it is attributed to desires to mask incompetence; and an expedient orientation, whereby reluctance to seek help is attributed to perceptions that asking for help will not expedite task completion (p. 631).

Based on this definition, autonomous help-seeking avoidance does not have the same negative connotations as ability-focused and expedient orientation reasons for help-seeking avoidant behavior.

Malleable view of intelligence. Intelligence is not a fixed trait; instead, a person can grow or cultivate intelligence through experiences and accepting opportunities to explore and expand intelligence through challenges, problems, and interactions. An individual with a malleable view does not view perceptions of others as a threat. (C. S. Dweck, 2000).

Mastery approach goal. These are goals in which an individual strives to master a task looking for opportunities to develop abilities, skills, and experiences as part of expanding oneôs learning and task mastery. Comparisons are against oneôs competence (Elliot & Dweck, 2005). A person with a mastery approach goal would look at a problem and think, ñIôm going to try to do better than the last time I tried to do thisò (Van Yperen, Elliot, & Anseel, 2009).

Mastery avoidance goal. These are goals in which an individual strives to avoid losing or reducing already mastered tasks or abilities. The focus is on potential negative outcomes related to changes in oneôs perceived mastery level. Comparisons are against oneôs competence (Elliot & Dweck, 2005). A person with a mastery avoidance goal would look at a problem and think, ñIôm going to try to do no worse than the last time I tried to do thisò (Van Yperen et al., 2009).

Metacognition. Metacognition is "cognition about cognition", or "knowing about knowing". It comes from the root word "meta", meaning beyond. It can take many forms; it includes knowledge about when and how to use particular strategies for learning or for problem-solving. Metacognitive is the adjective form of metacognition (ñWikipedia: Metacognition,ò 2015). Another definition is simply, ñthinking about thinkingò (ñDictionary.com: Metacognition,ò 2015).

Performance approach goal. These are goals in which an individual strives for results and competence to be perceived favorably in relation to the results of others. The focus is on performance outcomes compared to the outcomes of others. Comparisons are against peers or perceived expectations (Elliot & Church, 1997). A person with a

performance approach goal would look at a problem and think, ñIôm going to try to do better than others in my classò (Van Yperen et al., 2009).

Performance avoidance goal. These are goals in which an individual strives for results and competence to be perceived no worse in relation to the results of others. The focus is on performance outcomes compared to the outcomes of others. Comparisons are against peers or perceived expectations (Elliot & Church, 1997). A person with a performance approach goal would look at a problem and think, ñIôm going to try to do no worse than others in my classò(Van Yperen et al., 2009).

Self-efficacy. Self-efficacy involves

> a generative capability in which cognitive, social, and behavioral subskills must be organized into integrated courses of action to serve innumerable purposes. Perceived self-efficacy is defined as peopleôs judgements of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses.
>
> Judgements of personal efficacy are distinguished from response-outcome expectations. Perceived self-efficacy is a judgement of oneôs capability to accomplish a certain level of performance (Bandura, 1986, p. 391)

An additional aspect of self-efficacy is the ñé conviction that one can successfully execute the behavior required to produce the outcomesò (Bandura, 1977b, p. 79). Self-efficacy is a core construct of social cognitive theory (see definition).

Self-regulated learning (SRL). ñThe process whereby learners systematically organize and direct their thoughts, feelings, and actions to attain their goalsò (Schunk & Usher,

2013, pp. 1ï 2). Zimmerman stated that ñé self-regulated learning involves three key elements: use of self-regulated learning strategies, self-efficacy perceptions of performance skill, and commitment to academic goalsò (Zimmerman, 1990, p. 185). SRL builds upon the triadic model of social cognitive theory using the precepts of SCT in the specific arena of self-regulated learning strategies (Schunk & Usher, 2013).

Social cognitive theory (SCT). ñé people are neither driven by inner forces nor automatically shaped and controlled by external stimuli. Rather, human functioning is explained in terms of a model of triadic reciprocality in which behavior, cognitive and other personal factors, and environmental events all operate as interacting determinants of each otherò (Bandura, 1986, p. 18). More recently, Bandura, expounds on the definition by renaming the triadic model in terms of person determinates, behavior determinates, and social/environmental determinants and is formed from an agentic perspective where the person is an active agent and exerts influence on their functioning and outcomes by their actions (Bandura, 2001, 2012). Self-efficacy is a primary, influential component. According to Bandura, ñé perceived self-efficacy occupies a pivotal role in the causal structure of social cognitive theory because efficacy beliefs affect adaptation and change not only in their own right, but through their impact on other determinantsò (Bandura, 2001, p. 10).

Stereotype threat. Steel (1997a) defines stereotype threat as

> the social-psychological threat that arises when one is in a situation or doing something for which a negative stereotype about one's group applies. This predicament threatens one with being negatively stereotyped, with being judged or treated stereotypically, or with the prospect of conforming to the stereotype.

> Called stereotype threat, it is a situational threat--a threat in the air--that, in general form, can affect the members of any group about whom a negative stereotype exists (p. 614)

Zone of proximal development (ZPD). According to Vygotsky, ñthe zone of proximal developmenté is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peersò (Vygotsky, 1978). It is a zone because experiences previously mastered and within a personôs ZPD are ineffective for future development. Similarly, tasks that are well beyond a personôs current developmental level do not increase the development level (for example, teaching a higher mathematics problem to a child) (Vygotsky, 1978).

CHAPTER 2

LITERATURE REVIEW: THEORETICAL MODEL

Introduction

I reviewed the literature in the context of the studyôs theoretical framework which acts as the filter to interpret the datað specifically, self-efficacy and self-theory of intelligence as influences. Help-seeking behavior is examined as a metacognitive construct to answer the following research questions:

1) Why do engineering students make the decision to seek or avoid help?
2) What are the gender and ethnic dimensions to help-seeking?

With the goal to support a theoretical model of help-seeking behavior as part of my theoretical framework and to support the two manuscripts within this dissertation, the literature review is made up of four distinct sections.

- First, I describe my search methods for prior resources.
- Second, I develop a theoretical model for help-seeking behavior supported by previous literature. This model acts as the scaffolding for my help-seeking behavior study; therefore, I researched and distilled a broad representation of literature across three primary theoretical foundations in creating the model: self-efficacy, self-theories of intelligence (including goal theory), and self-regulated learning. While typical help-seeking studies are at the K-12 level and quantitative, they provide the background and basic structure informing the theoretical model for help-seeking behavior. This model will act as one of the inputs into my theoretical framework and perspective.

- Third, I explore prior literature investigating the engineering domain including gender issues and ethnic concerns relating to help-seeking behavior. In total, sections two and three of the literature review inform my methods including sample selection, interview questions, and analysis.
- Finally, I summarize the gaps and jumping points to the manuscripts representing empirical results from the data.

Search Methods

One of the primary resources for the literature review included Google® Scholar with the included search links to GALILEO and GIL, the University of Georgiaôs online library catalog. This combined resource provided access to a wide variety of sources from which I searched for peer-reviewed articles from reputable journals and publications from databases including PsycINFO, Elsevier, PsycARTICLES, ERIC, Education Research Complete, Academic Search Complete, APA PsycNET, JSTOR, ASEE and others. I have collected articles over the past two+ years using the following search terms: help-seeking, help-seeking behavior, adaptive help-seeking, help-seeking avoidance, self-efficacy, self-efficacy and academic achievement, self-theory, implicit-theory, Dweck theory of intelligence, social cognitive theory, self-regulated learning, qualitative engineering education, engineering education, and many others formed by adding additional keywords such as: academic, gender, ethnic or engineering education to the each of the primary search terms. I referred to the reference bibliographies of articles and books and used these as pointers to additional relevant sources. When I found sources citing seminal books, I checked out these books or purchased them. These books are often article repositories containing additional references.

In cases where articles were not easily accessed via internet or UGA libraries, I used UGA interlibrary loan or, in some cases, found parallel or more recent articles from the same author as additional material. In addition, my major professor, committee members, instructors, and peers have suggested or provided other materials. Finally, I have taken courses in pursuit of a Qualitative Research Certificate at the University of Georgia. These courses (QUAL 8400, QUAL 8410, QUAL 8420, QUAL 8750, and QUAL 9400) have provided instruction and references critical to the qualitative theories, methods, and techniques for this study.

Help-seeking Behavior Historical Perspective and Groundwork

Historically, researchers viewed help-seeking from the standpoint that the person needing help did not play an active role in the help-seeking process but played a dependent role with the helper, often an adult, as the active agent in the process (Nelson-LeGall, 1981). These early views of help-seeking were influenced by cultural norms, especially in western culture, which honored independence, success based on hard work, persistence, and action over passivity with those needing help often stigmatized (Butler, 2006; Karabenick, 2006; Nelson-LeGall, 1981). However, a study by Sharon Nelson-LeGall presented a different perspective on the complexity of help-seeking behavior.

> That help-seeking activity requires a fair amount of sophistication is apparent when one considers that in order to initiate help-seeking children must first learn to associate others with the achievement of their goals and must learn various means of inducing others to help attain these goals. Children who ask for help may be considered dependent because they are not solving a problem by themselves. However, seeking out a competent person for aid or advice may be an

independent method of solving a difficult problem. A child who seeks help is showing initiative (Nelson-LeGall, 1981, p. 226).

Summarizing her thoughts, help-seeking requires a decision by an individual to socially interact with a competent person to aid in solving a problem which he or she cannot solve alone. At the time of Nelson-LeGallôs writing, these views were contemporary with Vygotskian precepts for learning described as ñé a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with his peers. Once these processes are internalized, they become part of the childôs independent developmental achievementò (Vygotsky, 1978, p. 90).

Using this foundation from the early 80ôs, current research has suggested help-seeking behavior is part of an overall self-regulated learning strategy wherein help-seeking is a component behavioral action of the triadic self-regulated learning phases of forethought, performance, and self-reflection (Artino, Hemmer, & Durning, 2011; Cheng, Liang, & Tsai, 2013; DiBenedetto & Bembenutty, 2013; Karabenick & Berger, 2013; Pintrich, 2004; Zimmerman, 2002). Stuart Karabenick (2011), referring to research from (Nelson-LeGall, 1981; Richard S. Newman, 2000; Zimmerman & Martinez-Pons, 1990), said, help-seeking ñé models incorporate the metacognitive processing involved in determining the presence of problems and recognition of the need for help, perceived benefits and costs of seeking and not seeking help, help-seeking goals (instrumental or executive), selection among sources of assistance, and obtaining and processing helpò (p. 290). Clearly, then, the view of help-seeking has changed from its earlier roots and is now accepted as part of a metacognitive process.

Help-seeking Types

One of the greatest benefits of past research is the established vocabulary and ways in which to view help-seeking behavior. Nelson-LeGallôs (1981, 1985) early works defined an effective form of help-seeking referred to as instrumental help-seeking and an inappropriate form of help-seeking referred to as executive help-seeking. Table 2.1 provides other terms for help-seeking adapted from Richard S. Newman (2006), with the left column denoting the help-seeking researchers who describe the terms.

The upper left quadrant of the table (I) represents a situation where help is truly needed; it is necessary. The student has expended internal effort in an attempt to solve a problem and truly needs assistance; however, the support does not include asking for the answer but just enough information to assist in solving the problem individually, or autonomously as Butler indicates. The student is a participant in a self-regulated learning process, and help-seeking is a strategy used as part of the process (Richardson, Abraham, & Bond, 2012).

Table 2.1: *Help-seeking Quadrants*

Adaptive Help-seeking	**(I) Help Needed = Yes**	**(II) Help Needed = No**
(a) (Richard S. Newman, 2002)	Adaptive HS	Working the problem
(b) (Butler, 1998)	Autonomous HS	Working the problem
(c) (Ryan, Patrick, & Shim, 2005)	Appropriate HS	Working the problem
(d) (Nelson-LeGall, 1985)	Instrumental HS	Working the problem
Non-Adaptive Help-seeking (Help-seeking avoidance)	**(III) Help Needed = Yes**	**(IV) Help Needed = No**
(a)	Passivity	Non-adaptive HS
(b)	Avoidant-Covert	Executive HS
(c)	Avoidance	Dependent HS
(d)	Passivity	Executive HS

The upper right quadrant (II) represents the situation where no help is needed; therefore, an adaptive help-seeking individual would not ask for help. It does not mean there is no problem to solve. It means the adaptive help-seeker has not determined help is needed to address the problem. They are ñworking the problemò or, perhaps, have already completed the problem. The lower left quadrant (III) represents the situation where help is needed; however, non-adaptive help-seeking behavior results in either passivity/avoidance (do nothing) or avoidant-covert (copy or cheat from a peer). In either case, help is not asked for even when help is needed. Unwanted consequences may resultð poor performance for do nothing and possible expulsion for cheating. The lower right quadrant (IV) represents the situation where help is not needed; however, help is actively pursued by the individual. In this case, the student may not want to put effort into the problem and asks for the answer as a way to quickly move past the problem. This is different from quadrant (I) where the student expends effort and then asks for just enough help to complete the problem to conclusion. In quadrant (IV), the student spends little effort and asks for the answer instead of help on technique or hints for progression to the answer. Although the student requests help, the help-seeking is not beneficial because it does not engage the student in solving the problem. The help does not expand or aid in increasing the studentôs ZPD because the student did not expend effort on learning (Vygotsky, 1978). It does not increase the studentôs mastery self-efficacy because no effort was applied (Bandura, 1997). For purposes of this study, I will use the term ñadaptive help-seekingò or ñseek helpò to denote actions related to quadrants (I and II) and ñhelp-seeking avoidanceò or ñavoid helpò to indicate actions related to quadrants (III and IV).

Help-seeking Costs and Benefits

Help-seeking as a behavior under social cognitive theory and as a metacognitive process under self-regulated learning is unique because competing factors are at play directing the final decision by the individual to seek help or avoid help. Help-seeking involves an internal cost/benefit analysis weighed to determine the final adaptive help-seeking or help-seeking avoidance decision. The stronger the belief help-seeking is beneficial versus the belief it has associated costs, the more likely the individual will pursue help (Richard S. Newman, 1990). Help-seeking is unique in the ñtool-kitò of self-regulated learning strategies. It requires a social component to be successful as opposed to other SRL strategies (verbalization or self-reflection, for example) (Karabenick, 2006; Karabenick & Berger, 2013).

Inherent psychological costs associated with help-seeking (Zusho & Barnett, 2011) usually emanate from the individualôs negative perceptions of what the peer group thinks about him/her, and the teacher/classroom context. From a SCT perspective, these would primarily emanate from the social/environment determinants influencing behavior (DiBenedetto & Bembenutty, 2013). First, help-seeking may engender feelings of low self-worth, inadequacy, inferiority, and dependence on others (Karabenick, 2006; Karabenick & Knapp, 1991; Sandoval & Lee, 2006). Second, seeking help as a social process may bring about feelings of embarrassment due to the scrutiny of others indicating an admission of failure. It implies there is a knowledge gap with the help-seeker acknowledging incompetence by asking for help (C. Ames, 1992; Karabenick & Knapp, 1988; Zusho & Barnett, 2011). In other words, the help-seeker fears looking ñdumbò to his peers and teacher (Richard S. Newman, 2000; Richard S. Newman &

Goldin, 1990; Ryan & Pintrich, 1997). Third, the help-seeker may acknowledge the helper is better, smarter, or more capable than he or she at solving the problem (Sandoval & Lee, 2006). Finally, the help-seeker may feel indebted or obligated in some way to the helper because of the help received (Karabenick, 2006). As discussed earlier, cultural norms of independence and self-reliance, when measured against one or any number of the negative connotations of help-seeking, would tend to inhibit asking for help. The result may be help-seeking behavior described in quadrants (III) and (IV) of Table 2.1.

Impinging upon the negatives are the benefits, the positive motivations and influences, encouraging adaptive help-seeking behavior. Since adaptive help-seeking is a metacognitive action, the factors affecting the benefits of help-seeking behavior are typically approached from SRL constructs (Altun & Erden, 2013; Artino et al., 2011; Cheng et al., 2013; Lichtinger & Kaplan, 2015) including self-efficacy. Zimmermanôs (2002) SRL model includes a performance and self-reflection stage in which monitoring of progress and self-reflection or self-judgement occur respectively. Monitoring is a metacognitive process in which the student tracks performance and outcomes. Self-judgement and self-reflection allow the student to compare results against a syllabus, target, or set of goals (Karabenick & Berger, 2013; Zimmerman & Kitsantas, 2014). A detailed analysis of achievement goal constructs and structures are beyond the scope of this study; however, research considering achievement goal (including 2x2 achievement goals) influences on help-seeking threats and benefits are numerous. In general, mastery or autonomous goals are associated with positive outcomes for adaptive help-seeking, and performance or ability goals are associated with threats to help-seeking leading to help-seeking avoidance (Butler, 1998, 2006; Roussel, Elliot, & Feltman, 2011; Ryan &

Pintrich, 1997; Ryan, Pintrich, & Midgley, 2001; E. M. Skaalvik & Skaalvik, 2013; Yang & Taylor, 2013; Zusho & Barnett, 2011). In short, SRL would suggest if the student believes help-seeking is a course of action to achieve goals, targets, or results, then help-seeking is a benefit and should proceed; yet, often it does not.

Influences

Help-seeking benefits versus the psychological or perceived social costs of help-seeking call the question, which side of the threat/benefit see-saw wins? This statement presupposes benefits and threats to help-seeking are both independent and orthogonal; however benefits and threats are not independent to each other and can be present simultaneously. It is this see-saw battle, this question, which defines the primary gap for this study which results in research question one and research question two when viewing minority constituents within engineering.

Primary influences involved are strategic aspects of SRL shaping positive help-seeking along with social/environment aspects of SCT influencing threats to help-seeking. In a college study, Karabenick (2004) found classroom context and environment directly influenced help-seeking avoidance. Classes which were more performance vs. mastery oriented resulted in less help-seeking independent of the individual studentôs performance vs. mastery orientation. Teachers who emphasized poor performance impacted students help-seeking behavior in a negative way. However, juxtaposed with this research are previously cited studies in which those students in most need of help are most likely not to ask for help. In Figure 2.1, taken from (Karabenick & Knapp, 1988, p. 407), Karabenick observed, in an often cited study, students with higher

expected grades had lower help-seeking need which is understandable; perhaps they did not need help. Paradoxically, the data showed students with the lowest expected grades had low help-seeking behavior leading to ñé those who need help the most are often the least likely to seek itò (p. 408). This was attributed to low levels of motivation perhaps due to threat-avoidance, low academic performance over an extended time, low perceived self-efficacy, or other SRL or SCT related factors (Karabenick, 2006; Karabenick & Knapp, 1988). A previous observational study found middle achievers asked for help more often than low or high achievers in the classroom (Gall & Glor-Scheib, 1985).

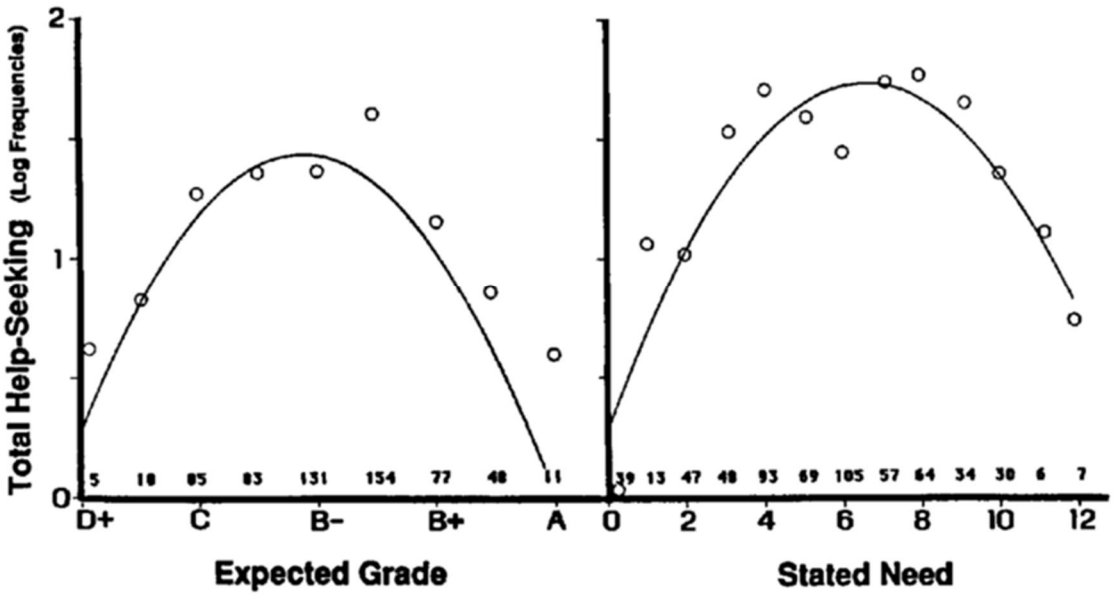

Figure 2.1: Help-seeking vs. Need and Expected Grade

Clearly, there are independent, competing factors affecting which type of help-seeking a student will choose when faced with adversity in academic situations. Many studies point to perceived self-efficacy as one of these influencing factors.

Self-efficacy

It is beneficial to relate self-efficacy in the context of Social Cognitive Theory (SCT) and then examine the relationship between self-efficacy and help-seeking in the literature. Using Figure 2.2 adapted and modified from A. Bandura (2012), Social Cognitive Theory (SCT) is based on the triadic reciprocal determination causal model in which ñé human functioning is a product of the interplay of intrapersonal influences, the behavior individuals engage in, and the environmental forces that impinge upon themò (p. 11). Self-efficacy is a constituent part of intrapersonal influences which direct the path of a personôs life. Self-efficacy ñé is assigned a central role, for analyzing changes achieved in fearful and avoidant behaviorò (Bandura, 1977a, p. 193) ï aspects of this relate to help-seeking behavior. Self-efficacy is not and should not be construed as a general, universal construct across all domains (Bandura, 1977a, 1986). Self-efficacy is a domain, or context, dependent construct. If a person has high self-efficacy in a mathematics classroom, it does not indicate the person will have high self-efficacy in an English class; the construct or domain is important.

Referring to Figure 2.2, self-efficacy acts as part of a feedback process of a personôs behavior, or decision to act, influencing what path to take for a particular domain, problem, or task. A person usually considers his or her capabilities, the environment, and potential consequences before performing an action. For example, most healthy individuals probably can jump over a two-foot wide ditch. We know this from prior experience. However, given a six-foot ditch, self-efficacy, fear, and other SCT determinants become more prominent. Many questions come into play for this dilemma. Have I jumped over something this wide before? Are people watching? Is the

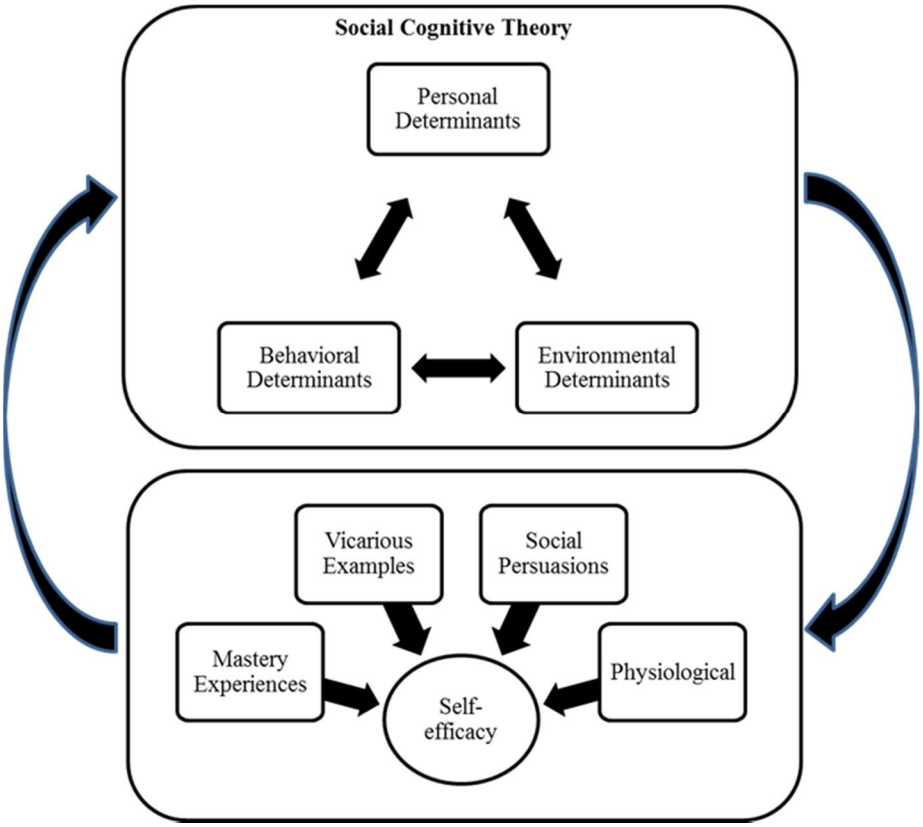

Figure 2.2: Self-efficacy Related to Social Cognitive Theory

ground wet? Do, I really care about doing this? Is there another way around? Self-efficacy has a predominant role in this situation as do contextual or domain factors.

> Not only can perceived self-efficacy have directive influence on choice of activities and settings, but, through expectations of eventual success, it can affect coping efforts once they are initiated. Efficacy expectations determine how much effort people will expend and how long they will persist in the face of obstacles and aversive experiences. The stronger the perceived self-efficacy, the more active the efforts. Those who persist in subjectively threatening activities that are in fact relatively safe will gain corrective experiences that reinforce their sense of efficacy, thereby eventually eliminating their defensive behavior. Those who

> cease their coping efforts prematurely will retain their self-debilitating expectations and fears for a long time (Bandura, 1977a, p. 194).

In other words, self-efficacy acts as the ñtorqueò related to how hard the individual will exert effort to overcome adversity. A person reinforces self-efficacy in a domain by persisting through the difficulty. Actual success is not as much of a factor as continuing to a conclusionð toughing it out. Thomas Edison is attributed to have said referring to the light bulb, ñI have not failed 10,000 times. I have not failed once. I have succeeded in proving that those 10,000 ways will not work. When I have eliminated the ways that will not work, I will find the way that will workò (Furr, 2011). Apparently, Edison had no shortage of self-efficacy for areas of science. Conversely, if the person gives up, ceases efforts, self-efficacy in that domain may weaken. The next time a similar problem presents itself the effort exceeded will be less or the problem may be bypassed entirely (Bandura, 1977a, 1977b). From the earlier example, if I decide to jump the six-foot ditch and succeed, I may increase my self-efficacy for a similar situation. If I try and fail, I may or may not affect self-efficacy. Was I close? Did I run as fast as I really could? Did I have on the right shoes? Were people watching? All of these can relate to self-efficacy changes. It is just as important to understand the type of effort exerted, the persistence of the effort, and mitigating factors that are present as it is to achieve success. If I decide to walk away, to cease efforts, I may increase self-efficacy but in a negative way. In other words, self-efficacy decreases and fear may increase when faced with a similar situation. The same thoughts apply when help-seeking is the action in question.

Referring again to Figure 2.2, self-efficacy is, itself, influenced by four inputs: mastery experiences, vicarious experiences, social persuasions, and physiological factors (Bandura, 1986, 1997). I will describe each of these followed by a review of the research linking self-efficacy to help-seeking behavior.

Mastery experiences are associated with the most influential or powerful of the four self-efficacy sources. When an individual faces challenges, mastery experiences are particularly compelling when the person overcomes the problem especially if he or she perceives the challenge as difficult (Bandura, 1986, 1997; Jansen, Scherer, & Schroeders, 2015; Usher & Pajares, 2009; Wood & Bandura, 1989). The mastery experience is related to a specific domain. Successes in this domain raise self-efficacy as long it is a non-trivial task; there must be a challenge involved. This is closely related to Vygotskyôs view of ñgood learningò which includes challenges that expand development. Continuously repeating already accomplished levels does not increase development (Vygotsky, 1978). Repeated failures can lower self-efficacy by showing a lack of mastery. However, if a high sense of self-efficacy accompanies an experience, failures will not automatically lower self-efficacy. As previously described many factors come into play. The individual will consider influences from SCT constructs such as the environment, personal effort, or social factors that may have affected the outcome resulting in no detrimental effect on self-efficacy (Bandura, 1986). Placed in the context of this research studyôs view of help-seeking, if an individual has used adaptive help-seeking in the past to overcome a problem with favorable results, this should strengthen the mastery experience influence on self-efficacy related to help-seeking. In other words, the engineering student might think, ñIôm not sure how to solve this thermodynamics

problem. When I had an issue in statics and asked for help, I ógot itô. Iôm going to ask for help on this problem.ò

Vicarious experiences relate to learning by watching others (Bandura, 1986, 1997). It truly is the primary form of learning we first begin to utilize as a child, and it is how a society passes on knowledge to the next generation. How productive would we be individually or as a people if each of us had to learn from scratch the skills of a trade, how to write, compose music, or cook an omelet? Vicarious experiences are related very closely to Vygotskyôs theory of ZPD where individuals learn through social experience with peers (Vygotsky, 1978). In a classroom setting, students relate to and compare themselves with other students in the class. An individual will measure their capabilities and evaluate challenges based on the success or failure of others by comparison of self to those with perceived lower abilities, those with perceived similar abilities, and those with perceived higher abilities. This ñpeer modeling can alter efficacy beliefs through the influence of social comparison independently of any skill transmissionò (Bandura, 1997, p. 234). Based on the difficulty of the challenge and the performance of others, the individualôs self-efficacy may be lowered, increased, or unaffected (Bandura, 1986; Jansen et al., 2015). Relating this to help-seeking, if a student needing help has seen other students ask for help, self-efficacy related to help-seeking may be altered based on the results of vicarious experiences. For example, if the teacher and classmates show open, understanding, affable reactions to requests for help, self-efficacy related to adaptive help-seeking may increase and help-seeking avoidance may decrease. Conversely, if requests for help engender derision or embarrassing laughter from students or an unsympathetic or unempathetic response from the teacher, help-seeking avoidance

self-efficacy may increase while adaptive help-seeking may decrease. In other words, the engineering student might think, ñIôm not sure how to solve this thermodynamics problem. When my classmate asked for help last week, the teacher called the question óinappropriateô; what does that mean? Iôm not asking that guy for help.ò

Next, social persuasions refer to ñYou can do it!ò types of motivation. These are words of encouragement from sources of trust: parents, teachers, and peers. The result is a boost in self-confidence and effort as long as additional scaffolding like appropriate instruction or environment is provided (Bandura, 1997; Usher & Pajares, 2009). Social persuasions can be affected by the perceptions of the individual on the experiences and mastery level of the persuader and on the obstacle in question (Bandura, 1986). For example, no amount of encouraging would persuade the typical golfer he or she can shoot a hole-in-one on their next round of golf. Similarly, no amount of encouragement would increase my self-efficacy concerning my capability to dunk a basketball. A longitudinal study with engineering students found environmental (classroom) supports related to positive influence on self-efficacy (Navarro et al., 2014). Juxtaposed to beneficial social persuasion are verbal attacks from peers that can have detrimental effects on self-efficacy. In fact, comments from peers like ñYouôre stupidò or ñThat was a stupid questionò can more easily undermine self-efficacy than encouraging words from the teacher (Bandura, 1997; Usher & Pajares, 2009). In a help-seeking scenario, the engineering student might think, ñIôm not sure how to solve this thermodynamics problem. Since my instructor encourages learning and sharing ideas in the classroom and allows us to talk openly, Iôll ask for help.ò

Finally, physiological influences relate to physical and emotional feelings such as anxiety, heart rate, illness, stress, and other emotional or physical conditions. These pressures or motivators are often associated with reactions related to the environment associated with the problem or obstacle. If self-efficacy is already low for a particular domain, anxiety will probably be high and act as a recursive feedback on self-efficacy. If self-efficacy is high in a domain, feelings of confidence, ñI got thisò, would tend to positively influence self-efficacy (Bandura, 1977a, 1986). From a help-seeking perspective, the engineering student might think, ñIôm not sure how to solve this thermodynamics problem. I recognize I feel nervous about asking for helpð my heart is racing a littleð but, Iôve learned this is normal for me. The last time I asked for help things worked out well.ò

The four factors influencing self-efficacy are independent but interrelated to each other and intertwined (Bandura, 1997). Recent studies have looked at multiple influences of the four factors in an attempt to quantify significance or classifying the strongest input to self-efficacy. One study found mastery experiences were the most substantial influence on self-efficacy. Vicarious experiences were more significant when mastery experience was limited or lacking. Social persuasion acted as an enhancement to mastery experiences, and physiological influences related to development of student self-efficacy in the classroom (Britner & Pajares, 2006). Testing that mastery experiences influence self-efficacy based on closeness of domain, engineering studentsô self-efficacy correlated with ACT math/science scores and with prior GPA in similar college classes (H.-S. Lee et al., 2015). Using SCT as a basis for examining learning experiences, Thompson and Dahling (2012) found learning and mastery experiences positively influenced self-

efficacy. Similarly, first year engineering studentsô self-efficacy assessments were most influenced by mastery experiences; however, self-efficacy beliefs were profoundly influenced by comparison with peers when lacking mastery experiences in situations where they have little to no experience (no prior college classes) while social persuasion provided additional support (Hutchison-Green et al., 2008).

Few studies attempt to analyze all four self-efficacy inputs. Chen and Usher (2013) classified students based on number of self-efficacy influencers in order to categorize the effect of physiological influences. Students classified as ñMasteryò students had mastery experiences as the primary, almost exclusive, influencer to self-efficacy. ñMulti-sourceò students had aspects of mastery, vicarious, and social (in order of significance) as influencers. For these two student groups, physiological state was a minimal influencer. ñAt riskò students (low overall self-efficacy) had physiological influences as the highest factor with the other three factors measuring lower on self-efficacy input. It appears students with stronger mastery and vicarious experiences may have higher self-efficacy in a particular domain while students with high physiological states (fear or anxiety) compared to mastery or vicarious experiences may have lower self-efficacy. Looked at from the view of help-seeking behavior, this is of interest to this study.

Self-efficacy and Help-seeking

Self-efficacy as a determinant of how hard, how long, and how motivated a person will work through a problem should, in some way, relate to help-seeking behavior including persistence of help-seeking or deciding to seek help even in uncomfortable situations. Perhaps self-efficacy may act as the extra push for an individual to choose an

adaptive help-seeking path instead of a help-seeking avoidance path. A view of relevant research may help clarify this assumption.

Many researchers have shown self-efficacy directly relates to positive outcome in academic achievement (Altun & Erden, 2013; Bandura, 1993; Héfer Bembenutty & White, 2013; Diseth, Meland, & Breidablik, 2014; Feldman & Kubota, 2015; Ferla, Valcke, & Schuyten, 2010; Komarraju & Nadler, 2013; W. Lee, Lee, & Bong, 2014; Pajares, 1996; Putwain, Sander, & Larkin, 2013; Schnell, Ringeisen, Raufelder, & Rohrmann, 2015; Vogt et al., 2007; Williams & Takaku, 2011a, 2011b; Yang & Taylor, 2013; Zhu, Chen, Chen, & Chern, 2011); however, how does self-efficacy relate specifically to help-seeking? Few quantitative studies examine help-seeking as the dependent variable with self-efficacy as the independent. For many, help-seeking is a component of the research with other factors like academic achievement, retention, SRL, or self-efficacy measures as the outcome of interest.

Early work presented help-seeking data in a university setting representing the relationship between stated need and help-seeking as an inverse quadratic (Figure 2.1) in which low need and high need corresponded with low help-seeking tendencies while middle stated need corresponded with high help-seeking behavior (Karabenick & Knapp, 1988). In a later study, low-self efficacy was found to correlate with avoidant help-seeking while high self-efficacy correlated somewhat with adaptive help-seeking but did not correlate with avoidant help-seeking (Karabenick, 2003).

The interpretation is a low self-efficacy student may not seek help because it would not make any difference even based on high need. High self-efficacy students may not ask for help even with high need because they want to try and solve the problem

on their own first; however, they may also not seek help if other factors are influencing the avoid-help decision since high self-efficacy did not correlate with avoidant help-seeking. Quantitative studies and qualitative, observational studies may not capture this avoid-help decision.

A more recent research study of teachers related help-seeking types versus self-efficacy in which avoidance-executive help-seekers (those with moderate avoidance, do not ask for help, and moderate executive, ñjust give me the answerò) corresponded to lower self-efficacy; avoidance-adaptive help-seekers (those with moderate avoidance and high adaptive, beneficial help-seeking) corresponded with middle self-efficacy ratings; and adaptive help-seekers (low avoidance and high adaptive) corresponded with highest self-efficacy (White & Bembenutty, 2013). Both of these studies relate low self-efficacy to low or non-productive help-seeking, and both studies link higher self-efficacy with an increase in more productive help-seeking. In the discussion on help-seeking types, those students secure in adaptive help-seeking may not seek assistance if they believe they are still productively working on the problem; however, at some point, they may move to active, adaptive help-seeking when help is needed; therefore, in Karabenickôs research, those with high self-efficacy may not have asked for help as often because, in the domain under study, those students may not have needed help. (This is one example of why observation studies may be an inaccurate way to describe help-seeking behavior. It is hard to observe a student needed help but did not ask for help because they wanted to solve the problem without assistance.) In a study looking at help-seeking visits to a writing tutor in a college setting, self-efficacy correlated negatively with help-seeking; higher self-efficacy related to less help-seeking (Williams & Takaku, 2011a). Ryan and

Shin (2011) found academic self-efficacy associated positively with adaptive help-seeking and negatively with avoidant help-seeking; specifically, higher self-efficacy related to a tendency toward adaptive help-seeking and less toward avoidant help-seeking with lower self-efficacy related to less adaptive help-seeking and more avoidant help-seeking behavior. From a slightly different perspective, a second study found avoidance of help-seeking as a negative influence on self-efficacy (Pajares, Cheong, & Oberman, 2004). These results give strength to the reciprocal nature of self-efficacy wherein self-efficacy is not only an input into behavior but takes as its own input results of that behavior.

Summarizing these results, there seems to be a consensus on low self-efficacy equating to lower instances of help-seeking or higher help-seeking avoidance; however, as self-efficacy rises the studies differ with help-seeking positively related, negatively related, or no relationship depending on the form of help-seeking chosen. Clearly, as self-efficacy increases other factors come into play impinging on the final decision to seek or avoid help. My research study will attempt to help answer this quandary by asking the experts, the students.

Other studies have not directly looked at self-efficacy but at mastery and performance goals which relate to my overall SE, STOI and HSB framework. Roussel et al. (2011) found mastery goals correlated positively with benefits of help-seeking and instrumental help-seeking (beneficial or adaptive help-seeking); performance avoidance positively correlated with costs of help-seeking and negatively with instrumental help-seeking; friendship avoidance correlated positively with costs of help-seeking; and friendship approach correlated positively with instrumental help-seeking and negatively

with costs to help-seeking. A study of computer science majors found positive correlations between task goals with increased instrumental help-seeking and benefits of help-seeking and decreased executive help-seeking (non-beneficial, ñjust give me the answerò, help-seeking) and avoidance help-seeking (Pajares et al., 2004). Referring to the definitions, mastery (or task) goals relate less to perception of others and more to objective requirements while performance goals relate directly to perception of others. Friendship avoidance and approach refer to comfort level with peers. Each of these factors relates closely to vicarious experiences and social persuasions as inputs into self-efficacy and to the social determinants under the SCT umbrella.

Finally, one particular study by Ryan et al., (1998) examined self-efficacy and help-seeking avoidance across classrooms. They found classroom context and teacher encouragement overcame low self-efficacy, and help-seeking avoidance decreased. The results of this study provide some insight into the differences found in other studies examining help-seeking and self-efficacy. Self-efficacy is a dynamic, domain construct with social and environment factors playing a vital role independent of the studentôs current self-efficacy perceptions. In the Ryan (1998) study, environment and social factors decreased help-seeking avoidance even with low self-efficacy. In other constructs previously cited, teacher and peer threat increased help-seeking avoidance independent of self-efficacy even in situations where students would typically show adaptive help-seeking tendencies. Both strengthen the idea that vicarious experiences and social persuasions are highly influential to help-seeking. It is not stated this way in studies, but I believe they are highly influential to help-seeking self-efficacy. Help-seeking has its

own self-efficacy inputs just like any other action and is part of the theoretical construct of my research.

Prior research does provide substantial evidence of self-efficacy and inputs into self-efficacy as influencers of various forms of help-seeking behavior. However, as has already been documented, self-efficacy is domain specific. It affects and is affected by the triadic reciprocal foundations of SCT. But what is the primary influencer? Does help-seeking influence self-efficacy or does self-efficacy influence help-seeking? Next, although the research has provided linkage between self-efficacy and help-seeking, context is a key, and perhaps foundational, component of help-seeking. Finally, research is sparse approaching help-seeking as a stand-alone action. Studies tend to measure help-seeking with self-efficacy influences as a path or component to other results. Research examining help-seeking as an action in a particular context by querying the help-seekers using qualitative methods may provide additional data to scaffold help-seeking research. There are other rudders attempting to influence help-seeking; however, although closely related, they have different perspectives than self-efficacy. One rudder is self-regulated learning.

Help-seeking and Self-regulated Learning

A treatise on self-regulated learning (SRL) is beyond the scope of this paper; however, if help-seeking is an action, SRL has a role in help-seeking behavior. I, therefore, include SRL in the literature review in order to better understand how prior research may relate SRL theory with self-efficacy and self-theory of intelligence influencing the help-seeking decision. For purposes of this study, I view SRL as subordinate to SE and STOI within the theoretical framework. SRL describes the actions

an individual takes when approaching a problem (Zimmerman, 2002) but does not adequately, I believe, explore the underlying behavior of the actionð in this case, the help-seeking decision. Self-efficacy and STOI act as the framework to describe the underlying behavior.

SRL is a triadic cyclical process which includes forethought (pre task) feeding performance (during task) feeding self-reflection (post task) which feeds back to forethought (Schunk & Usher, 2013; Zimmerman, 2002). Forethought includes strategic planning, goals, values, and self-efficacy; performance includes self-control (applying strategies, focusing attention, and help-seeking) and self-observation (attending to performance, identifying need of help); and self-reflections includes self-judgment (evaluating performance, attributions, and help-seeking) (Pintrich, 2004; Schunk & Usher, 2013; Zimmerman, 2002). As a metacognitive process, SRL requires the student self-monitor and self-assess during each stage allowing the learner to be in control of the process. First, the learner is obligated to intervene, proactively make choices, and take responsibility for their own learning including diagnosis and remediation of problems resulting from lack of skills or difficulty in classes. Second, the learner must seek out and utilize experts and peers as part of the learning process (Boud, 1995). Schön's (1983) advice in this reflection process is to ñUse your own ignorance. Do not be afraid to admit ignorance, ask for help in understanding, and expect to get itò (p. 301). So, help-seeking is a necessary component in the SRL process, but does SRL influence help-seeking? Or stated another way, is help-seeking its own action directed by its own SRL processes?

One study involving graduate students found positive correlation between self-regulation strategies and help-seeking (Dunn, Rakes, & Rakes, 2014). Another study

found self-regulation learning strategies of giving metacognitive feedback and instruction on help-seeking caused an increase in help-seeking and resulted in a general increase in help-seeking behavior outside the context of the original study (Roll, Aleven, McLaren, & Koedinger, 2011). Prior research links self-regulated learning strategies to an increase in persistence, an increase in deep learning (a desire to understand what is being taughtð similar to mastery goals), and a decrease in performance oriented goals (Ferla et al., 2010) all of which would tend to increase help-seeking and decrease help-seeking avoidance. Each of these provides examples of the SRL process affecting help-seeking or help-seeking as a component of the SRL process; however, if help-seeking is a metacognitive action, the action of help-seeking should follow the SRL process model. Summarizing the links between SRL, self-efficacy and help-seeking behavior, Karabenick and Zusho (2015) describe the SRL process as a dynamic relationship with self-efficacy in which ñefficacy affects performance and performance influences efficacy judgmentsò (p. 155). They describe help-seeking as ña special case of potential social involvement in SRL since it often involves interpersonal interactions;é nevertheless, with some exceptions (Karabenick & Berger, 2013), help seeking that involves social interaction remains underrepresented in the extensive literature on SRLò (p. 160). I believe this study will shed light on these underrepresented areas of HSB.

SRL Help-seeking Behavior Process

The roots of help-seeking behavior lie primarily in K-12 contexts (R. Ames & Lau, 1982; Gross & McMullen, 1983; Nelson-LeGall, 1981, 1985) in which help-seeking researchers identified help-seeking as an independent act by the help-seeker. Synthesizing much of this research, Karabenick and Berger (2013) present eight stages

defining help-seeking as a series of steps. These steps are listed in Table 2.2 adapted from the same article (p. 240). Karabenick and Berger suggest successful *learning* may relate to implementation of help-seeking steps for adaptive help-seeking. In their view, help-seeking is part of the learning process from an outside construct indicating they do not consider help-seeking as its own stand-alone metacognitive action with self-efficacy and STOI influences. It is worth noting I did not find other researchers who view help-seeking as its own stand-alone action with SE and STOI influencers which is my motivation for developing this idea as a theoretical model. Reviewing the steps of the help-seeking process, most research concentrates around steps (3-7) by using surveys or observation. Determining if help is needed (steps 1-2) and if help-seeking proceeds (steps 3-7) are critical in the help-seeking process. While help-seeking is set in motion by some catalyzing event such as a low grade (Gross & McMullen, 1983), determining the state of mind of a student at any point in time is difficult in quantitative studies, and observational studies leave the underlying motivations silent (Karabenick & Newman, 2006).

Table 2.2: *Help-seeking Process*

Stages of the help-seeking Process	**SRL phase in Zimmerman model**	**Process of self-regulation**
(1) Determine if there is a problem	Forethought	Task Analysis
(2) Determine if help is needed or wanted	ñ	ñ
(3) Decide to seek help: Yes/No	ñ	Strategic Planning
(4) Decide on the type of help: avoidant or adaptive	ñ	ñ
(5) Determine whom to ask for help	ñ	ñ
(6) Solicit help	Performance	Self-control
(7) Obtain help	ñ	ñ

(8a) Evaluate help received	Self-reflection	Self-judgment
(8b) React to help received	ñ	Self-reaction

Karabenick and Berger (2013) call out for further research in many areas including: gaps in self-motivation beliefs in the forethought phase steps (1-5), questions concerning self-efficacy, and understanding the relationship between the self-reflection process of help-seeking and feedback to the forethought phase. The literature is silent concerning driving factors within steps (6-7) examining perseverance of help-seeking and, once started, what drives the help-seeking journey and what happens during and after step (8). Finally, the initial decision to seek help or avoid help (3) is not well understood. The gaps are present primarily due to the history of quantitative inquiry and to observational studies both of which leave the thoughts, feelings, and motivations of the participant silent especially in steps (3) and (4).

Along with Karabenick and Berger (2013), additional quantitative researchers recommend qualitative inquiry in order to expand on questions left unanswered by other methods (Concannon & Barrow, 2012; Gonida et al., 2014; Inda et al., 2013; Nelson-LeGall, 1985; Pajares, 1996; Schenke et al., 2015; Schunk, 1991; Thompson & Dahling, 2012; Usher & Pajares, 2009; Zusho & Barnett, 2011). These studies are replete with statistical data based on Likert scale surveys, GPA results, pre-test/post-test, and the like; however, they are ultimately limited because the data reveal little about the individual and lack the voices of the students explaining in their own words the feelings and internal processes associated with the help-seeking decision (Workman & Bodner, 1996).

My study will not attempt to answer all of the prior questions; however, the questions provide perspective concerning how much we do not know concerning help-

seeking behavior especially treating help-seeking as a metacognitive process in which the student has a choice to make. Self-efficacy does appear to be a contributing factor within the decision process. While self-efficacy plays a role in this SRL choice, I believe there is another factor influencing the help-seeking decision.

Help-seeking and Self Theory of Intelligence

An implicit theory or self-theory of intelligence (STOI) suggests two primary frameworks for intelligence and achievement in individuals. First, is an entity/fixed/validation view in which intelligence is an unchanging, fixed trait. Second, is an incremental/malleable/growth view in which an individual increases intelligence by effort and experience (C. S. Dweck, 2000; C. S. Dweck & Leggett, 1988; Dykman, 1998). A more formal description of each mindset is well described by Dweck (2006). First, the fixed mindset:

> Believing that your qualities are carved in stoneð the fixed mindsetð creates an urgency to prove yourself over and over. If you have only a certain amount of intelligence, a certain personality, and a certain moral characterð well, then youôd better prove that you have a healthy dose of them. It wouldnôt do to look or feel deficient in these most basic characteristics.
>
> Iôve seen so many people with this one consuming goal of proving themselvesð in the classroom, in their careers, and in their relationships. Every situation calls for a confirmation of their intelligence, personality, or character. Every situation is evaluated: *Will I succeed or fail? Will I look smart or dumb? Will I be accepted or rejected? Will I feel like a winner or a loser?* (C. Dweck, 2006, p. 6)

She continues describing the growth, or malleable, mindset:

> The growth mindset is based on the belief that your basic qualities are things you can cultivate through your efforts. Although people may differ in every which wayð in their initial talents and aptitudes, interests, or temperamentsð everyone can change and grow through application and experience.
>
> You can see how the belief that cherished qualities can be developed creates a passion for learning. Why waste time proving over and over how great you are, when you could be getting better? Why hide deficiencies instead of overcoming them? é The passion for stretching yourself and sticking to it, even (or especially) when itôs not going well, is the hallmark of the growth mindset. This is the mindset that allows people to thrive during some of the most challenging times in their lives (C. Dweck, 2006, p. 7)

Based on the descriptions, a fixed mindset would tend to view help-seeking as a threat to perceived intelligence both inwardly for how it would make the person feel about their intelligence and outwardly from what others would think about the personôs intelligence for admitting the need for help; therefore, help-seeking avoidance may be the resultant action. In contrast, it appears a malleable view of intelligence would tend to view help-seeking as a means to enable learning, to achieve an outcome, and to gain experience in a new area; therefore, the person may see help-seeking as a benefit with adaptive help-seeking as the resultant action. Concerning perception of intelligence and asking for help, Dweck (2006) quotes a seventh-grade girl.

> I think intelligence is something you have to work foré it isnôt just given to you. Most kids, if theyôre not sure of an answer, will not raise their hand to answer the

question. But what I usually do is raise my hand, because if Iôm wrong, then my mistake will be corrected. Or I will raise my hand and say, ñHow would this be solved?ò or ñI donôt get this. Can you help me?ò Just by doing that Iôm increasing my intelligence (p. 17).

Literature relating implicit theories or self-theory of intelligence to self-efficacy, achievement goals, and help-seeking behavior may shed light on this premise.

Linking SE and STOI to HSB

Although goal theory is not part of my theoretical framework, understanding how goal theory informs STOI and SE may be beneficial to understanding help-seeking. Achievement goals (mastery goals and performance goals) relate to malleable and fixed views of intelligence, respectively. The prevailing literature associate incremental/malleable/growth views of intelligence with increased mastery goals and entity/fixed/ability/validation views of intelligence with increased performance goals (Chen & Pajares, 2010; C. S. Dweck, 1986; C. S. Dweck & Leggett, 1988; Elliot, 1999, 2005; Elliot & McGregor, 2001; Pintrich, 2004). (Note: due to the multiple terms for the two theories of intelligence, I endeavor to use fixed and malleable for all referenced work). Research in achievement goal theory has its roots in or is associated with work related to theories of intelligence. Table 2.3 provides a summary from C. S. Dweck and Leggett (1988) which I have adapted with additional concepts presented in prior citations. Mastery goal orientation is related to adaptive help-seeking behavior, and performance goal orientation is related to help-seeking avoidance (as a reminder, help-seeking avoidance includes active help-seeking but using unfavorable methods and motivations) with actual help-seeking type under the performance goal orientation dependent on the

context of the environment (mastery context, teacher and peer factors, for example) (R. S. Newman & Schwager, 1995).

Table 2.3: *Theory of Intelligence, Goals, and Behavior*

Theory of intelligence	**Achievement goal orientation**	**Perceived ability**	**Behavior when faced with challenge**
Fixed/entity/validation (intelligence is fixed)	Performance (goal is for positive judgments and to avoid negative judgments)	High	Mastery Approach (seek challenge; high persistence). Influenced by judgments.
		Low	Helpless/Ability judgments (avoid challenge; low persistence)
Malleable/incremental/ growth (intelligence can increase)	Learning/Mastery (goal is to increase experience or competence)	High or Low	Mastery Approach (seek challenge that engages in learning; high persistence)

Prior research has investigated relationships between self-efficacy and self-theories of intelligence. A higher level of perceived malleable ability versus perceived fixed ability resulted in much higher indicators of mastery and multi-source self-efficacy influencers resulting in higher probability of stronger self-efficacy in one study (Chen & Usher, 2013) resulting in fewer ñat riskò students. Another study found a direct positive correlation between malleable ability and self-efficacy, a direct negative correlation between a fixed ability and self-efficacy, and a negative correlation between malleable and fixed views showing the two views are independent (Diseth et al., 2014). A study of science students found malleable views of intelligence had positive correlation with task goals and self-regulated learning strategies which then positively correlated to self-efficacy. In the same study, fixed views associated negatively with self-regulated learning strategies reducing its influence on self-efficacy (Chen & Pajares, 2010). Dweck

and Leggett (1988) found that a debilitating factor to performance goals (previously related to fixed intelligence) reduced perceived self-efficacy by lowering the belief in efficacy of effort; conversely, they found that a facilitating factor of learning (or mastery) goals was a continued belief in efficacy of effort. Studies which directly link implicit theories of intelligence and self-efficacy are little in number; studies which directly link implicit theories of intelligence with help-seeking are rare indeed.

Most help-seeking studies referencing implicit theories of intelligence proceed directly to examining achievement goals without examining or measuring intelligence views; for example, a study of college students found help-seeking correlated with students having a propensity for outcome-based goals (Grant & Dweck, 2003). The best, and perhaps seminal, linkage of self-theory of intelligence with help-seeking is attributed to Nelson-LeGall (1981, 1985). She describes her two views of help-seeking as mastery-oriented help-seeking linked to malleable views with mastery goals and behavior and executive help-seeking related to fixed views with dependency and performance oriented goals and behavior.

I summarize the research relating STOI, SE and help-seeking behavior in Table 2.4 in which I have organized the ideas represented in the prior work into a help-seeking outcome based on an STOI/SE relationship bridged by goal theory. The idea students make decisions in order ñto avoid unfavorable judgements of competenceò (Nelson-LeGall, 1985, p. 66) will be important in my findings and may be the best way to get at the intersection of SE, STOI, and HSB; I will let the studentsô responses speak for themselves.

Table 2.4: *Goals, STOI, SE, and Help-seeking*

STOI	**Achievement goal orientation**	**Perceived ability**	**Behavior when faced with challenge**	**Self-efficacy**	**Help-seeking behavior**
Fixed/entity/ validation (intelligence is fixed)	Performance (goal is for positive judgments and to avoid negative judgments)	High	Mastery Approach (seek challenge; high persistence). Influenced by judgments.	May be decreased, unchanged or increased based on context (social/ classroom). Vicarious & Social Persuasions	Help-seeking based on context
		Low	Helpless/Ability judgments (avoid challenge; low persistence)	May be unchanged or decreased	Help-seeking avoidance
Malleable/ incremental/ growth (intelligence can increase)	Learning/ Mastery (goal is to increase experience or competence)	High or Low	Mastery Approach (seek challenge that engages in learning; high persistence)	May be unchanged or increased: Mastery and Vicarious	Adaptive Help-seeking or no observed help-seeking, ñIdl do it myself.ò

A Framework Represented by the Theoretical Model

Self-efficacy and self-theories of intelligence act as the framework for the theoretical model. Added to this are the influences brought with my subjectivity. Help-seeking describes a metacognitive strategy, an internal decision and action or process (an agentic response), which the individual actively chooses to do properly (adaptive) or

improperly (avoidant). What follows is a model representing my theoretical framework defining help-seeking behavior.

Figures 2-3 to 2-5 and Table 2.4 represent the framework which will act as a guide to interview questions for the study along with methods and implications. Figure 2.3 brings together self-efficacy and implicit theories of intelligence as influencers to help-seeking. Based on the reviewed literature, these relationships can go both ways with feedback changing the influencing component. Thoughts from several researchers (Bandura, 1977a, 1986, 2012; Chen & Pajares, 2010; C. S. Dweck, 1986, 2000; C. S. Dweck & Leggett, 1988; Ferla et al., 2010; Karabenick & Zusho, 2015; H.-S. Lee et al., 2015; Lent et al., 2003, 2013; Ryan et al., 1998; Schnell et al., 2015; Wood & Bandura, 1989) allow a framework for help-seeking in light of self-efficacy and implicit theories.

Figure 2.4 places help-seeking behavior as a metacognitive action under social cognitive theory. Thoughts from (Bandura, 1989, 1997, 2012; DiBenedetto & Bembenutty, 2013; Karabenick & Berger, 2013; Schunk & Usher, 2013) and others previously cited allow help-seeking steps to align with the triadic determinants in SCT.

Figure 2.5 places help-seeking behavior as a metacognitive action under the self-regulated learning umbrella. Thoughts from (Karabenick & Berger, 2013; Karabenick & Dembo, 2011; Pintrich, 2004; Schunk & Usher, 2013; Zimmerman, 1990, 2002) and others previously cited allow help-seeking steps to align with the triadic determinants in SRL.

In figures 2-4 and 2-5, I have added steps from Table 2.2. As a reminder, Karabenick and Berger (2013) acknowledge the lack of clarity on steps 1-5 and step 8 in the process. I believe my qualitative study may shed light on these steps from the

studentsô perspectives and lived experiences. I am especially interested in these steps as well since, I believe, my theoretical framework acts to illuminate these steps.

Finally, Table 2.4, represents a summary of a proposed relationship between theory of intelligence, self-efficacy, and help-seeking behavior using previous work examining goal theory as a way to describe the relationship.

The proposed theoretical framework is not a hypothesis to be tested in this research. As a qualitative study, the theoretical or conceptual framework is

> primarily a conception or model of what is out there that you plan to study, and of what is going on with these things and whyð a tentative theory of the phenomena that you are investigating. The function is to inform the rest of your designð to help you to assess and refine your goals, develop realistic and relevant research questions, select appropriate methods, and identify potential validity threats to your conclusions. It helps you justify your research. (Maxwell, 2013, p. 39)

The interview questions in the study (see INTERVIEW PROTOCOL in the appendix) relate directly to the framework and to the research questions. The methods, discussion, and implications relate directly to the framework, the research questions, and relevant literature. Specific safeguards to design methods, procedures, and quality are covered within the context of the included manuscript articles.

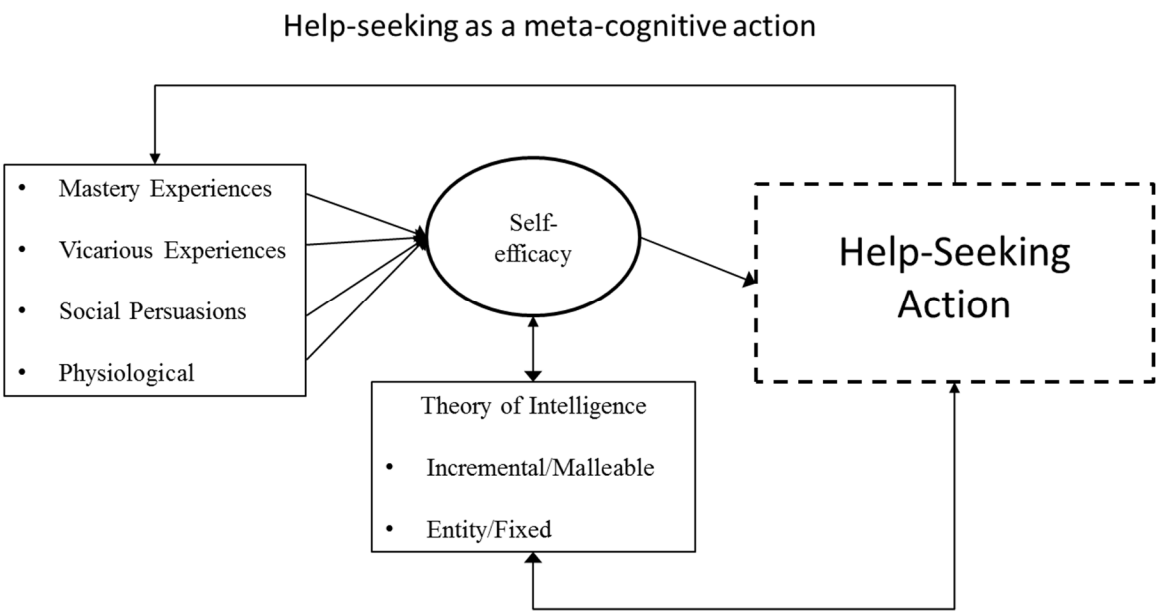

Figure 2.3: Help-seeking as an Action under SE and STOI

Note: The ñHelp-Seeking Actionò in the dashed box Figure 2.3 is located at the center of the triangles of Figure 2.4 and Figure 2.5. Once a help-seeking action starts, it is influenced by constructs from SCT and SRL as shown in Figure 2.4 and Figure 2.5. Figure 2.3 captures the starting influencers of HSB and demonstrates the feedback process.

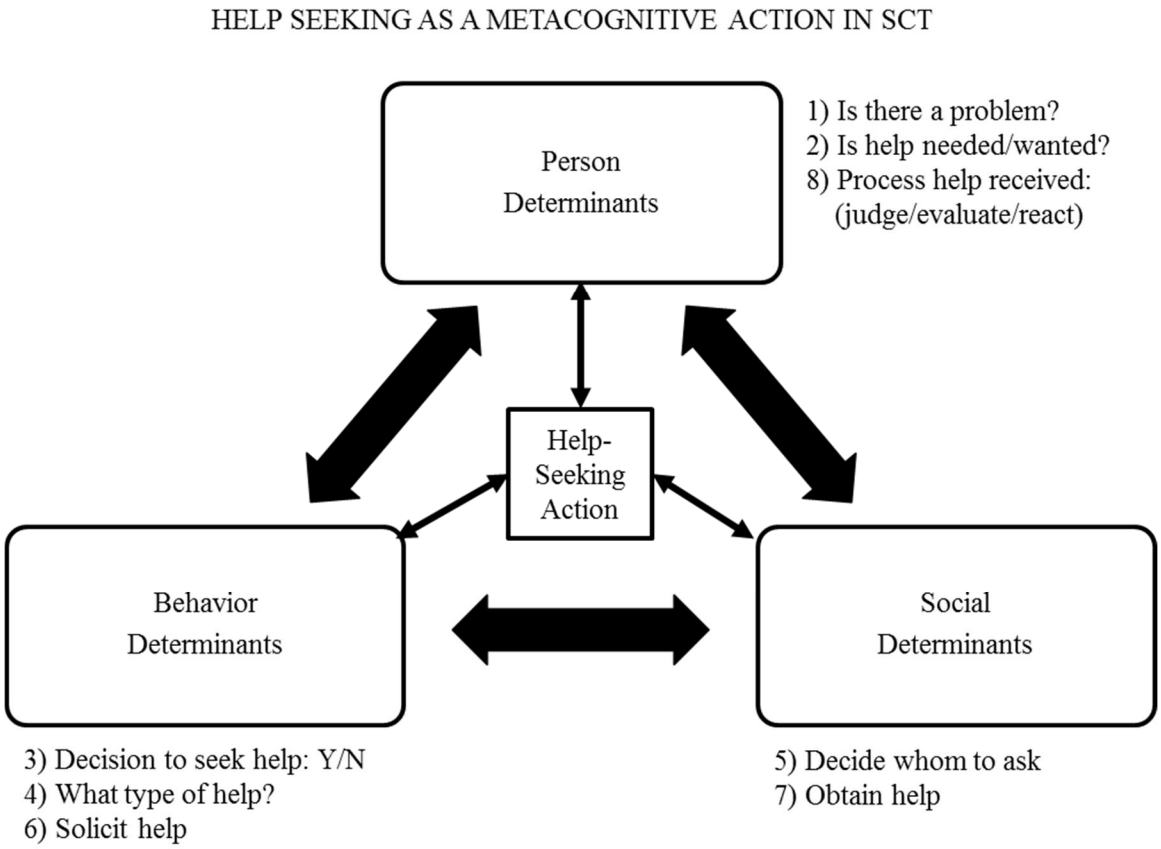

Figure 2.4: Help-seeking and SCT

Note: Steps 1-8 from Table 2.2.

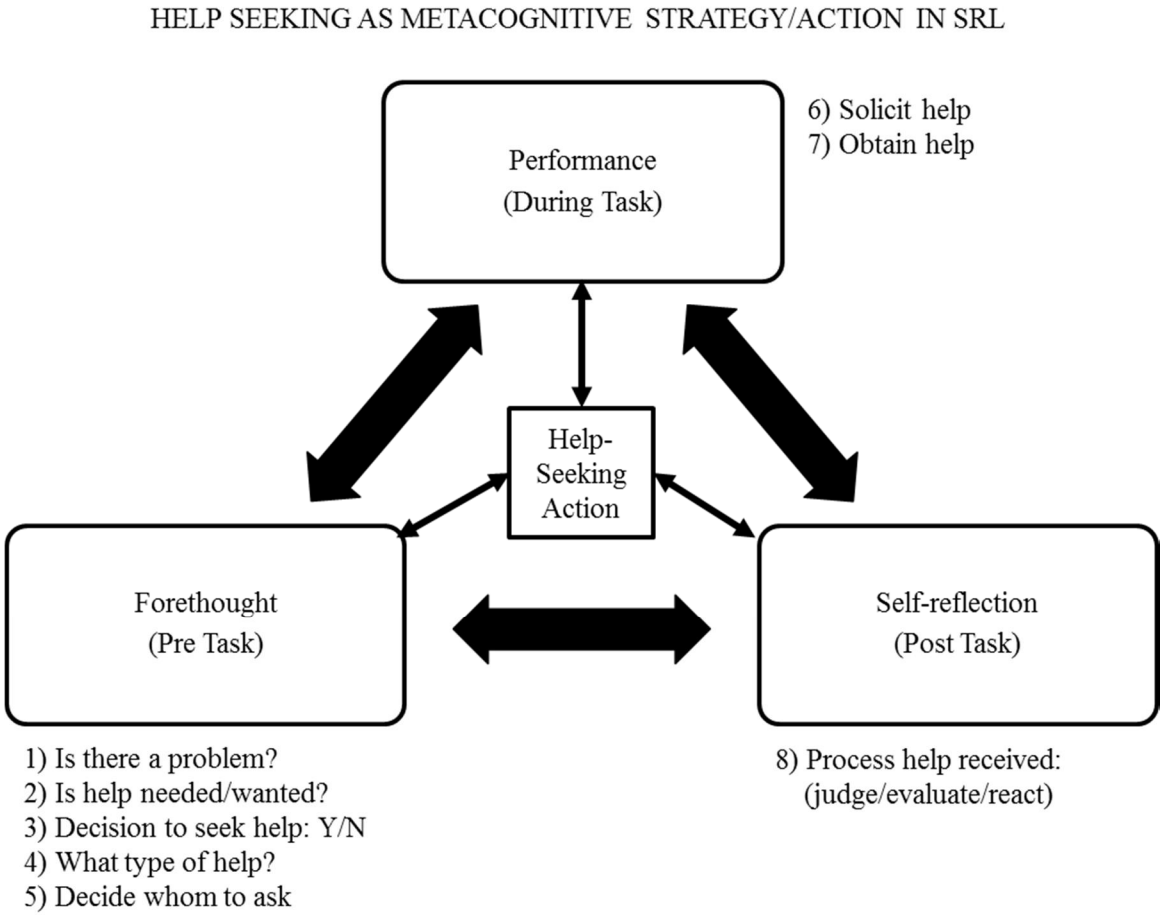

Figure 2.5: Help-seeking and SRL

Note: Steps 1-8 from Table 2.2.

CHAPTER 3

LITERATURE REVIEW: ENGINEERING CONTEXT, GENDER, ETHNICITY

Introduction

While the previous model represents an overview of help-seeking behavior viewed as an action in students, it does not speak to the nuances of the help-seeking behavior decision for underrepresented demographic groups within engineering: female and ethnic minority students. This section of the literature review investigates prior work informing help-seeking for female and ethnic students within the engineering context.

Perhaps the best way to describe current research regarding help-seeking behavior related to gender and ethnic backgrounds is to acknowledge it as divergent, often conflicting, hampered by sample size (especially in engineering and other STEM fields), and often revealing as many future questions as proposed answers. I first examine self-efficacy within K-12 and college level contexts since this reflects how the research is typically divided. After the overview, I present specific examples of research in an attempt to express the difficulty reflected by the researchersô own thoughts related to gender and ethnic concerns. I follow SE with a look at STOI research; however, there are very few examples of STOI research examining gender in a college context and ethnic factors in any context. In general, there is an egregious lack of research examining ethnic related differences for SE, STOI, and academic help-seeking especially in post-secondary, STEM contexts.

K-12 Context

A study by Ryan, Gheen, and Midgley (1998) examined self-efficacy and help-seeking avoidance across classrooms and gender. They found self-efficacy affected help-seeking with lower self-efficacy negatively relating to help-seeking avoidance (lower self-efficacy equals higher help-seeking avoidance) with boys, controlling for self-efficacy, reporting higher help-seeking avoidance. When the researchers looked at self-efficacy versus help-seeking avoidance across classrooms, they found that the relationship varied. The variance was explained by the teacherôs expectations and environment of the classroom as related to mastery or performance goals. In classes focused on tasks, understanding, or mastery, students exhibited lower level of help avoidance. In classes where students perceived relative-ability measurements or competition, help-seeking avoidance was more prevalent (Ryan et al., 1998; Ryan & Pintrich, 1997).

The results of this study provide some insight into the differences linking help-seeking and self-efficacy. Self-efficacy and its effects on behavior can be increased, decreased, or nullified, based on other outside influences. Self-efficacy is a dynamic, domain construct with social and environmental factors playing a vital role independent of the studentôs current self-efficacy perceptions (Bandura, 1997). In this particular example, classroom context and teacher encouragement overcame low self-efficacy and help-seeking avoidance decreased. Based on the relationships in Table 2.4, there are many variables at play regarding context, SE, and STOI influencing help-seeking. This study points to other factors such as the teacherôs expectations. I believe there may be

additional ñother factorsò related to help-seeking behavior which may act as a determinant of gender differences for my study.

Vicarious experiences, social persuasions, and environmental factors were shown to increase help-seeking avoidance which correlated with increased perceived threat from teachers and from peers with girls perceiving more of a threat than boys (Ryan, Allison M., Hicks, L., & Midgley, 1997; Ryan & Pintrich, 1997). Skaalvik and Skaalvik (2013) found classroom learning structure promoting mastery behavior correlated positively with increased help-seeking while perception of teachers as being accommodating indirectly increased help-seeking with female students slightly more inclined to see teachers as more accommodating. These studies give gravity to the argument that social, environmental, and vicarious influences do affect help-seeking directly and are viewed differently by gender; furthermore, as inputs into self-efficacy, one could argue they affect help-seeking through changes in self-efficacy based on classroom, cultural, or social context validating the idea that self-efficacy is domain or context dependent (Bandura, 1997).

Based on the research, social constructs seem to be a major factor but in different ways for female versus male students. In a study of white, male high school students, ñé the need to fit into oneôs social environment constitutes the core category. The male students appear to be continuously assessing their actions and decisions in reference to the degree they perceive those behaviors to impact their level of acceptance by those in their small, competitive, conservative environmentò (Timlin-Scalera et al., 2003, p. 343). These social constructs within an engineering classroom may influence help-seeking behavior, especially for underrepresented groups.

Engineering and College Contexts

As a precursor to the review to follow, research specifically applied to help-seeking in engineering education is limited; however, studies considering help-seeking in STEM (science, technology, engineering, mathematics) courses and majors are relevant to the review. While there are studies examining gender differences, the results are sometimes contradictory. Studies examining ethnic differences are scarce, at best. Studies often have aspects of help-seeking or self-efficacy as discussions within the results. In many of these reports ñconfidenceò and ñself-efficacyò are often conflated.

In a study examining men and women in STEM careers, Zeldin, Britner, and Pajeres (2008) found both men and women base their confidence in self-efficacy but from different sources. Self-efficacy in men is highly influenced by mastery experiences while vicarious experiences and social persuasions are more significant in women. Where a man might think ñI can do itò, a woman might think ñIf they can do it, I can do itò (my quotes for emphasis). In a follow-up study, Zeldin and Pajares (2000) conclude the ñself-efficacy beliefs of the women in our sample were nurtured by familial, academic, peer, and work-related influences, and these influences were recalled primarily in terms of the encouragement received or through the vicarious experience that they providedò (p. 237-238). Conversely, in a study of engineering students, Hutchison, Follman, Sumpter, and Bodner (2006) found a lack of significant variation in reported factors influencing the self-efficacy based on gender. However, what was interesting in Hutchisonôs study is that twice as many women as men identified availability of help as influential to their confidence in an engineering subject. Social persuasion was an influential result in another study of engineering students which found teacher support

was the only social input positively affecting self-efficacy for female students; while, for men, peer influence acted as a barrier (Inda et al., 2013). The previous study offered incomplete analysis. For example, in the cited study, teacher support was positive for females. What was teacher support for males? I dare not infer a result. For men, peer influence acted as a barrier. Did peer influence affect females? The comparison is similar to ñwhile an apple is red, an orange is notò.

The previous articles present an unclear picture of gender differences linking self-efficacy and help-seeking. Researchers do not consistently report results nor do they fully develop comparisons. An especially interesting study looked at how female college students viewed themselves versus male students in STEM majors. From a vicarious experience perspective, the female students entered college with the perception male students performed better academically which related to womenôs self-efficacy scores being lower than menôs scores; however, with four years of actual experience, by graduation, vicarious experience was won over by actual results (mastery experiences) and the womenôs self-efficacy beliefs measured similar to menôs in the STEM majors (Macphee, Farro, & Canetto, 2013). These results suggest gender differences in self-efficacy are mitigated by mastery experiences increasing self-efficacy in women; however, the prior articles and additional studies refer to self-reported and measured differences in mastery vs. vicarious/social persuasions in women versus men. Self-reported indicators can be an issue based on prior research showing the propensity for individuals to self-report more socially acceptable responses (Randall & Fernandes, 1991). This can result in self-report bias in quantitative studies. It is worth noting that ethnic influences and differences are silent for these studies.

Bridging self-efficacy to help-seeking, prior empirical work on gender differences typically investigate self-efficacy or academic achievement with help-seeking as an adjunct component (Concannon & Barrow, 2012; DiBenedetto & Bembenutty, 2013; Schenke et al., 2015; Vogt et al., 2007; Williams & Takaku, 2011a). One quantitative study found no differences between men and women related to academic help-seeking behaviors (Macphee et al., 2013). A prior quantitative study found greater perceived discrimination, effort, and help-seeking in female students and more academic self-confidence and self-efficacy in male students. The same study found female students were more likely to work with others; however, it was important they felt confident versus peers (Vogt et al., 2007). Another quantitative study found male students related help-seeking with loss of control and female students felt more positive about help-seeking as it became more closely related to social norms (Kessels & Steinmayr, 2013).

In a study using Banduraôs (1989) triadic model as a basis for academic success in engineering environments, self-efficacy was positively correlated with help-seeking, defined as asking for help or working with peers on a problem, with femalesô self-efficacy correlating with higher help-seeking behavior than malesô self-efficacy (Vogt et al., 2007). In a study investigating help-seeking visits to a writing tutor in a college setting, self-efficacy correlated negatively with help-seeking; higher self-efficacy related to less help-seeking with no differences based on gender (Williams & Takaku, 2011a). Conversely, and contradicting this, Ryan and Shin (2011) found academic self-efficacy correlated positively with adaptive help-seeking and negatively with avoidant help-seeking; higher self-efficacy related to a tendency toward adaptive help-seeking and less toward avoidant help-seeking with lower self-efficacy related to less adaptive help-

seeking and more avoidant help-seeking behavior. Two college level studies provided somewhat different results where one found high self-efficacy corresponded to less help-seeking (Komarraju & Nadler, 2013) while the other found self-efficacy correlated positively with help-seeking with a stronger influence on help-seeking in female students (Yang & Taylor, 2013).

Based on these results gender does not seem to change the consensus on low self-efficacy equating to lower instances of help-seeking or higher help-seeking avoidance. Gender relationships appear to indicate female students are more influenced to seek help when strong self-efficacy is present; however, some studies found no difference based on gender. Caution is in order as results for high self-efficacy students may be affected by self-report bias (Randall & Fernandes, 1991). Students may not want to report their need for help. While mastery influences are called out as important, vicarious experiences and social persuasions appear to be more highly influential especially for female students. Clearly, as self-efficacy rises, other factors come into play impinging on the final decision to seek or avoid help. These ñother factorsò call out for additional study related to help-seeking behavior and relate to the research questions for this study.

Help-seeking Related Studies

Ethnic concerns related to help-seeking is an understudied topic (Graham, 1994; Schenke et al., 2015); lack of ethnicity research is more pronounced in engineering. In one of the few college studies examining academic achievement factors including help-seeking along with ethnic and gender influences, help-seeking was found to correlate with positive academic achievement with African-American students (male and female) utilizing peer support and help-seeking more than their Caucasian counterparts. Even so,

all students failed to adequately make use of the available help-seeking resources with the researchers strongly suggesting ñé institutions of higher learning should ensure that the resources available for peer learning, tutoring or individual assistance from instructors should be in an environment that encourages student participation, rather than a place for slow and non-achieversò (Campbell, 2007, p. 18). In a similar study (not examining ethnic differences), college students did not adequately utilize available help-seeking resources with a decline of use noted throughout the study causing the researcher to suggest future research in this area is merited (DiBenedetto & Bembenutty, 2013). This conscious decision to defer from using available help-seeking resources is the root of research question one.

One longitudinal study of STEM college majors by Stout et al. (2011), examined the influence of classroom gender context (gender of student and gender of instructor) on help-seeking via observational techniques (Note: observational techniques cannot capture decisions needed but not taken). For female students, results indicate female professors resulted in more outside of class help-seeking and in class questions than with male instructors which resulted in zero female students requesting help after class as time progressed. For male students, results indicate help-seeking outside of class was independent of instructor gender; however, more students asked more in class questions of female instructors than male. This study relates to social/environmental persuasions previously discussed with self-efficacy influences. A study examining first year engineering students found both male and female (with female twice the rate of male) equated increased confidence in a first semester engineering class. All students, independent of gender, discussed help as a way to increase their chance to achieve

success in the course. Although understanding may be gender independent, action may not be. Vogt et al. (2007) found women sought help more than men in engineering learning environments with self-efficacy as a positive indicator to help-seeking with a higher correlation in women than in men.

Looked at from a different perspective, a study examining the effect of seeking help, being forced to seek help, or needing help on oneôs perceptions of self found students compared their own help-seeking behavior with their perception of the help other students needed which impacted self-efficacy in a greater way than mastery experiences, surprisingly (Hutchison-Green et al., 2008). The results point to the recursive nature of influences previously noted and corroborates the emphasis college students place on classroom context and peer comparisons (Karabenick, 2004; Ryan et al., 2005). In contrast to threats of help-seeking gained through peer comparisons, very positive influences on engineering student self-efficacy were observed in a collaborative based classroom environment resulting in students willingly working with each other to solve problems (Stump et al., 2011). I believe positive peer relationships may encourage future help-seeking by building a stronger cohort within the student peer community.

Many articles examining help-seeking or self-efficacy do report beneficial aspects; however, as shown by the following example, most studies not only leave gender or ethnic relationships silent but leave specific aspects of help-seeking lacking. In a study examining academic performance in an organic chemistry class, the researchers found help-seeking behavior was a clear influence on positive academic performance in the class; however, the study did not examine the reasons for help-seeking or attempt to classify the help-seeking type (avoidant or adaptive as noted in the study). The

investigators called out that understanding the ñwhyò and the ñtypeò involved with help-seeking behavior would be a beneficial addition to better communicate implications (Horowitz et al., 2013).

Example Articles

I thought it would be beneficial to present a few example articles in order to better present how help-seeking research is reported. Similar to a qualitative research studyôs findings, using the voices of the researchers may provide a sense of the struggle these researchers have in reporting results based on gender or ethnic concerns.

(Hackett, Betz, Casas, & Rocha-Singh, 1992)

This quantitative research examined academic performance factors and attempted to capture gender and ethnic differences in engineering students. Self-efficacy was the primary factor explored.

ñAs hypothesized, ethnicity was not directly predictive of performance. However, ethnicity was a significant predictor of both occupational and academic milestones self-efficacy, with Mexican-American students reporting lower self-efficacy expectations than Euro-American students. ñ (Hackett et al., 1992, p. 536)

The following statements are indicative of most STEM and engineering quantitative studies. The demographics do not allow for diverse gender or ethnicity in the sample. ñWe were also unable to recruit large enough samples of male and female students of color. This is a major problem in conducting research on engineering students; there are simply very few students of color and even fewer women.ò (Hackett et al., 1992, p. 536). This study found no significant differences in self-efficacy

expectations based on gender; however, they did find women perceived less opportunity than men in traditionally male-dominated areas. However, they explain

> because of the small number of women of color in this sample (due to the small numbers actually pursuing scientific/engineering degrees), we were not able to fully explore their unique experiences. Future research of this type requires a much larger sample of women of color to examine the interactions of gender and ethnicity. (Hackett et al., 1992, p. 536).

Although the study included ethnic participants, only Euro-American and Mexican-American were significant with respect to sample size; therefore, results of other ethnic backgrounds are silent.

(D. H. Schunk & Pajares, 2002)

This study demonstrates difficulties studying self-efficacy. Even though this investigation is at the K-12 level, it represents the issues related to reporting gender and ethnic differences.

> Gender differences in self-efficacy are confounded by a number of factors. First, these differences often are nullified when previous achievement is controlled (Pajares, 1996). Boys and girls also have a tendency to adopt a differing stance when responding to self-efficacy instruments. Researchers have observed that boys tend to be more self-congratulatory in their responses whereas girls are more modest (Wigfield, 1996). A third confounding factor is related to the manner in which gender differences typically are assessed and reported. Students usually are asked to provide confidence judgments that they possess certain academic skills or can accomplish academic tasks. Differences in the average level of confidence

> reported are interpreted as gender differences in self-efficacy (Schunk & Pajares, 2002, p. 10).

I believe the described self-report bias and other confounding issues may be present in studies asking students about their help-seeking experiences using Likert-based instruments. The tendency to self-congratulate or to affirm confidence judgments (Randall & Fernandes, 1991) may affect help-seeking studies based on similar quantitative assessments which is why, I believe, a qualitative study may help mitigate some of these issues.

Even when studies attempt to describe ethnic differences, these differences may be wrongly attributed.

> Relative to gender differences, much less research has been done on ethnic differences. Although some research shows minority students hold lower perceptions of competence than nonminority students, much of the research has confounded ethnicity with social class by comparing middle-class white children with lower class minority children (Graham, 1994).
>
> Graham (1994) disentangled this confound by conducting a review of published research on African American students and their achievement motivation. She found little support for the notion that African Americans have lower perceptions of competence than do White students, once socioeconomic status is controlled. In fact, African Americans often maintain a sense of optimism even in the face of social and economic disadvantage. Graham also found evidence that, even though the expectations of African Americans are high, they often fall short of their performances. We noted earlier that such incongruence

> often is found in self-efficacy research, especially among children. Whether this incongruence is substantially different from that found among nonminority students requires further research (Schunk & Pajares, 2002, pp. 12ï 13).

Although the previous article was research on children and not college students, it describes some of the issues related to quantitative based studies related to gender and ethnic concerns. Confounded variables can indeed provide an inaccurate picture in quantitative research. Perhaps the incongruence is connected to self-bias or perhaps it is indicative of the context. These issues may be independent of the age group of the participants and, therefore, be of concern to all studies of this type.

(Hefer Bembenutty, 2007)

This is a quantitative study of college students examining self-regulated learning strategies and related influences such as self-efficacy. I pulled this article as a typical example in the research. While looking at a key area of the study (SRL, in this case), the researcher presented findings related to self-efficacy and help-seeking as secondary results; in fact, the primary concern was academic performance (grades). Bembenutty notes gender and ethnic differences with caveats. I consider this study to be an exemplar with respect to gender and ethnic considerations even though it does not investigate HSB as a key component. I have underlined parts of the article where Bembenutty has expressed concern or called out for more research.

> The first aim of this study was to examine whether gender and ethnic differences existed in the relationships between academic achievement, learnersô use of self-regulation of learning and motivation, and delay of gratification. The <u>outcome of the study was ambiguous</u> in this regard. The results of the correlation suggested

that the association between studentsô motivation, academic achievement, and self-regulation might depend on the gender and ethnic group of the students (Hefer Bembenutty, 2007, p. 604).

Interestingly, these results differ from another study that reported a positive association between delay of gratification and grades among Korean college students, $r = .35$, $p < .05$ (Bembenutty, 2007). Certainly, future studies need to investigate these associations among these variables for African Americans and Hispanic learners (Hefer Bembenutty, 2007, p. 604).

The correlation between grade and cognitive strategies was positive for Caucasian males, and only for elaboration, critical thinking, and metacognition. For the other three groups, the correlation between their reported use of rehearsal, elaboration, organization, critical thinking, metacognition, and final course grade was not statistically significant; indeed, some of these associations were in the negative direction for at least three of the groups (Hefer Bembenutty, 2007, p. 607)

ñClearly, future studies will need to investigate these findings, and educators may need to consider innovative ways to help students to better use these strategies to improve course performanceò (Hefer Bembenutty, 2007, pp. 607ï 608).

The same article describes no relationship between help-seeking and academic performance. The findings contradict other research in the same area.

Peer learning and help-seeking were unrelated to academic performance among all students. This finding is critical given recent research suggesting that help-seeking from peers, teachers, and knowledgeable individuals is a self-regulatory

> learning strategy that results in positive academic outcomes and the present study seems to contradict this finding (Zusho, Karabenick, Bonney, & Sims, 2007) (Hefer Bembenutty, 2007, p. 608).

The study found that there may be a cross matrix based on gender and ethnicity. Gender differences may not equate with minority differences which increase the difficulty in reporting results.

> Caucasian males and minority males differed regarding their motivational beliefs; minority males reported lower confidence in their capability to perform designated academic tasks than Caucasian males. Caucasian females reported higher self- efficacy beliefs that minority females. Again, these results are of concern for minority students because they reported lower confidence levels and lower course grades than Caucasian learners. These findings call for additional studies to investigate and identify the socialization processes and classroom contexts that influence such patterns of behavior (Hefer Bembenutty, 2007, p. 607).

Bembenutty offers a number of suggestions which relate to inputs into experiences, vicarious examples, and social feedback all of which relate to increasing self-efficacy. The results call out for more help-seeking instruction. However, this research examined self-efficacy as related to academic performance. It does not look at self-theory of intelligence and does not consider help-seeking behavior as a focus. Bembenutty calls out for more study multiple times. Note, in the following excerpt, ñbeliefs about education and attitude toward collegeò sound like a call for qualitative investigations.

ñAdditional information about the students, including socioeconomic status, parental education, previous academic performance, beliefs about education, and attitude toward college, would also be of interestò (Hefer Bembenutty, 2007, p. 612).

Self-Theory of Intelligence in Context

Dweck (2000) presents many accounts of self-theory of intelligence from her research and the work of many others; however, none of the studies specifically expound on ethnic differences related to STOI. The closest is an observation. Dweck refers to a study by Steele (1997) in which Steel found a large number of African American students dropped out of college in their Freshman year independent of academic preparation. Students with high SAT scores were just as likely to drop out as students with low SAT scores. Dweck says, ñThis sounds very much like what Iôve been saying all along: The helpless response is not a matter of a studentôs present ability. Very skilled students are just as likely as less-skilled students to respond to difficulty by blaming their abilities and giving upò (C. S. Dweck, 2000, p. 123). The assumption is a fixed view of intelligence is present.

There are a small number of empirical studies which relate STOI by gender; however, these studies are not at the college level but in middle to high school students. The result from these studies are fairly consistent; therefore, I have selected a couple as representative. In one study of advanced eighth-grade students, girls were significantly more likely than boys to hold a fixed view of intelligence (C. S. Dweck & Leggett, 1988). In a more recent study of high school students, the same results were found as were results relating STOI with self-efficacy. (Note: entity equates to a fixed view and incremental equates to a malleable view).

> The overall results show significant gender differences in the students´ general implicit theories of intelligence and mathematics self-efficacy beliefs. Girls tend to hold an entity theory of intelligence and, compared with the boys, they feel less efficacious and competent in mathematics. Significant correlations between the implicit theories of intelligence and mathematics self-efficacy beliefs have been observed, in a sense that students´ with strong self-efficacy beliefs tend to hold an incremental perspective about intelligence (Todor, 2014, p. 322).

Example STOI Study.

There are very few studies relating to college (engineering, none found) level students specifically examining gender and ethnic differences on self-theory of intelligence views. I present and expound on one example study completed at the college level. I believe presenting the study in qualitative narrative form may help coalesce the emerging results and the issues related to inquiries of this type.

A quantitative, long-term study by Aronson, Fried, and Good (2002), attempted to affect change in African American college studentsô STOI by attempting to influence more of a malleable approach to learning. The study specifically looked at STOI changeability and investigated differences in African American and Caucasian students. I consider this a significant paper for my research and implications for the idea of changing a personôs STOI. Aronsonôs team used a pre-test, change, post-test approach. First, they measured an initial self-theory of intelligence perception in African American students. Second, they attempted to change these perceptions by education and self-awareness techniques. Finally, they followed up with a later STOI measurement to see if there was a change in STOI perception and if the change was lasting or not. The

researchers state, ñWe sought to persuade a group of students to adopt the view that their basic intelligence was malleable, that they could expand it with workò (p. 116).

> African American students, after just three sessions of advocating the malleability of intelligence, created an enduring and beneficial change in their own attitudes about intelligence. This change improved their academic profile to a significant degree: compared to their counterparts in either of the two control conditions, they reported enjoying and valuing academics more and they received higher grades. The intervention had some of the same positive effects for White students, though not to the same degree. One clear difference was that whereas, over time, African American students appeared to become more convinced of the expandability of intelligence, the White studentsô attitude change did not persist (p. 123).

In the following excerpt, the researchers describe that even with an encouraging change in STOI perceptions in the students, academic achievement, enjoyment, and overall performance was still less than their White classmates. Similar to the previous self-efficacy studies which do not examine STOI and HSB impacts, this study does not investigate self-efficacy and HSB influences which may account for some of the less encouraging results.

> At the same time we must note the less encouraging story these results tell us about the African American experience in college. Even after controlling for preparation and ability (as measured by SAT scores), these students received significantly lower grades, showed significantly lower identification or engagement with the schooling process, and reported enjoying themselves less

than their White classmates. This findingð as well as the additional finding that controlling for stereotype threat did not fully eliminate this gap in performance and engagementð underscores the difficulty these students face on predominantly White campuses. Our findings, moreover, are consistent with past findings in suggesting that at least part of this difficulty is created by suspicions of intellectual inferiority. And, also consistent with past research, the present study suggests that such doubts may be particularly damaging when the inferiority can be seen as irremediable (p. 123).

The intervention resulting in a positive change in perceived STOI was significant, I believe. It is worthy of future research. I trust my study may present findings to help explain, in some way, the juxtaposition of a positive change in STOI with unexpected results related to academic performance. Factors affecting HSB in ethnic students may be similar factors affecting Aronsonôs findings. Our studies are different, but in some ways the same; in any event, I would call it a success if students in my study find some positive benefit to participating similar to the students in Aronsonôs study.

The Aronson study introduced me to the idea of stereotype threat. Aronson describes ñtheir intervention had the effect of significantly changing Black studentsô feelings about being perceived by the larger community in a stereotypical wayð they felt less looked down upon academically by their White peersò (p. 123). I review stereotype threat as part of my results chapter in manuscript two.

Summary Thoughts

As indicated at the beginning of this section, prior research, while available, is limited at the college level and almost non-existent in an engineering context. The

available research is quantitative and often conflicting when comparing results across researchers. Sample size availability for minorities and female students within STEM fields is called out as limiting factors and impugn the results.

However, the available results do suggest there are gender and ethnic differences related to SE and STOI which may affect help-seeking. Studies with help-seeking as a measured component relate differences based on gender and ethnic background. However, at this point, I do not believe I nor any researcher can definitively describe what these differences are due to the lack of available research and difficulty of identifying demonstrable results as described in part by Schunk and Pajares (2002) and Bembenutty (2007). The lack of available gender and ethnic research in a college context (especially engineering), the differences in available results, potential of confounding variables including self-bias to cloud results, and the call for more analysis by prior researchers strengthen my choice of SE and STOI as part of my theoretical framework and the desire to investigate gender and ethnic related experiences in my own study.

The Gap

I believe the previous literature indicates self-efficacy is domain dependent and influences behavior including how much effort or persistence an individual applies to a problem. I believe the prior research demonstrates there are at least two views of intelligence which influence behavior, especially in social contexts. I believe SRL research shows individuals metacognitively weigh costs and benefits before making a decision. I believe prior research provides evidence for gender and ethnic related differences associated with decisions, especially in social contexts. However, an argument stating a student will choose to seek help when needed because the student has

strong self-efficacy, self-regulated learning, or views of intelligence is a non sequitur. I believe it is evident from the research (and anecdotally from experience) help-seeking avoidance is often chosen over adaptive help-seeking.

Gaps in help-seeking behavior research include: interrelations of SE and STOI to HSB; the most significant self-efficacy influence to HSB; the deciding factor when there are competing influences to HSB; HSB motivations in the individualôs own words, feelings, emotions, and thoughts; HSB differences based on gender and ethnic background; how the context of an engineering environment relate to HSB; how the student makes the initial help-seeking decision; what influences persistence to continue to seek help; and what we can do about it. I neither claim nor expect to answer all of these questions; however, I will remain open to allowing results emerging from the data to direct my studyôs findings, discussion, and implications.

Conclusion

In defining requirements for reflective thought, John Dewey (1910) wrote there are ñcertain subprocesses which are involved in every reflective operation. These are: (a) a state of perplexity, hesitation, doubt; and (b) an act of search or investigation directed toward bringing to light further facts which serve to corroborate or to nullify the suggested beliefò (p. 7). Echoing Dewey, when faced with a cognitive state of perplexity, hesitation, or doubt, the individual should utilize all methods available to search out and investigate means in which to validate or invalidate thought. The science or art of asking questions is one of those means which humans have developedð referred to as help-seeking in this context.

The research used well-structured sampling and data collection providing a novel approach to understand help-seeking behavior in an engineering education context. Additionally, the results may add insight and serve as the basis for further research examining impacts on student retention and performance based on gender and underrepresented demographics. The study was conducted in a unique setting that combines an existing engineering research infrastructure with the opportunity for educational change in the context of the University of Georgiaôs College of Engineering.

Using the lens of SE and STOI described by my theoretical model and framework, this qualitative endeavor addressed the gaps identified by: 1) using qualitative inquiry to expand on questions left unanswered by other quantitative methods; 2) giving voice to underrepresented gender and ethnic demographics in engineering; 3) treating HSB as an agentic action and exploring the actual help-seeking decision; 4) focusing on the initial help-seeking decision not easily examined by other methods; and 5) examining HSB in an engineering education context.

Introduction to Manuscripts

Two manuscripts follow each focused on one of the research questions and the identified gaps. Manuscript one, (Herring & Walther, 2016a), examines the lived experiences of the engineering student participants to create a help-seeking behavior model. This model provides a general structure and diagram of help-seeking behavior in engineering students. It concentrates on the initial help-seeking decision, the outcome of the decision, and the perseverance or subsequent actions after the initial decision. Manuscript two, (Herring & Walther, 2016b), examines help-seeking behavior from a gender and ethnic background perspective. The view of self in relation to others is an

influencing input identified in the model from manuscript one and peripherally by previously cited works. This construct, I believe, acts as the primary influence on the initial help-seeking decision. Manuscript two examines the nuances within this initial decision from a gender and ethnic perspective using the studentsô lived experiences. Manuscript two includes an additional literature review centered around stereotype threat to inform the results.

Role of Researcher and Researcher Assumptions

(The subjectivity statement or role of the researcher would typically be part of the methods section of the dissertation. Since this is a manuscript dissertation, I have included subjectivity related items before the manuscripts.)

Research is attached to a particular anchor, orientation, or perspective (Merriam & Tisdell, 2016); therefore, my life history provides an additional component into the studyôs theoretical framework. I was born to high-school dropout parents. We lived in a trailer parkð mom, dad, my sister, and I. I believe this background may allow me to understand some perspectives of certain socio-economic status groups. I learned an honest work ethic and respect for authority from my parents. I learned personal responsibility during this time. My parents both worked and could not afford day care when we came home from school; therefore, when the bus dropped us off, we were latchkey kids. It was during this time my grandfather became disabled and came to live with us. He had a fourth-grade education but was a World War II veteran and an excellent mechanic. By ñhelpingò him (I called it helping; he probably called it something else.), I learned how to ask ñWhy?ò and ñHow?ò.

My ninth grade math teacher taught me how to expect and demand excellence from myself. She recognized ability in me and recognized how to motivate, to challenge, me. She did this by allowing me to go at my own pace as an independent study. I learned from her the importance of a teacherôs influence in my life and a newfound recognition of my capabilities along with the responsibility to push for achievement utilizing all resources around me.

This foundation of learning how to ask questions from those around me, understanding the synergistic relationship with teachers or those with advanced understanding, and taking responsibility for my own actions and achievement girded me throughout my academic career and years of industry experience. The ñpersonal lensò through which I view most of the world can be summed up as attributing responsibility for oneôs actions by utilizing the available resources for whatever the goal, objective or problem might be.

As a leader of teams, I observed group synergies often dictate success; however, often it is one personôs reaction to difficulty that makes or breaks the teamôs achievement. In other words, in my experience, help-seeking behavior directly correlates with success. Similarly, while teaching special topics SAT courses, I witnessed many occasions when a student in need of help either proactively sought help or, just as proactively, avoided help.

It is the paradoxical decision of needing help, understanding help is needed, acknowledging seeking help is probably the best route, yet deciding not to seek help that is entirely foreign to my psyche and drives me to understand this phenomenon seen in others. Given this research is based on understanding personal decisions influencing

help-seeking behavior, I will need to carefully monitor my views during interviews, data analysis, and interpretation. I must recognize my place with respect to the student participants and how they might perceive me as being an experience, Caucasian, male engineer. I believe memoing and journaling will help mitigate instances that may result in this bias. It is my hope this subjectivity statement informs the reader with my perspective and in some way may assuage their own understanding.

CHAPTER 4

ENGINEERING ACADEMIC HELP-SEEKING: AN EMPIRICAL STUDY OF EXPERIENCES AND BEHAVIORS IN UNDERGRADUATE ENGINEERING STUDENTS[1]

[1] Herring, C. and Walther, J. To be submitted to *Journal of Engineering Education*

Abstract

Help-seeking is correlated to academic achievement. Primary efforts are quantitative which limits the voice of students and does not capture the essence of the help-seeking decision. The purpose of this research is to develop a rich, empirical understanding of engineering studentsô help-seeking behavior ensuring the perspective of underrepresented groups. The study examines the question: what motivates a student to either actively seek or not seek academic help? Four constructs are generated from the data: help-seeking positive motivators, self-conflict, help-seeking as a learned skill, and subsequent help-seeking is recursive until resolved. These constructs along with rich descriptions of the results are used to generate and describe a model representing academic help-seeking behavior.

Keywords: self-efficacy; qualitative; help-seeking decision; help-seeking conflict

Introduction

Help-seeking behavior is of particular importance when evaluated against the requirements for ABET (Accreditation Board for Engineering and Technology). Graduates from ABET accredited institutions should be able to apply knowledge, solve problems, and engage in lifelong learning (Shuman et al., 2005). In addition, retention and participation in engineering and other STEM related fields by underrepresented groups based on gender, socioeconomic status, or ethnic background is of particular interest to ABET (2014) and the National Science Foundation (2012). Help-seeking behavior in college classes is correlated to higher academic performance as defined by increased grade point averages (Horowitz et al., 2013; Karabenick, 2003). In addition, correlation between academic performance in university classrooms and help-seeking behavior may be more significant in African-American students than their Caucasian counterparts (Campbell, 2007). Seeking-help has been identified as an indicator of positive self-directed processes in a studentôs proactive and active maintenance of their academic progress (Zimmerman, 2008). With academic performance a major contributor to retention in engineering (Dai & Cromley, 2014) and especially so for women in engineering (Brainard & Carlin, 1997), help-seeking becomes significant not only to ABET but to the engineering student and to the engineering profession; however, help-seeking is often not the chosen course of action (Karabenick, 2006).

Due to motivational influences, classroom context and social factors, academic help-seeking often becomes help-avoidance (Carraccio, 2014; Inda et al., 2013; Ryan et al., 1998). Asking for help is often perceived as lack of mastery (Ryan et al., 1998) or is perceived as lack of ability (S. Skaalvik & Skaalvik, 2005). A paradoxical result is those

in most need of help are those most likely to avoid asking for help (Karabenick & Knapp, 1988; Richard S. Newman, 2012; Ryan et al., 1998; Ryan & Shin, 2011). Help-seekingôs influence on academic performance and retention become more pronounced when gender, ethnic background (Collins & Sims, 2006; Schenke et al., 2015; Vogt et al., 2007), and competitive majors (Horowitz et al., 2013; Payakachat et al., 2013) are considerations. The purpose of this empirical study is to understand the academic help-seeking response of engineering, undergraduate students. The analysis will examine the research question: what motivates a student to seek or not seek academic help?

Literature Review and Theoretical Framework

While ample research exists investigating help-seeking behavior in education, the majority is quantitative in nature and K-12 focused (Butler, 1998; Kessels & Steinmayr, 2013; Nelson-LeGall, 1981; R. S. Newman & Schwager, 1995; Puustinen et al., 2015) with fewer examples at the college level (Karabenick, 2003; Payakachat et al., 2013). Although these studies provide empirical evidence of help-seekingôs benefit to academic achievement, they do little to inform the help-seeking decision especially for the avoid-help path resulting in a call-out to better understand the beliefs students bring to the decision (Horowitz et al., 2013). Very little research examining academic help-seeking relates to engineering majors. The research focused on engineering education most relevant to this study tends to be framed as self-efficacy research (Concannon & Barrow, 2012; Hutchison-Green et al., 2008; Inda et al., 2013; H.-S. Lee et al., 2015; Lent et al., 2013) with help-seeking behavior as a component variable within the study and not the focus. Summarizing these results there is a consensus on low self-efficacy equating to lower instances of help-seeking or higher help-seeking avoidance; however, as self-

efficacy rises the studies differ with help-seeking positively related, negatively related, or no relationship based on the form of help-seeking chosen (avoid or seek). As self-efficacy rises other factors come into play impinging on the final decision to seek or avoid help (Karabenick, 2003). The studies do not examine the inherent help-seeking decision.

The framework of this study treats help-seeking behavior as an action influenced by its own self-efficacy influences. Self-efficacy is context dependent and is a constituent, key element of interpersonal behavior. According to Bandura (1977a), self-efficacy determines if behavior will be started, the amount of effort allocated, and the persistence in the face of difficulties. Bandura (1977a) argues influencers of self-efficacy are derived from personal mastery experiences (skills, accomplishments, personal history), vicarious experiences (observing behavior or actions of others), verbal persuasion (suggestions of expectations from others), and physiological states (fear, excitement, illness). Self-efficacy is a factor in helping overcome academic and social obstacles especially for women in STEM careers (A. L. Zeldin & Pajares, 2000). In summary, self-efficacy is context dependent and may act as an influence to help-seeking behavior by affecting the studentôs help-seeking choice, the perseverance of help-seeking, and future help-seeking based on prior results; however, self-efficacy is not the only theory influencing the study.

The second component of this studyôs framework is self-theory of intelligence (STOI) (C. S. Dweck, 1986, 2000) which defines the idea of intelligence as either fixed or malleable (C. S. Dweck & Leggett, 1988). A person with a fixed view is concerned with looking smart and, even more so, not looking dumb (C. S. Dweck, 2000); therefore,

a fixed view may lead to help-seeking avoidance when faced with a help-seeking situation independent of self-efficacy (Karabenick, 2003). Conversely, a person with a malleable view perceives intelligence as something to be increased in the moment with hard work and persistence and is more concerned with opportunities to understand something new than with appearances of looking smart to others (C. S. Dweck, 2000); therefore, a malleable view may lead to adaptive help-seeking (Karabenick, 2011; Karabenick & Berger, 2013).

Synthesizing much of current help-seeking behavior research, Karabenick and Berger (2013) present help-seeking as a self-regulated learning process (Zimmerman, 2002) with well explored relationships to goals (Butler, 1998; Ryan & Shin, 2011). However, while help-seeking behavior is set in motion by some catalyzing event such as a low grade (Gross & McMullen, 1983), determining the state of mind of a student at any point in time is difficult in quantitative studies or observational methods (Karabenick, 2006; Karabenick & Berger, 2013). For example, lack of help-seeking behavior does not imply help-seeking was not needed or contemplated by the student. In other words, it is difficult to measure what a student should have done but did not do. We contend this is a gap in most prior quantitative and qualitative, observational studies.

Acknowledging the difficulty assessing the essence of the help-seeking decision, Karabenick and Berger (2013) call out for further help-seeking behavior research referring to: uncertainties in self-motivation beliefs during the forethought phase of the decision, questions regarding self-efficacyôs influence on the decision, and understanding feedback of prior help-seeking to new help-seeking. They call out for examining perseverance of help-seeking and, once started, what drives the help-seeking journey.

Similarly, other quantitative researchers have recommended more qualitative inquiry in order to expand help-seeking behavior understanding not captured by quantitative studies (Concannon & Barrow, 2012; Inda et al., 2013; Schenke et al., 2015; Thompson & Dahling, 2012; Usher & Pajares, 2009; Zusho & Barnett, 2011).

The purpose of this empirical study is to understand academic help-seeking behavior in a particular populationð undergraduate, engineering students enrolled in a large Southeastern United States research university. The primary gaps in help-seeking concern the initial help-seeking decision and persistence of help-seeking, if chosen. A qualitative, empirical, interview study provides experiential data from the participants informing their help-seeking behavior. Using self-efficacy and self-theory of intelligence as a framework, this study examines the initial help-seeking decision and persistence of help-seeking in light of the research question: what motivates a student to seek or not seek academic help?

Research Design Methods

For ease of reading and writing, ñIò or ñmyò refers to the primary investigator who performed the data collection and analysis for this study.

My paradigmatic stance is an ontology of realism and an epistemology of constructionism. Realism states there is a world that is real in which we, as people, interact with each other and with the components. Individuals create meaning with each other and with the world (Altheide & Johnson, 2011). Constructionism states that all knowledge, all meaningful reality, is based on human interaction with other human beings and their world in a particular context (Crotty, 1998). Crotty states ñThe existence of a world without a mind is conceivable. Meaning without a mind is not. Realism as an

ontology and constructionism in epistemology turn out to be quite compatibleò (p. 10) ï see also, Maxwell (2008).

The primary researcher is Caucasian, male, and much more mature in years than the students. The interview questions lead to areas concerning interaction with professors or other authority figures in the studentsô lives. I acknowledge that I may be perceived as an authority figure in the interview. The students are the experts in their own experiences. In an interpretive, constructionism interaction, both participants are active in creating the reality (Crotty, 1998). The form and flow of the interview questions were carefully considered in light of the framework and research question in order to remain within the context of interest and for me to stay within my role as researcher: listening and not reacting, providing a non-threatening environment, and honoring the participantôs role (Roulston, 2010).

The research type is an empirical, qualitative, interpretive, interview study (Merriam & Tisdell, 2016; Patton, 2015; Roulston, 2010; Walther, Sochacka, & Kellam, 2013). Interpretive research is a social interaction and exchange of knowledge from the researcherôs interpretation of the participantsô lived experiences (Walther et al., 2013). Interviews aid in research for understanding Roulston (2010) and allow for an interpretive approach to make meaning of lived experiences (Lincoln, Lynham, & Guba, 2011).

Data collection

Semi-structured, one-on-one interviews were used to capture the studentsô experiences. In a semi-structured approach, the researcher has the flexibility to change order of questions and include new questions during the interview based on the response

of the participant (Kvale, 2007; Roulston, 2010). Throughout the data collection process, I reviewed the form and function of the questions against the data and adjusted as needed to better align the questions so that they captured data pertinent to the research question (Charmaz, 2014). For example, Table 4.1 provides two examples of initial questions and the final form of each question. The intent is to better align the question to the theoretical

Table 4.1: *Evolution of Questions*

Initial Question	Final Question
ñIf you are having trouble understanding material in a class, what do you do?ò	ñWhat if you are having trouble understanding material or concepts in a class, what do you do?ò
ñWhat is the purpose of asking for help?ò	ñWhat do you believe is the purpose of asking for academic help?ò

framework and place the student within the context of interest using ñWhat ifé ò, ñWhat do you believeé ò, and ñThink abouté ò questions (see below). Changes in the question list were archived to show this progression.

Each question maps to the theoretical framework. Table 4.2 provides examples of interview questions. The columns represent self-efficacy (SE) with master (M), vicarious influences (V), social persuasions (S), and physiological state (P); self-theory of intelligence (STI) with fixed (F) and malleable (M); and help-seeking behavior (HSB) with adaptive help-seeking (AHS) and help-seeking avoidance (HSA). An (X) in the column indicates the question generally informs the theory, and if the column is blank, the question does not necessarily inform the theory. Using different question types draws out information especially from reticent participants (Merriam & Tisdell, 2016). Each question is mapped to a topology of four question types in the last four columns: hypothetical (Hyp), devilôs advocate (DA), ideal position (Ideal), and interpretive (Inter). The example questions do not map to every framework or question type; however, the

interview protocol of 50 suggested questions provides complete coverage. Additional examples of interview questions are within the results. I kept the focus of the questions on the engineering class context and academic issues by restating the context periodically throughout the interview.

Table 4.2: *Interview Map Example*

Question	SE	STI	HSB	Type
What if you are having trouble understanding material or concepts in class, what do you do?	X	X	X	Hyp
If an assignment seems too hard for you, what do you do?	X	X	X	Hyp
How do you know that you need academic help?	M			Inter
What do you believe is the purpose of asking for academic help?	M	X	AHS	DA
When the professor asks, ñDoes anyone have any questions?ò, ñWhat happens?ò	V,S		X	Hyp
Think about and tell me about the last time you needed help and you asked for help. Follow up: How did you feel after asking?	X	X	AHS	Inter
Think back and tell me about a time when you should have asked for academic help but did not ask.	X	X	HSA	Inter

Participant selection

Participants were chosen from a large Southeastern United States research university using purposeful sampling with maximum variation and criterion based protocols (Creswell, 2013; Patton, 2015). Gender and ethnic background were used as part of a maximum variation strategy. Given the lack of gender and ethnic diversity in prior help-seeking studies, especially for engineering contexts (Graham, 1994; Schenke et al., 2015), we purposefully chose to force equality in gender and provide diversity in ethnicity in order to understand help-seeking from a broader constituency. Inclusion criteria included students: designated as full-time, undergraduate, engineering majors; willing to be personally interviewed and audio recorded for approximately 90 minutes; willing to voluntarily sign the IRB approved consent form; and not students of the researcher.

Two students were interviewed as a pilot. We retained the pilot interviews as data because the theoretical framework, research question, and initial interview protocols were established, and the students met the inclusion criteria. The three step sampling process occurred in parallel to the pilot interviews. First, volunteers were recruited by sending an email to all undergraduate engineering students, and the primary researcher visited a total of six core classes in mechanical, computer, and environmental engineering. Volunteers numbered 206 (113 from email and 93 from classes). Second, volunteers were invited to participate in a Qualtrics (qualtrics.com) survey. While 110 students completed the survey, 106 satisfied the criteria. The Qualtrics survey had two purposes. First, the survey satisfied inclusion criteria, and second, the survey gauged the studentsô help-seeking behavior in the context of interest with three questions:

1) Think back on an engineering class which was difficult for you. How many times during the semester did you approach the professor or TA for help? (0 = never, 10 = 10 or more times)
2) Assume you are in an engineering classroom situation. The professor is lecturing on the subject, and you are confused. How likely are you to stop the professor and ask a question during the class? (0 = not at all likely, 10 = extremely likely)
3) How does asking for academic help make you feel? (1 = Very sad, 5 = Very happy)

The three results were summed to create a scale for each student from 1 (all three lowest responses) to 25 (all three highest responses). The results of the survey were: mean = 12.89, median = 13 and standard deviation = 5.29. With the high number of qualified

students, the results from the three questions were used to group the students into three categories (Table 4.3) representing their propensity toward help-seeking: low, neutral, and high. (Neutral represents +/- 1 standard deviation from the mean.)

Table 4.3: *Sampling*

View of help-seeking	**Low**	**Neutral**	**High**
Range of scores	1-7.6	7.6-18.2	18.2-25
Rounded to nearest whole number and categorized	1-8	9-17	18-25
Number of students (m/f)	22 (18/4)	67 (40/27)	17 (12/5)
Students randomly selected (m/f)	6 (3/3)	6 (3/3)	6 (3/3)

The students were grouped by ethnic background and gender within the three categories. A random number generator was used to select three male students and three female students from each of the three categories by ethnicity. The 18 selected students plus the two pilot students provided 20 students for the study (Table 4.4). The Qualtrics survey results were not carried past the student selection process in order to reduce bias which might result from associating a student with the qualtrics results. Each student received a $25 Amazon gift card after the interview. No other benefits were provided.

Table 4.4: *Participant Demographics*

Pseudonym	**Gender**	**Year**	**Engineering Major**	**Ethnic Background**	**Interview Length**
Ben	Male	Sophomore	Environmental	Caucasian	77 min
Cameron	Male	Junior	Environmental	Caucasian	91 min
Donna	Female	Sophomore	Mechanical	Caucasian	86 min
Edward	Male	Freshman	Mechanical	African American	49 min
Felicia	Female	Freshman	Mechanical	Caucasian	68 min
Greg	Male	Sophomore	Computer	Caucasian	65 min
Henry	Male	Junior	Computer	Hispanic	49 min
Ian	Male	Junior	Biological	Caucasian	73 min
Jill	Female	Freshman	Computer	African American	77 min
Karla	Female	Sophomore	Biological	Asian	49 min
Linda	Female	Freshman	Mechanical	Asian	61 min
Mike	Male	Sophomore	Computer	Caucasian	47 min
Nina	Female	Junior	Environmental	Asian	80 min
Oliver	Male	Junior	Mechanical	Asian	81 min

Pam	Female	Junior	Environmental	Hispanic	68 min
Quincy	Male	Junior	Computer	Asian	71 min
Robin	Female	Sophomore	Agricultural	Caucasian	57 min
Steve	Male	Senior	Computer	African American	94 min
Tina	Female	Sophomore	Biological	Caucasian	71 min
Ursa	Female	Junior	Civil	African American	75 min

Field notes were written immediately after each interview and after the initial transcription review. Field notes aid in improving data quality by documenting items not captured in the recording such as: the researcherôs thoughts of the interview, critique of interview questions, capturing key moments in the interview, and cataloging any environmental, physical, or other issues which may have affected the interview (Bogdan, R. C., & Biklen, 2007).

Data management

Interviews were digitally recorded on two recorders and professionally transcribed. Each transcription was reviewed and validated for accuracy to the recording. Any edits were tracked in a separate file. Copies of the transcripts were provided to each participant as a member check with feedback requested especially for questions or concerns. Four of the students responded with responses of: ñThank youò or ñLooks goodò. No one responded with questions or concerns. The transcriptions are stored on the primary researcherôs password protected computer and Google Drive. Transcripts were loaded into NVivo 11 software to aid analysis by providing a means for organizing the data, capturing codes, identifying categories, synthesizing results, searching for patterns, and archiving the evolution of the analysis

Data analysis

The data analysis used the constant comparative method (Glaser & Strauss, 1967) and constructivist, interpretive analysis techniques (Charmaz, 2014). Charmaz (2014)

indicated that a constructivist interpretive approach retrieves the ñinsidersò view (the engineering students). Holton (2010) described the constant comparative method as a three step process. First, incidents are compared to incidents to establish underlying categories or concepts. Second, previous concepts are compared to incidents from new data leading to more informed interpretations which may generate new concepts and/or refine previously generated concepts. Finally, concepts are compared to concepts. It is a continual, recursive process until no new categories or concepts are created resulting in saturation (Charmaz, 2014).

In vivo and descriptive codes were used as part of the constant comparative method. ñIn vivoò codes are codes taken from the actual datað quotes from the students. Descriptive codes provide a description of what is going on in the data and are appropriate for interview based studies (Saldaña, 2015). After initial coding, codes were grouped into categories. During the categorization process the two investigators discussed the categories as they emerged from the codes providing peer review for the study (Creswell, 2013). After an initial set of categories emerged, categories having a large number (>20) of codes were further examined for sub-categories. With the first round of coding completed for a student, codes were compared with the previous coding resulting in a repeated process of coding a student followed by comparing to the previous coding results across all students. The method provided an ever emerging, expanding, and contracting code and category list throughout the process.

Focused codes were developed to represent categories grouping related codes across all students. Charmaz (2014) used focused codes as the second major step of coding. Focused codes are particularly valuable in synthesizing and interpreting large

amounts of data. Focused codes allow identification of predominant themes across the data. Each focused code was defined by using memos. Memos allow for the researcher to identify in his or her own thoughts the connections and interpretations identified in the data (Charmaz, 2014, p. 165).

The final analytical step involved identifying key concepts and building theoretical constructs. From a constructivistôs view, these concepts, or constructs, build the framework for the theoretical interpretation. Constructs become interpretations related to the research question and context and serve to form the supporting elements of the interpretation (Saldaña, 2015). The constructs form the basis for the model described in the results. The two investigators discussed the constructs and relationships within the model as a second peer review for the study. The evolution of the complete analysis was archived by saving the entire NVivo 11 record after coding each student.

As an example of coding, four nodes (NVivo 11 refers to codes as nodes) under the construct of ñSelf-conflictò and focused code of ñComparison to Othersò are presented below. The following examples from Donna, Steve, and Linda (which includes a back-and-forth with the interviewer) demonstrate the coding. Each quote includes: (Student/Construct/Focused Code(Category)/Sub-category (if present)/Code (node)).

- ñif Iôm among a group of people that also donôt understand, I am much more likely to ask for help from a professor. Just because weôre all sort of sitting there together, strugglingò (Donna/Self-conflict/Comparison to others/Togetherness/Struggling).

- ñSo I kind of felt like I didnôt want to look like the person that didnôt understand or look like the person thatôs behindò (Steve/Self-conflict/Comparison to Others/Iôm behind/Nobody wants to be behind).
- ñIn high school, if you had a GPA higher than 3.6, I think, they gave you an honor cord and I was really obsessed with cords for some reason. So I really wanted that cordò. (Linda/Self-conflict/Comparison to Others/Acknowledgement or approval from others/Need to be above average)

  ñAnd what do you think that represents for you?ò (Interviewer)

- ñThat I am above average (laughs)ò (Linda/Self-conflict/Comparison to Others/Competitive/Need to be above average)

Assessing data quality

There is a lack of consensus regarding methods and assurances of quality within the engineering education research community Borrego (2007). Walther et al. (2013) proposed a qualitative framework based on validity and reliability using pragmatic validation defined as ñthe process of determining whether the theory and constructs used or developed in a particular study can withstand prolonged exposure to the empirical reality, both in making the data and in handling the dataò (p. 647). The idea then is to tie interpretation to context to knowledge to action.

With respect to internal validity, generalization, and reliability, or what Walther et al. described as ñmaking the dataò, a diverse, representative, group of students were interviewed. Rigor in sampling ensured the data emerged from participants who best represent the focus of the study and the context of interest. For example, in the interview protocol, the first seven questions were established to engage the studentôs thinking

within the context of their engineering classes so that subsequent questions concerning help-seeking continued on the trajectory formed by the first questions. Peer review (see analysis) helped ensure both procedural and framework validation within the study.

With respect to external validity, generalization, and reliability, or what Walther et al. describe as ñhandling the dataò, interpretations of the data must be made in light of the theoretical constructs and the social constructs of the participants. If the structure of the study resonates with the participants and provides meaningful interaction during the making of data, the results and actions will not only resonate with the participants but with the external reader as he or she applies their own social context to the context of the study strengthening pragmatic validation claims for the study (Walther et al., 2013). Summarizing items described in the prior methods, handling the data is supported by: the described safeguards and processes; peer debriefing and checks; data collected from students in the context of their own lived experiences; field notes written immediately after each interview; member checked interviews which resonated with the students; data analysis informed by the defined theoretical framework; archiving the trajectory of coding with NVivo 11; and rich, thick description of the data.

Results

With the research question as the canvas, the theoretical background as the framework, and the voices of the students as the palette, a picture begins to emerge making meaning of the studentsô help-seeking response. My interpretation presents four constructs from the analysis: (I) help-seeking positive motivators, (II) self-conflict, (III) help-seeking as a learned skill, and (IV) subsequent help-seeking is recursive until resolved. The four constructs and subcategories use descriptive and in vivo titles. For

example (**I.a Understanding: "I need academic help"**) represents construct ñIò, subcategory ñaò, descriptive title ñUnderstandingò, and in vivo quote from the data ñ*I need academic help*ò. The results conclude with an Academic Help-seeking Model (AHM).

Construct I, Help-seeking Positive Motivators

Students were unanimously represented in this construct which represents motivators, goals, and needs driving the help-seeking process to proceed. For there to be help-seeking, there must be a need. All students were able to identify and acknowledge need in order for the initial help-seeking decision to proceed.

I.a Need for Understanding: "I need academic help".

Participants described or defined needing academic help with ñunderstandingò, ñI donôt knowò, and ñI canôtò. Identifying need is rooted in self-reflections from prior experiences expressed by students as found in Donnaôs thoughts on needing academic help.

> If I need help on something or if Iôm not getting something, é I donôt have time to just sit there and struggle. I have to understand it, so somebodyôs got to explain it to me. Like even though I want to get it on my own, Iôm sort of reasonable enough to understand that I need help in order to get it quickly. Donna

Donnaôs statement could, by itself, represent many aspects of the model. She includes the thought, ñeven though I want to get it on my ownò, which foreshadows the conflict within the student when faced with a help-seeking situation. The drive to do it ñon my ownò is positioned against ñI donôt have time to just sit there and struggleò, and ñI have to understand it.ò These are oppositional influences both to avoid help and to actively

seek help. In summary, each student was able to clearly articulate understanding and acknowledging need for academic help. Understanding and acknowledging need for academic help are required motivators in the initial help-seeking decision.

I.b Academic achievement: "Grades"

Value or benefit is a personal thing, and it was a prevalent theme for help-seeking. Benefits were equated with filling the understanding gap, positive influence on grades ñI like to get good gradesò (Felicia), or improving strategic, long term standing. Grade improvements are immediate benefits to help-seeking which Robin describes. ñI guess if my grades were starting to get like really bad, then I would probablyé go and ask for help more because then I would realize I can't do this on my own anymore ò. Grades are a concern and influencer for Robin; however, it is interesting that Robin said she would ñprobablyò ask for help and that she realizes she cannot ñdo this on my own anymoreò. She is expressing a struggle within herself over the help-seeking decision. Surprisingly, in the face of ñreally badò grades, she cannot make an unequivocal decision to seek help, and she shares what appears to be a regret that she can't do things on her own and must seek out help from others. This reluctance to admit need or ask for assistance relates to a force acting against actively seeking help which all students acknowledge as a benefit. The result is an internal struggle weighing cost to benefit.

I.c Personal goals: "I can be the best".

Students expressed the importance of understanding where they rank compared to others in the class, ñI put my self-worth on whether I can like in the long run do itò (Pam). Engineering is a competitive major. Self-ranking may motivate a student to ask for help if the help-seeking action supports being ñthe bestò. Ian's driving influence to

improve or keep his perceived standing exhibits his concern for personal rank: ñI mean, I always want to be at the top of the bell curve. Iôm not happy with being at the average, I guess. So thatôs a motivatorò. Oliverôs drive is similar: ñIôm naturally a competitive person. I feel I have a higher drive to, you know, have a better average than my peers.ò Ben exemplifies the drive to ñbe the bestò: ñI have that drive to always get the best score possible and mostly just impress myselfé so that way I can be the bestò. However, the desire to be above average may not be enough to motivate seeking help. STOI theory proposes that while the malleable-view student would see challenge as the path to achievement, a desire to over achieve may result in the fixed-view student detouring from tougher problems so that they are not in a position to fail (C. S. Dweck, 2000) which leads to Construct II.

Construct II, Self-conflict

Self-conflict represents a negative influencer to the help-seeking decision. While some students are concerned with ñbeing the bestò, others do not like ñgetting things wrong and getting help in front of othersò (Mike). Students were concerned about not being ñthat guy thatôs behindò as described by Steveôs feelings about asking for help.

> Iôm thinking about what they think about me and I donôt want to be thought of as that guy thatôs behind or that guy thatôs a little bit slower than everybody elseé You never want to be that black duckling or that person thatôs just kind of out on the outskirts whoôs just trying to figure it outé So I feel intimidated by that. Steve

II.a Fear of judgment for needing help: "Afraid of being judged".

When faced with reflecting on help-seeking experiences, students often expressed feelings of judgment. Linda described it as, ñI guess I feel like Iôm being judged that Iôm not understanding the topicò, while Nina expressed, ñI donôt like being singled outò. During Tinaôs interview, I asked her to elaborate on how she feels about asking for help. Her remarks summarize many of the studentsô concerns.

> So, thereôs definitely a lot of nerves that go into it. And then you kind of feel dumb at the end when that one teacherôs like oh well, I donôt know how to help you because I donôt know why you donôt understand it. Weôve gone over this so many times, you know, you kind of feel like okay, well Iôm the dumb kid now sitting in class. (Tina)

The judgment of peers and of the teacher, looking ñdumbò in front of them, is a strong, motivator not to risk seeking help even in the face of professed academic need. Tinaôs perception may be incorrect, but it is her reality. The concern is not so much how you perceive yourself in relation to others (ñI can be the bestò) but your perception of how others see you (ñI donôt want to be seen as behindò). The first is inward focused while the second is outward. The first provides a sense of control while the second provides a sense of subordinance.

Robin offers a slightly different view conflating asking a question with intelligence leading to judgment. ñA lot of people are probably afraid of being viewed as less intelligent for asking a questioné Even though I donôt think thatôs the case, but I feel like thatôs how theyôre afraid of being judgedò (Robin). Robinôs statement embodies many of the concerns related to being judged, embarrassment, and perception of self.

Even with the need and benefits of seeking help, Robin is conflicted. She gives insightful thoughts but says ñI donôt think thatò. The act of answering the question exhibits an internal struggle outwardly expressed in her answer. During the interview, Robin shared with me that she had ñonly ever asked for help one timeò. She reached out only when her efforts were exhausted, unsuccessfully.

II.b Help-seeking is a weakness: "Flaws in your character".

Studentsô help-seeking feelings or emotions are often self-deprecating. I asked the question, ñWhen you make the decision, in that moment, whether or not to ask for help, how do you feel?ò. Ben, often short on words, expressed without flinching, ñIôm just feeling like I donôt know everything, Iôm flawed but thatôs okayò. Benôs self-reflection calls himself ñflawedò, and in the same breath, says ñthatôs okayò. Henryôs response to the help-seeking question was, ñfailureò because it represents that ñI canôt do it own my ownò.

It is unclear how Ben and Henry can resolve their inner conflict. On the one hand, they may not ask for help given the linkage to failure. Associating help-seeking to failure may indicate STOI fixed attributes or self-efficacy social persuasion, perhaps. On the other hand, they understand the benefits ascribed to help-seeking (all students identified need and benefit) which should be a strong self-efficacy mastery experience motivator encouraging help-seeking.

II.c Lack of confidence: "My own knowledge obviously isn't good enough"

Students were concerned about performing academic related activities the ñrightò way. Their own experiences may not be ñgood enoughò; therefore, they use indicators from those around them as guidance. For example, Cameron determined, ñIôm not doing

college rightò, by comparing his methods to others. If the student is concerned about doing something incorrectly, it may relate both to self-efficacy vicarious inputs and to STOI inputs influencing behavior.

Students may degrade their own expertise in the face of others. Quincy provides an example: ñI guess inside my head, I know that other people understand this more than me, and é thatôs what influences me to hold back a little bit and see that other people know the answerò. For Quincy, mastery influences are secondary to vicarious examples. The competing input from two primary self-efficacy influences results in self-conflict for many of the students and helps to explain why the help-seeking decision is deferred even if prior experience and motivators suggest it is the correct course of action.

Comparing oneôs self to another exposes a personal struggle for Steve. He is conflicted about his perceived position within his peer group.

> I kind of think about like man, I donôt know that pretty well, what am I going to do?...it makes me think about why donôt I learn ï why donôt I know this stuffé So it kind of messes ï messes (laughs) my psyche up. Steve

Steveôs self-reflection exposes a self-imposed impediment for active help-seeking. Steve described to me that he ñshuts downò when faced with situations of vulnerability and exposure of his need to the professor and to other students. It is fitting that Steve uses the Greek word for soul, ñpsycheò. His feelings are indeed deep-seated. If exposure of need causes such negative, emotional feelings, it may result in strong positive reinforcement to avoid help from a self-efficacy framework, and may reinforce a fixed view of intelligence from an STOI perspective. It is represented by the Avoid Help path in the AHM.

II.d Need of acceptance: "We're driven by what others think of us".

Summarizing the self-conflict construct, students perceive and measure their own self-value based on what others think of them. If strongly held, this measure of self-value may be the insurmountable factor in the initial help-seeking decision. Ursa describes her concern with the perception of others and need to ñfit inò. While construct II.a involves fear of judgment for needing help and implies an action or consideration of action, this construct describes a desire to be accepted by others within the domain. Need of acceptance may influence a studentôs decision for help-seeking and for other actions within the domain.

> Maybe people donôt know but every day we wake up, weôre driven by what other people think of us and I want people to think highly of me. I care what people think about me a lot, so Ié just want ï I just want to fit in. Ursa

My thought was, ñWow, what a burden to carry.ò At the end of the interview, Ursa expressed the following when I asked if she had any parting thoughts. She responded, ñI donôt want you to think of me as a person thatôs lazy. I want you to think highly of me. Not too highly but I want to be just like the same level as everybody elseò (Ursa). I was somewhat taken aback, almost shocked, that she would express this concern to me. Even with what I believed to be a neutral, encouraging interview, she was concerned with my perception of herð and this was a low-stakes context.

Construct III, Help-seeking Learning: "I'm learning how to do it"

Construct III was not clearly identified in prior literature. The data demonstrates many students enter college without help-seeking skills or theyôve already learned not to seek help. As shown in the model, results feed into future help-seeking responses via

self-efficacy inputs and self-conflict. Positive help-seeking learning occurs only if help-seeking proceeds in the initial help-seeking decision.

All students acknowledged knowing when they need help and the benefits to seeking help; however, knowing does not guarantee action without developed skills. Many of the students discussed having no experience asking for help or learning how to ask for help after entering college as described by Pam.

> Iôve learned to ask for help because in high school, if I didnôt get something, I was like whatever. Like I would never ever ever ask for help. And Iôve gotten better at it, so I know that itôs important. Pam

Like Pam, Steve describes help-seeking as a learning process for him. He equates courage to asking for help. ñI think theyôre courageous (laughs) because I couldnôt do it. Any timeé I see a person that does that, I think theyôre very bold and very brave becauseé Iôm learning how to do itò (Steve). Many of the students related similar stories to Pam and Steve. For these engineering students, high school did not offer many opportunities necessitating asking for help. When faced with the high pressure, fast moving environment of an engineering program, help-seeking became a new experience for these students impacting their ability to optimize their chances for academic achievement.

Learning to seek help may relate to who you need to go to for help. If a student needs help and must go to the professor, it requires interaction between the student and the professor; however, interaction with those in authority assumes a skill not mastered by some students as described by Quincy.

> The initial thought is kind of scary because I donôt know what to expect. Like I feel a little weird having one-on-ones with teachers sometimes because I donôt know, adult interaction with me, itôs a little eh right now. Like Iôm still learning how to do that. Quincy

Many professors may assume their students know how to approach and talk to them. Quincy is learning how to interact with adults. Quincy also indicated his friends are even more reluctant than him to approach professors for questions and go to him with questions to ask the professor. Lack of experience communicating with professors can prohibit students like Quincy from taking the seek help path in the initial help-seeking decision.

Unfortunately, some students enter college having learned an inappropriate help-seeking skill, help-seeking avoidance.

> I think it just kind of stems back to when I was really young; I was really shy so I wouldnôt ask questions in class because I guess I was nervous. And then as I got older, I just got used to not asking questions so it wasnôt really like a matter of shyness anymore, it was just I was used to figure out things by myself. Robin

Robin ñgot used to not asking questionsò and so she does not ask questions. Robin would have to unlearn the ñnot asking questionsò skill and learn how to seek help in a positive way. Henry presents another example of a learned avoid-help skill. ñI guess itôs because throughout my whole school career, from kindergarten to here, Iôve never really asked questions in class. I guess just not doing it, it just prevents me now from being able to do it.ò

Construct IV, Subsequent Help-seeking is Recursive Until Resolved: "I want an answer"

If the initial help-seeking decision is to seek help, the student will continue to seek help in a recursive fashion until the help-seeking event is resolved. Students described help-seeking in ways relating to ñdrivesò or ñfilling a holeò often associated with understanding: ñI canôt move on in this course without understanding what is happeningò (Nina). These drives are compelling and ensure that the initial ñseek-helpò decision leads to subsequent help-seeking behavior moving to closure in a recursive fashion. Students are driven to fill the hole caused by lack of understanding.

> I can find the answer; there is an answer out there somewhere. Itôs not going to be easy but itôs going to be there. And what drives me isé itôs like having a puzzle piece and just wanting to get that last pieceé, and then when you get the puzzle piece completed, you just have that satisfaction that Iôve completed it. Jill

Jillôs drive is a strong motivator; yet, Jill does realize it is not ñgoing to be easyò. What do students do when faced with this need ñto find the answerò? Ursa would continue to pursue an answer until found.

> If I donôt understand ït I want an answer, I want an answer and thatôs the goal, to get an answer, to get a grasp of it. So if that takes going to four or five different sources and gathering them all together, thatôs what drives, becauseé I have to make sure that itôs complete. Ursa

Finally, one of the interview questions asks: ñThink about a situation where you needed help in your class or a class assignment and you decided to ask for help. Describe what you would do if the first source does not answer your question to your satisfactionò

All students indicated they would either go back again for help or try a different resource. Jillôs response best captures the overall thought.

> I feel like theyôre also alternative plans, like if one ï one resource does not work, you can always resort to the other. And if that resource doesnôt work, thereôs always a plan C. If plan A and B donôt work, thereôs plan C, plan D, all the way to Z. Jill

The idea of trying over and over again, going to multiple sources, and the drive to get a solid grasp supports the idea of help-seeking as a learned skill for engineering students (Construct III). Help-seeking, once started, moves to completion driven by specific needs expressed by the students even for those like who have self-conflict; however, having these drives does not guarantee the student initially seeks help.

Help-seeking Model

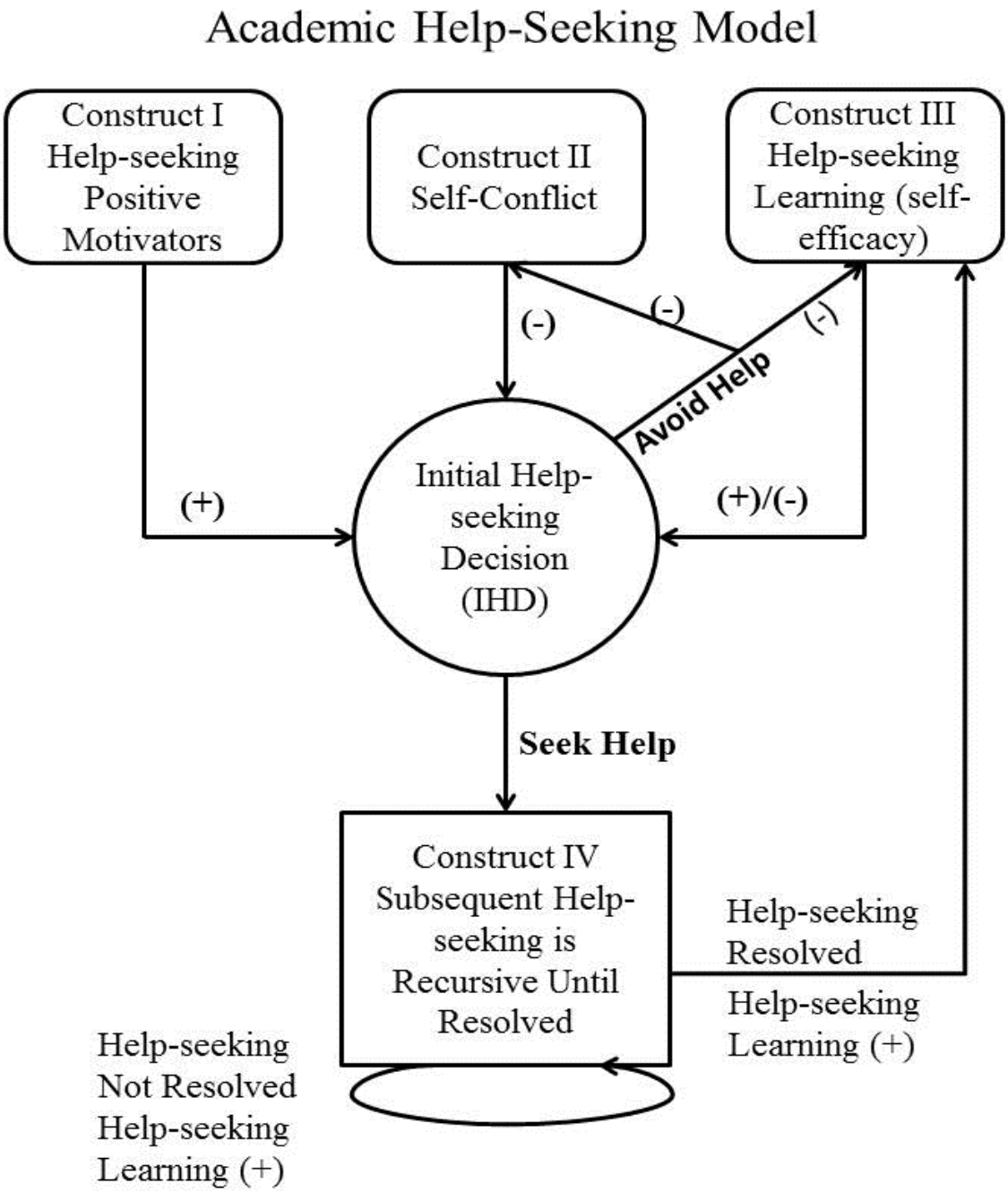

Figure 4.1: Academic Help-seeking Model

Overview of the model

Referring to the Academic Help-seeking Model (AHM), Figure 4.1, the first three constructs are inputs in the initial help-seeking decision. The result of the initial help-seeking decision is a bifurcated path represented by output arrows from the circle: to avoid help or to seek help. First, after acknowledging help is needed, the student must grapple with the initial help-seeking decision based on: help-seeking positive motivators, self-conflict which is a negative influence, and prior help-seeking learning which can be a positive or negative influence. The initial help-seeking decision is a personal crucible resulting in the decision to avoid help or to seek help. The initial help-seeking decision is the crux of help-seeking behavior and is not easily captured by quantitative studies or observation (Karabenick, 2006; Karabenick & Berger, 2013). The avoid help path negatively affects future self-conflict and help-seeking learning. That is, self-conflict is increased while help-seeking learning is increased in a negative way towards avoiding help. If the student chooses to seek help, positive help-seeking learning can occur. Subsequent help-seeking behavior is recursive and driven primarily by Construct IV until resolved. With the self-conflict resolved in the initial help-seeking decision, conflict resolution is no longer a factor in subsequent help-seeking behavior for the current help-seeking context. The resultant decision path affects future initial help-seeking decisions faced by the student by changing help-seeking learning and possibly changing help-seeking self-efficacy based on context of the problem, results, and effort (Bandura, 1997).

Discussion

Two primary conclusions emerge from the findings. First, the initial help-seeking decision is most negatively influenced by internal self-conflict (Construct II) resulting

from the perceived view of self in relation to others. Two views are present in the results. One view is concerned with your own measure of self versus others (Ian, Oliver, Pam, and Ben; see Construct I.c). The second view is concerned with how others perceive you and not wanting to look bad when looked at by others (Steve, Ursa, Linda, and Tina; see Construct II). It is this second view which has influence on students not seeking help even for those holding the first view. For example, although Ben holds the first view, he expressed help-seeking feelings as ñbeing flawedò (Construct II.b) representing internal conflict. Feelings of inadequacy and fear of being judged are strongly rooted in the STOI fixed-view (C. S. Dweck, 2000) and represent a self-conflict catalyst in the initial help-seeking decision.

Referring to Karabenick and Bergerôs (2013) process, help-seeking may be acknowledged in the forethought phase, but the decision is not as clinical as what self-efficacy, self-regulated learning, or goal inputs might imply. Instead, the studentsô voices show vulnerability, humility, self-abasement, judgment, and embarrassment act to change the help-seeking course of action in the initial help-seeking decision shown in the model (Construct II and IHD). These influences may be inward focused, outward focused, or both. The action may be emboldened in some cases where the end goal is performance and there is less concern with opinions of others (Construct I.c); however, for the majority of the students, the converse was true. The ñvictorò of the initial help-seeking decisionôs internal conflict is often a decision to avoid help which ends the help-seeking process and negatively impacts future initial help-seeking decisions. Upon careful consideration, many of these conflicts relate to ranking, intelligence, perception of ñbeing behindò, and not doing things ñrightò, all of which are constructs described within

Dweckôs STOI especially for the fixed view (C. S. Dweck, 2000; Rattan, Good, & Dweck, 2012). Others have described conflict related to ñlooking dumbò (Ryan & Pintrich, 1997); however, lack of ability does not adequately capture the initial, internalized decision wherein the student acknowledges the need and benefit of help-seeking but is faced with a conflict resolution in which ñlooking dumbò may be a minority concern among many others described by the students. It is during this conflict resolution that the initial help-seeking decision occurs.

Self-efficacy theory would argue that if the mastery experiences or vicarious experiences are highly positive with respect to an action, the individual will pursue the action and exert more effort and emotion into the action (Bandura, 1986, 1997; Jansen et al., 2015; Usher & Pajares, 2009; Wood & Bandura, 1989). Self-regulated learning theory would argue that if forethought indicates an action should proceed it probably will proceed (Pintrich, 2004; Schunk & Usher, 2013; Zimmerman, 2002). If either of the prior arguments is necessary and sufficient, all students in this study would continue with the help-seeking process; however, within and during the forethought part of the process (the initial help-seeking decision in the model) the conflicts primarily exposed from Construct II outweigh help-seeking positive motivators (Construct I) and the influences of prior experiences and learning (Construct III) resulting in a choice to avoid help. From a self-efficacy perspective, avoiding help may become a spiral reinforcing the negative decision in future situations as represented in the model by ñ(-)ò. That is, if the decision is made to avoid help, the internal conflict is reduced (in the moment) and may reinforce itself the next time an initial help-seeking decision is made resulting in increased mastery

experience to avoid help and increased self-conflict from judgment related concerns. I see examples in Henry, Robin, Nina, and Steve (among others) (see II.a and II.c).

If help-seeking is the chosen course of action, the conflict is resolved in a positive way, and the student is compelled to complete the help-seeking objective via help-seeking motivators (Construct I) and the need to seek help until resolution (Construct IV). Resolving the internal conflict (this is the studentôs ñcrossing the Rubiconò moment) by choosing to seek help becomes a powerful incentive to mitigate the lack of understanding and remove the ñstruggleò (Donna, I.a; Jill, IV). The choice to seek help acts as a positive feedback reinforcing the positive decision to seek help in future situationsð similar to inputs into mastery experiences within self-efficacy. The model captures the persistence of continuing to gain understanding by including a recursive ñtry againò loop (Construct IV) where the student is trying and learning new help-seeking methods as described by Steve, Jill, Edward, Karla, Ursa and others (see I.a and IV). While in the recursive loop, the student has the potential to build positive self-efficacy master experiences within the context of the situation providing additional positive reinforcement for the next initial help-seeking decision. The recursive response points to the malleable view in STOI theory. A malleable view sees overcoming problems as a positive path to learning (C. S. Dweck, 2000) and becomes a key component to discriminating between the initial help-seeking decision and subsequent, recursive help-seeking behavior in the model. The recursive aspect of subsequent help-seeking may indicate that all students may hold some amount of malleable view of intelligence which comes to the forefront during the recursive process. It is the initial help-seeking decision which shackles or liberates the malleable view.

The second primary conclusion was unexpected. One of the strengths of qualitative inquiry is that the participants bring with them the real ñrealityò and unexpected revelations are the result (Patton, 2015). One of the early participants, Steve, expressed the idea of help-seeking as something he is ñlearning to doò. This was an ñahaò moment. We did not expect 19-22 year old engineering students to acknowledge the need to learn help-seeking skills. Many of the students indicated they did not ask for help in high school due to easiness of high school, much slower pace, abundance of repeated instruction, and ñjust learn thisò handouts; therefore, these students lacked opportunities or reasons to engage in help-seeking learning and increase help-seeking self-efficacy mastery experiences (Bandura, 1997) prior to facing the rigor of an engineering major. Similarly, there are students like Henry and Robin who have learned not to seek help or, like Quincy, who are learning how to engage in dialogue with professors (all in Construct III). These students would need to unlearn the avoid-help behavior and learn how to adaptively seek help else they are relegated to perpetually take the help-seeking avoidance loop in the model. The model captures instances of help-seeking learning as results of the decision to avoid help (-) or to seek help (+). Help-seeking learning opportunities become inputs into help-seeking self-efficacy and self-conflict.

Inadequate or incorrect training in help-seeking is a negative contributor both to help-seeking self-efficacy and self-conflict within the model. If no learning takes place, mastery experiences cannot be improved (Bandura, 1997) and comparisons of self to others may be negatively affected resulting in increased self-conflict (represented by (-) in the model). In contrast, positive help-seeking learning may increase help-seeking self-

efficacy dependent on context of the problem, results, and effort expended (Bandura, 1997). The data did not demonstrate where help-seeking learning, or knowing how to seek help, would positively influence self-conflict, or stated differently, reduce negative self-conflict. According to STOI, for those with a fixed view, negative comparisons of self versus others are not mitigated by prior positive experiences, and, in fact, positive experience may act to increase a fixed view due to higher expectations (C. S. Dweck, 2000). While increased help-seeking learning or knowing how to seek help may be a positive influence for self-efficacy, it does not remove the self-conflict from STOI influences. Students with self-conflict still worry about comparisons independent of possessing adequate skills and capabilities and is represented in the data. For example, see Benôs view of his performance (I.c) versus his concern regarding seeking help (II.b).

Positive help-seeking learning is achieved within the recursive help seeking loop, and it is help-seeking learning which contributes in a positive way to the initial help-seeking decision. Consequently, the need to learn how to seek help (Construct III) combined with the recursive nature of subsequent help-seeking (Construct IV) is the second major conclusion from the results. Based on the students lived experiences, help-seeking does require learning even for engineering students, and based on the prevalence in the data, it is a construct within the findings and represented in the AHM. If a student is well-trained in help-seeking, it may increase self-efficacy influences, and result in active help-seeking; however, for untrained students like Ursa, who is concerned about how others perceive her, or Steve, who believes help-seekers are ñcourageousò, lack of help-seeking skills may catalyze the internal conflict resulting in a decision to avoid help.

Therefore, the two primary findings of self-conflict resolution and help-seeking learning can be viewed as independent but also interrelated.

Conclusion

Implications

Professors and educational administrators can mitigate the self-conflict felt by students needing academic help and increase opportunities for help-seeking learning. Empathy training or role-model exercises might cast light on the issue to students and faculty, increase self-efficacy through help-seeking learning, and positively change STOI influences. Sometimes being aware of the issue affects a change in behavior by all (Higgins & Rholes, 1978). For example, a study by Aronson (2002) presented promising results demonstrating a more malleable STOI view was encouraged in African American college students by exposing the students to their own STOI predispositions. The studentsô self-awareness affected their STOI view. If engineering students are trained to be self-aware to their help-seeking internal struggles, it may allow the students to better self-regulate conflict and guide the initial help-seeking decision to seek help. If students recognize the struggle occurs in other students, classrooms may become less judgmental environments thereby reducing self-conflict.

With help-seeking as a learned behavior, instruction can be provided either in the syllabus or explicitly taught in the first days of the class describing appropriate methods for help-seeking and encouraging the same. The professor may consider the use of anonymous questions or posting questions received so all students see and receive the benefit of the question and answer. Finally, professors aware of the impact of their own responses to questions within the classroom can change the perceived response of the

student (See Tinaôs experience as ñthe dumb kidò, II.a). The idea is to promote help-seeking as ñokayò and non-threatening while simultaneously promoting help-seeking learning.

Follow on qualitative or quantitative studies may add additional insight related to the findings especially the ñin the momentò decision (see results for Ursa, II.d; Ben and Henry, II.b; and Quincy, III). The initial decision is critical in the help-seeking process; therefore, a better understanding of critical incidents, professor interaction, feelings, or triggers related to conflict resolution is fundamental to understanding what motivates students to seek or avoid academic help. Understanding the recursive nature of the help-seeking process as well as ways in which students engage in positive help-seeking learning is fundamental to fully understanding academic help-seeking. Finally, identifying differences (if any) related to gender and ethnicity is worthy of additional inquiry.

This research was conducted at a large Southeastern United States research university. Different institutional contexts may produce additional insight. We acknowledge the three questions in the Qualtrics survey and the interviews may be influenced by self-report bias. Self-reported indicators can be an issue due to the propensity for individuals to self-report what is perceived as more socially acceptable (Randall & Fernandes, 1991). Finally, a comprehensive model (qualitative or quantitative) does not exist fully capturing the academic help-seeking process. Expanding on the initial help-seeking decision, help-seeking learning, and subsequent recursive behavior have added to the help-seeking model, but much waits to be discovered.

Concluding Remarks

Help-seeking behavior is a critical skill for college students within competitive majors such as engineering. While students can identify the need and benefit of help-seeking, many choose not to seek help even in the face of acknowledged need. This study attempted to understand what motivates engineering studentsô help-seeking behavior especially during the critical moment when the student decides to initially seek or not seek help.

Using a lens influenced by my paradigmatic stance, theoretical framework and interpretive techniques, four constructs were identified from the data represented by a diverse sample of studentsô lived help-seeking experiences. Using these constructs and prior theory, self-conflict emerged as a pivotal factor in the initial help-seeking decision followed by a recursive, help-seeking decision process. Additionally, the data demonstrated help-seeking as a skill not learned by many engineering students or a skill already learned but in the undesired form of avoiding help. The findings were incorporated into a model for help-seeking identifying an initial help-seeking decision, subsequent help-seeking recursive behavior, and help-seeking learning. Finally, opportunities for future work and implications for practice were presented, both of which may influence a more productive help-seeking decision.

References

(contained within main bibliography)

CHAPTER 5

ENGINEERING ACADEMIC HELP-SEEKING: AN EMPIRICAL STUDY OF GENDER AND ETHNIC INFLUENCES IN UNDERGRADUATE ENGINEERING STUDENTS[2]

[2] Herring, C. and Walther, J. To be submitted to *Journal of Women and Minorities in Science and Engineering*

Abstract

Help-seeking is correlated to academic achievement. This becomes of interest in light of performance and retention concerns in engineering and other STEM majors especially for female and ethnic minority students. The purpose of this research is to develop a rich, empirical understanding of engineering studentsô help-seeking behavior ensuring the perspective of underrepresented groups. The research examines the question: what motivates help-seeking behavior by engineering students considering gender or ethnicity? Drawing on constructivist, interpretive analysis techniques, this empirical study uses semi-structured interviews to capture the essence of self-conflict associated with academic help-seeking. The sampling method ensures a diverse representation of ethnicity and gender. Using the construct of self-conflict, help-seeking behavior is influenced by five categories relating oneôs view of self in relation to others. This conflict determines the help-seeking behavior outcome and is experienced differently for minority students within engineering. The self-conflict originates from the studentôs view of self in relation to others. We show stereotype threat plays a major role in this self-conflict for minorities within the domain. The result can lead to decreased academic performance and disassociation from the domain. We conclude with implications to mitigate stereotype threat for students resulting in reduced impediments to seeking help and, perhaps, mitigate stereotype threat.

Keywords: stereotype threat; gender; ethnic; qualitative; academic help-seeking behavior; self-conflict

Introduction

Graduates from ABET (Accreditation Board for Engineering and Technology) accredited institutions must be able to solve problems, apply knowledge, work with others, and engage in lifelong learning (Engineering Accreditation Commission, 2014). In order to achieve these objectives, it is incumbent upon engineering education programs to be concerned with all aspects of a studentôs performance and well-being. In addition, retention and participation in engineering and other STEM fields by underrepresented groups based on gender, socioeconomic status, or ethnic background is of particular interest to ABET (2014) and the NSF (2012). U.S. population demographics (National Science Foundation, 2015) consisted of the following: Caucasian, 63%; Hispanics, 16%; Blacks, 13%; and Asians, 6%. Engineering demographics in bachelorôs degree programs were male%/female% for: all enrolled, 81.4/18.4; Caucasian, 54/11; Hispanics, 7.8/2; Blacks, 3.9/1.3; and Asians, 8.4/2.3. Engineering bachelor degrees awarded were male%/female%: all, 81/19; Caucasian, 74.8/17.6, Hispanics, 6.7/1; Blacks, 2.8/1; and Asians, 8.6, 2.6. Clearly, women and minorities continue to account for lower enrollment in engineering than the general population would suggest. The demographics become more of a concern with retention to degree completion in engineering majors for minorities, especially for female minority students.

Given help-seeking behavior is correlated to academic achievement as defined by grade point average (Horowitz et al., 2013; Karabenick, 2003), academic help-seeking becomes significant not only to ABET but to the engineering student and to the engineering profession; however, help-seeking is often not the chosen course of action (Karabenick, 2006). These issues become more pronounced when gender and ethnic

background are factors (Collins & Sims, 2006; Vogt et al., 2007). Previous studies show there are perceived social costs with help-seeking and that these costs are interpreted differently by gender (Ryan & Shim, 2012; Schenke et al., 2015) and by ethnic background (Campbell, 2007; Ryan & Shim, 2012; Ryan, Shim, Lampkins-uThando, Kiefer, & Thompson, 2009). These perceived social costs lead to the paradoxical result that those in most need of help are those most likely to avoid asking for help (Karabenick & Knapp, 1988; Richard S. Newman, 2012; Ryan et al., 1998; Ryan & Shin, 2011). Finally, these previous studies do not study the ñhowò or ñwhatò related to these costs associated with help-seeking nor do they adequately cover minority concerns especially in the engineering context due to the small ñnò problem (Vogt et al., 2007).

The purpose of this empirical, interpretive, qualitative study is to understand the academic help-seeking response of engineering students informed by gender and ethnic background. The analysis will examine the research question: what motivates help-seeking behavior by engineering students considering gender and ethnicity?

Literature Review and Theoretical Framework

While ample research exists investigating help-seeking behavior in education, the majority is quantitative in nature and K-12 focused (Butler, 1998; Kessels & Steinmayr, 2013; Liu, 2012; Nelson-LeGall, 1981; Puustinen et al., 2015) with fewer examples at the college level (e.g., Holt, 2014; Horowitz et al., 2013; Karabenick, 2003; Payakachat et al., 2013). Very little research examining help-seeking behavior relates to engineering majors especially related to gender and ethnicity concerns. In a quantitative study examining academic achievement factors related to gender and ethnicity in engineering students, the researchers concluded, ñWe were also unable to recruit large enough

samples of male and female students of color. This is a major problem in conducting research on engineering students; there are simply very few students of color and even fewer women.ò (Hackett et al., 1992, p. 536). More than two decades later, gender and ethnic differences in help-seeking continue to be an understudied topic in STEM disciplines (Schenke et al., 2015).

The lack of available data leads to a lack of consensus within the available studies investigating gender and ethnic concerns with help-seeking as a component. In one college study examining academic achievement factors along with ethnic and gender influences, help-seeking was found to correlate with positive academic achievement with African-American students (male and female) utilizing peer support and help-seeking more than their Caucasian counterparts (Campbell, 2007). In contrast, a quantitative study examining college studentsô learning strategies and self-efficacy, including gender and ethnic differences, came to a different conclusion finding a lack of correlation to academic performance (Hefer Bembenutty, 2007). Bembenutty calls out for future research to explore these areas. Both prior examples were academic achievement, self-efficacy studies and did not consider help-seeking behavior as the primary topic of research; however, they present an example of the need for additional perspective regarding help-seeking related to gender and ethnic concerns.

Many of these prior works have difficulty identifying demonstrable results for gender or ethnic questions for STEM fields (Amy L. Zeldin et al., 2008). These studies leave detailed aspects of help-seeking lacking independent of minority concerns summarized by a call out for the ñwhyò involved with help-seeking behavior (Horowitz et al., 2013). Similarly, other quantitative researchers have recommended more

qualitative inquiry in order to expand help-seeking behavior understanding not captured by quantitative studies (Concannon & Barrow, 2012; Gonida et al., 2014; Inda et al., 2013; Schenke et al., 2015; Thompson & Dahling, 2012; Usher & Pajares, 2009; Zusho & Barnett, 2011).

We completed a prior study describing help-seeking behavior in engineering students (Herring & Walther, 2016a) in which we developed a model of help-seeking behavior using a framework of self-efficacy (Bandura, 1997) and self-theory of intelligence (C. S. Dweck, 2000). Self-efficacy is context dependent and is a constituent, key element of interpersonal behavior. According to Bandura (1977a), self-efficacy determines if behavior will be started, the amount of effort allocated, and the persistence in the face of difficulties. Self-efficacy may act as an influence to help-seeking behavior by affecting the studentôs help-seeking choice, the perseverance of help-seeking, and future help-seeking based on prior results.

Self-theory of intelligence (STOI) (C. S. Dweck, 1986, 2000) defines the idea of intelligence as either fixed or malleable (C. S. Dweck & Leggett, 1988). A person with a fixed view is concerned with looking smart and, even more so, not looking dumb (C. S. Dweck, 2000); therefore, a fixed view may lead to help-seeking avoidance when faced with a help-seeking situation independent of self-efficacy (Karabenick, 2003). Conversely, a person with a malleable view perceives intelligence as something to be increased in the moment with hard work and persistence and is more concerned with opportunities to understand something new than with appearances of looking smart to others (C. S. Dweck, 2000); therefore, a malleable view may lead to adaptive help-seeking (Karabenick, 2011; Karabenick & Berger, 2013).

We identified three constructs driving the initial help-seeking decision: help-seeking positive motivators, self-conflict impeding the initial help-seeking decision, and help-seeking as a learned skill. If the initial help-seeking decision is to seek help, a fourth construct defined subsequent help-seeking as recursive until the student achieves resolution for the required help. Using data collected by semi-structured interviews of 20 students, we found all students acknowledged the need for help and the benefit for seeking help and most students admitted needing additional help-seeking training. We found it is the initial help-seeking decision which determines help-seeking behavior and to what extent the student will continue to seek help. The initial help-seeking decisionôs determining factor involved the studentsôview of self in relation to others resulting in a ñself-conflictò struggle. It is this social perception self-conflict that, we contend, is the crux of the initial help-seeking decision and is manifested differently based on gender and ethnic background. We, therefore, looked to examine the data from gender and minority perspectives to explore ways students experience this self-conflict, with an eye on what might inform this self-conflict.

Research Design Methods

For ease of reading and writing, ñIò or ñmyò refers to the primary investigator who performed the data collection and analysis for this study. This research data was collected as part of a study examining help-seeking behavior in engineering students(Herring & Walther, 2016a).

Based on the research question for this study, we went back to the literature to inform our results and discussion. Charmaz (2014) advocated research begins with the previous views and experiences of the researcher and initial literature and theoretical

framework. She argued that the researcher might encounter new areas not foreseen going into the study; therefore, additional, relevant, literature must be examined. In our case, having little basis for prior gender and ethnic research related to our topic, we went back to the literature after seeing self-conflict emerge as a primary component related to help-seeking.

Data collection

Semi-structured, one-on-one interviews were utilized to understand the experiences and perspectives of the students. Interviews allow for an interpretive approach to make meaning of lived experiences using the interview as a collaborative mechanism (Lincoln et al., 2011). Roulston (2010) described that interviews aid with research focused on understanding with the research questions driving the study. In a semi-structured approach, the researcher has the flexibility to change order of questions and include new questions during the interview based on the response of the participant (Kvale, 2007; Roulston, 2010). Throughout the data collection process, the form and function of the questions were interpreted against the data and adjusted as needed to better align the questions so they captured data pertinent to the research question (Charmaz, 2014). Changes in the question list were archived to show this progression.

The interview questions did not explore gender or ethnic background. The interview questions were mapped to the theoretical framework of self-efficacy and self-theory of intelligence (Herring & Walther, 2016a). Entering into the study, we did not want to presuppose differences in gender or ethnic background which might lead to researcher bias by finding what you are looking for and forcing data into preconceived findings (Charmaz, 2014). With the interview questions mapped to the framework and

looking to answer the research question ñwhat motivates a student to seek or not seek academic help?ò, we allowed the students to provide their own experiences of the essence of help-seeking. We went back to the data for interpretations using gender and ethnicity as a lens.

Participant selection

Acknowledging the lack of prior research examining gender and ethnic concerns, we purposefully sampled ensuring 50/50 gender and variation of ethnicity. The context of the research was a large Southeastern United States research university. Inclusion criteria included students: designated as full time, engineering majors; willing to be personally interviewed and audio recorded for approximately 90 minutes; willing to voluntarily sign the IRB approved consent form; and not students of the researcher.

Eighteen students were randomly selected from a group of 106 qualified students to provide variation of ethnicity, views, and 50/50 gender. The 18 students plus two pilot interview students resulted in a total of 20 students in the study (Table 5.1). Each student received a $25 Amazon gift card after the interview. No other benefits were provided. Please note additional safeguards to participant selection in the subjectivity statement. Additional detail regarding participant selection is available (Herring & Walther, 2016a).

Table 5.1: *Student Participant Demographics*

Pseudonym	Gender	Year	Engineering Major	Ethnic Background	Interview Length
Ben	Male	Sophomore	Environmental	Caucasian	77 min
Cameron	Male	Junior	Environmental	Caucasian	91 min
Donna	Female	Sophomore	Mechanical	Caucasian	86 min
Edward	Male	Freshman	Mechanical	African American	49 min
Felicia	Female	Freshman	Mechanical	Caucasian	68 min
Greg	Male	Sophomore	Computer	Caucasian	65 min
Henry	Male	Junior	Computer	Hispanic	49 min
Ian	Male	Junior	Biological	Caucasian	73 min
Jill	Female	Freshman	Computer	African American	77 min

Karla	Female	Sophomore	Biological	Asian	49 min
Linda	Female	Freshman	Mechanical	Asian	61 min
Mike	Male	Sophomore	Computer	Caucasian	47 min
Nina	Female	Junior	Environmental	Asian	80 min
Oliver	Male	Junior	Mechanical	Asian	81 min
Pam	Female	Junior	Environmental	Hispanic	68 min
Quincy	Male	Junior	Computer	Asian	71 min
Robin	Female	Sophomore	Agricultural	Caucasian	57 min
Steve	Male	Senior	Computer	African American	94 min
Tina	Female	Sophomore	Biological	Caucasian	71 min
Ursa	Female	Junior	Civil	African American	75 min

Data analysis

This study is an empirical, interpretive interview study. The data analysis used the constant comparative method (Glaser & Strauss, 1967) and constructivist analysis (Charmaz, 2014). Using a lens defined by the main construct of ñself-conflictò found in our study on help-seeking behavior in engineering students (Herring & Walther, 2016a), we identified five focused codes: ñCompete with othersò, ñCollaborate with othersò, ñReceive guidance from othersò, ñReceive no disapproval of othersò, and ñWithdraw from othersò. Focused codes represent categories grouping related codes. Charmaz (2014) used focused codes as the second major step of coding and provide utility in analyzing large amounts of data while looking for themes across the data. I defined each focused code by using memos. Memos allow the research to capture thoughts, define connections, and aid in interpretations (Charmaz, 2014).

These focused codes resulted from analyzing the codes and categories which we defined from the initial study already referenced. We used these focused codes, or categories, to identify gender and ethnic perspectives for the help-seeking behavior influenced by self-conflict related to the help-seeking decision: to seek help or avoid help. The results represent the voices of the students. The underlying codes within each

category, focused code, and construct are ñin vivoò quotes from the students. Additional detail regarding analysis techniques resulting in the help-seeking model and the self-conflict construct is available (Herring & Walther, 2016a).

This is not a quantitative study; however, we examined the prevalence of gender and ethnic background within each of the five focused codes to frame our results. With this in mind, we identified significant quotes from each student capturing the essence of their feelings of self and others. We looked for frequency of data for each student within each category. In this way, we were able to identify primary and secondary (if any) categories for each student. We struggled with the idea of a secondary category; however, we did not want to leave the data silent. Identifying primary and secondary categories aids in demonstrating the struggles experienced by students within the construct of self-conflict. For example, even though Ben is highly competitive and wants to ñbe the bestò in the class, he is conflicted by needing to receive help and sees it as being ñflawed but thatôs okayò. We, therefore, coded Ben as holding a primary ñCompete with others viewò and a secondary ñReceive no disapproval from othersò view. While there are 20 students analyzed for the study, the total summed for all categories equal 33 due to primary and secondary categorization.

Subjectivity

My paradigmatic stance is an ontology of realism and an epistemology of constructionism guiding a qualitative, interpretive, interview study (Merriam & Tisdell, 2016; Patton, 2015; Roulston, 2010; Walther et al., 2013). Realism states that the world is real, and people interact with each other and the worldôs components (Altheide & Johnson, 2011). Constructionism describes human interaction with other human beings

as the foundation for all knowledge and reality (Crotty, 1998). Interpretive research is an interaction between the researcher and the participant. The researcher interprets the exchange of knowledge based on the participantôs lived experiences (Walther et al., 2013).

Peshkin (1988) advocates researchers should understand their own subjectivities which they bring to the study. These affect methods and data analysis. While I cannot change my subjective stance, I can acknowledge what I bring to the study and allow this to act as a warning to ñavoid the trap of perceiving just that which my own untamed sentiments have sought out and served up as dataò (p. 20). I acknowledge I am a Caucasian, male engineer with 25+ years in industry. I am a first-generation college graduate from a home (a trailer in a trailer park) where both parents were high school dropouts. I believe this is pertinent to the study because I am attempting to understand the experiences of female and minority students (which may include those of low socioeconomic status in the context of interest). While I may understand the point of view of lower socioeconomic households, I am neither female nor am I from a minority class within the engineering demographic; therefore, I must be sensitive to the idea of ñconstructing the otherò (Apple, 1993, 1996) in which ñthe otherò represents social perception of classes of peopleð typically due to differences or lack of understanding.

Appleman (2003) discussed critical issues regarding respect and responsibility in representing racial-based research. In an attempt to mitigate participant ñchoiceò issues, as she describes them, I used random selection as part of the sampling method. Appleman described the benefits of transcription and the participantsô own words to mitigate ñreckless interpretationsò and to present a clearer picture of the data as opposed

to other research methods. Semi-structured interviews provided the participantsô own words, and transcriptions were carefully validated against the audio record taken on two recorders.

Finally, with a high power differential compared to the participant students, I must be sensitive to the studentsô perspectives and my own. The duality of the researcher and the participant adds to the value of qualitative inquiry, but I must be cognizant of the dangers of reading into data that which I expect to be there (Peshkin, 2000). We acknowledge Peshkinôs concern with our methods, our engagement with the data, and our desire to explore additional theory relating to the data attempt to remove ñreading into it what we expectò.

Assessing data quality

Walther et al., (2013) proposed a qualitative framework based on validity and reliability using pragmatic validation defined as ñthe process of determining whether the theory and constructs used or developed in a particular study can withstand prolonged exposure to the empirical reality, both in making the data and in handling the dataò (p. 647). The idea then is to tie interpretation to context to knowledge to action.

With respect to internal validity, generalization, and reliability, or what Walther et. al described as ñmaking the dataò, I interviewed a diverse, representative, group of students using rigor in sampling to ensure the data emerged from a group which best represents the focus of the study and the context of interest. Peer review was used to help ensure both procedural and framework validation within the study. With respect to external validity, generalization, and reliability, or what Walther et al. described as ñhandling the dataò, interpretations of the data must be made in light of the theoretical

constructs and the social constructs of the participants. If the structure of the study resonates with the participants and provides meaningful interaction during the making of data, the results and actions will not only resonate with the participants but with the external reader as he or she applies their own social context to the context of the study strengthening pragmatic validation claims for the study (Walther et al., 2013). For this study, handling the data is supported by: the described methods, safeguards and processes; peer debriefing and checks; data collected from students in the context of their own lived experiences; member checked interviews which resonated with the students; data analysis informed by the defined theoretical framework; and rich, thick description of the in vivo data.

Items related to sampling (Appleman, 2003), presuppositions (Charmaz, 2014), and researcher bias (Peshkin, 2000) were previously discussed. Each of these represents areas to improve data quality. We approached each step in the study cognizant of these issues.

Results

We present the data in table form (Table 5.2) and refer to this data and additional data from the interviews in the remainder of the document. In summary, the data inform each of the five categories defining relationships of self with others related to help-seeking behavior. The table depicts increasing self-conflict and more negative perceptions of self in relation to others from left to right with a higher weighting of female and minority students to the right (more self-conflict) of the table.

We found students solely held one view or held two views with a primary and secondary view. The primary view is in bold text and listed first for each category.

While we coded multiple instances of views for each student (archived in Nvivo software), we present one example of primary and secondary (if present) in an attempt to capture the essence of the view and for brevity of reading. The first row of the table contains the five category codes under the self-conflict construct. The second row contains a description of conflict moving from left, ñVery little conflictò, to right, ñHigh conflictò. The third row contains descriptive quotes from each student holding the view. The fourth row identifies each student holding the view both primary and secondary. Row six is a repeat of row one for ease in reading. Row seven is a guide for reading the table.

Table 5.2: *Self-conflict Views of Self*

Self-conflict Construct				
Compete with others	**Collaborate with others**	**Receive guidance from others**	**Receive no disapproval from others**	**Withdraw from others**
Very little conflict (goal driven)		Conflict emerges (situational)		High conflict (self-worth)
ñI have that drive to always get the best score possible and mostly just impress myselfò Ben ñDoing or scoring in a higher percentile. So I guess doing better than everybody else.ò Greg ñI always want to be at the top of the bell curve. I ï Iôm not happy with being at the average, I guess.ò Ian ñI feel I have a higher drive to,	ñweôre all sort of sitting there together, strugglingò Donna ñI had to help him through it and that made me feel like I ï I understood the subject and like a ï I was learning while I was explaining things, so that made me confident.ò Felicia ñif they can see when I ask for help then Iôll be able to see when they ask for help too. So thatôll make me feel like	ñSo just like ï just sort of somebody has done it, this is socially acceptableò Cameron ñmaybe they could provide some insight to why Iôm not ï why Iôm feeling that the assignmentôs so hard.ò Edward ñI like to imagine that I donôt really ï that I donôt really know my limitations. So I think if anyone else can succeed at a situation, then if I try, then I could	ñIôm just feeling like I donôt know everything, Iôm flawed but thatôs okay.ò Ben ñI think people in this college expect themselves to be able to hack it. And so I think that people who are not doing well will either lose confidence and not feel that they have the potential to be a good engineer or good at this aspect of engineering.ò Cameron ñif everyone else	ñIf I feel that Iôm the only one asking questions, the only one needing help, I am uncomfortable, very uncomfortable if other students can see that. But if I feel that everyone is asking for help, then I donôt feel isolated.ò Nina ñtheyôll study five hours for a test. Iôll study 10 hours for a test because Iôm like I know that I just need a little bit more time. So no, Iôve never had help with any of that. Iôve just done it all

you know, have a better average than my peers.ò Oliver ñthe top 10 people will get an A. So it is a direct competition with like almost every class Iôm in.ò Pam	Iôm not the only one whoôs struggling.ò Henry ñBecause sometimes knowing that thereôs other people struggling, it makes you feel a little bit better saying okay, weôre all in the same boat. We can all get through this together.ò Jill ñitôs a lot easier to like work together because we all ï we all know that we care and so like we ï we like ask each other for help.ò Karla ñI think the first thing I would do is I would collaborate with other students, get a general consensus on how they feel about it. So if everyone felt it was hard, we would probably work together and then ask questionsò Nina ñI feel like we share a friendship or a bond, I guess (laughs) and they wonôt ï friends donôt really judge each other that harshly. And maybe, I donôt know, they know the struggles that ï the struggles or the questions you	too.ò Henry ñIôll be intimidated, you know, push for attempting it but Iôd rather watch somebody do it than attempt it on my own.ò Mike ñI get very distracted very easily so itôs just good for me to have someone there whoôs like ï whoôs thinking like okay, weôve got to work and stuff. So that just helps me just ï somebody else whoôs influencing me to focus instead of get distracted.ò Robin	seems to understand something and youôre the only one that doesnôt. Youôre not ï maybe even not cut out for the classò Greg ñI feel behind and I feel like everyone else is getting it a lot more faster and everyone just knows what theyôre doing, sometimes it discourages me. Feels like that Iôm not doing the best I can and I feel like I may not be living up to the potential or Iôm not living up to standards like that is expected of me. Imperfection. Itôs admitting that thereôs ï you will have flaws in your characterò Jill ñI donôt want the people like to do the same thing I do and like tune me out because like itôs just like a ï itôs like a really easy question or something.ò Karla ñI guess I feel like Iôm being judged that Iôm not understanding the topic. Yeah. And I feel like if they donôt have a question to ask, that means they	on my own. I put my self-worth on whether I can like in the long run do it.ò Pam ñI donôt want to know how my friendôs doing in the classò ñI tend to consider myself to be averageò Robin

	want to ask.ò Quincy ñyou know, thereôs always somebody else struggling. You know, I think you have to remind yourself of that, is that thereôs always somebody else who needs help too.ò Tina ñsomebody whoôs in the same boat that I am and we have like the same background of knowledge, like I get this. I tell them oh, okay, now I get this, I can do this and weôre just like bouncing ideas back and forth off each other. In the end, we get it together and it makes me feel good because I learned and I helped somebody else.ò Ursa		understand the topic and I donôt. So maybe I get the sense that theyôre looking down on me.ò Linda ñyou just donôt want your classmates to see you fail.ò Oliver Itôs hard for me to ask questions because I feel judged for like maybe dumb questions, é but I feel like if I ask something and then my other friends or peers say oh, thatôs an easy question. Why are you saying that?ò Quincy ñI donôt want to feel like Iôm wrong in the midst of my peers (laughs). Itôs ï I wish I wasnôt but thatôs just how ï thatôs how I am at this point, you know, Iôm still working on that but I donôt want to feel ï I donôt want to feel like below them or I donôt want to feel like Iôm the ï the person thatôs struggling behind. It kind of like almost shuts me downé it kind of messes ï messes (laughs) my psyche upò Steve ñWeôve gone over	

			this so many times, you know, you kind of feel like okay, well Iôm the dumb kid now sitting in class.ò Tina ñevery day we wake up, weôre driven by what other people think of us and I want people to think highly of me. My own knowledge obviously isnôt ï itôs not good enoughò Ursa	
Student (Gender/Ethnicity)				
Ben (M/C) **Greg (M/C)** **Ian (M/C)** Oliver (M/A) Pam (F/H)	**Donna (F/C)** **Felicia (F/C)** **Henry (M/H)** **Nina (F/A)** Jill (F/AA) Karla (F/A) Quincy (M/A) Tina (F/C) Ursa (F/AA)	**Cameron (M/C)** **Edward (M/AA)** **Mike (M/C)** Henry (M/H) Robin (F/C)	**Jill (F/AA)** **Karla (F/A)** **Linda (F/A)** **Oliver (M/A)** **Quincy (M/A)** **Steve (M/AA)** **Tina (F/C))** **Ursa (F/AA)** Ben (M/C) Camron (M/C) Greg (M/C)	**Pam (F/H)** **Robin (F/C)** Nina (F/A)
Very little conflict (performance driven)		Conflict emerges (situational)		High conflict (self-worth)
Compete with others	Collaborate with others	Receive guidance from others	Receive no disapproval from others	Withdraw from others
Students are listed: Pseudonym (gender/ethnic background). For ethnic background: A=Asian, AA=African American, C=Caucasian, H=Hispanic. Attribute: **primary** is bold and first in list				

First, we define the five categories. Next, using the concept of ñemergent ideationò in which the knowledge from qualitative research is emergent and not known prior to entering into the study (Wertz et al., 2011), we examine gender and ethnic related concerns as informed by additional theory. Finally, we discuss the results in light of the additional theory.

Category Definitions

Category: Compete with others

The student experiences the class as a competition in which someone is ñat the top of the bell curveò (Ian), and the student wants to be that person. Help-seeking becomes a means to an end. That is, if seeking help results in achieving the objective, it is okay. Conflict in this category emerges for those with a fixed view of intelligence (C. S. Dweck, 2000) if the objective is validation of ability. Self-efficacy master experiences within the context of the domain (Bandura, 1997) are prevalent for these students. Male students were the majority in this category with the lone female student having a secondary indicator.

Category: Collaborate with others

In this view, students value working with others as important to the help-seeking process. Being ñin the same boatò (Ursa) and ñsitting there together, strugglingò (Donna) makes the help-seeking process okay. If friendly peers are not available, then help-seeking may not occur due to those that might ñjudge each other harshlyò (Quincy). We believe this shows aspects of vicarious influences from self-efficacy vicarious experiences and social persuasions (Bandura, 1997) which may encourage future help-seeking by building a stronger cohort within the student peer community. Female students were the majority in this category. The category ñcollaborate with othersò (Nina) was a secondary indicator for most students holding this view.

Category: Receive guidance from others

This view is strongly associated with vicarious persuasion from self-efficacy theory (Bandura, 1997) in which the actions of others represent behavior favorable to

overcoming obstacles. Students look for someone to acknowledge help-seeking is ñsocially acceptableò (Cameron). Students seek help from those that are ñinfluencing me to focusò (Robin). Male students were the majority with the lone female student having a secondary indicator. For those holding this view, male students appeared to be more concerned with social norms and looking to others for ñinsightò (Edward).

Category: Receive no disapproval from others

All 20 students exhibit aspects of this view with 11 showing it as primary or secondary. This view does not look for approval from others but, instead, no disapproval from others. It is a strong self-theory fixed view. Even with prior knowledge and the ability to perform, those with this view may detour from tougher problems so they are not in a position to fail (C. S. Dweck, 2000). Students expressed concerns about being able ñto hack itò (Cameron), ñnot living up to standardsò (Jill), or feeling like Iôm ñbelow themò (Steve). These students simply want others to ñthink highly of meò (Ursa). Since help-seeking may give the perception that the help-seeker is ñthe dumb kid now sitting in classò (Tina), the student avoids seeking help. Genders were equally represented for primary and secondary attributes. Female students were the majority looking at primary only. This category is highly represented by minority, ethnic students.

Category: Withdraw from others

Students holding this view of others epitomize the fixed view of intelligence. ñEvery situation calls for a confirmation of their intelligence, personality, or character. Every situation is evaluated: *Will I succeed or fail? Will I look smart or dumb? Will I be accepted or rejected? Will I feel like a winner or a loser?*ò (C. S. Dweck, 2000, p. 6). Pam retreats by herself to her room or the library. Sheôs done it ñall on my ownò. She

puts her ñself-worth on whether I can é in the long run do it.ò Robin says, ñI donôt want to know how my friendôs doing in the classò. Robin admitted to me she had only ever asked for help one time in college. She says, ñif I ask for help then Iôm not really learning it to the best of my ability.ò Robin does not answer questions in class even if she knows the answer, ñEven in the case that I do know the answer, I still wonôt raise my hand and answer the question.ò This view is a more concentrated form of the ñReceive no disapproval from othersò view. Nina represents an interesting dichotomy. She wants to ñcollaborate with othersò; however, if she finds herself ñtoo far behindò, she refers to feeling ñisolatedò and ñI donôt like being singled outò. These feelings drive Nina to ñwithdraw from othersò and ñshrink down in my deskò. Only female students were in this category.

With the last three categories, self-efficacy inputs, even if strongly present, are overshadowed by self-conflict perhaps relating to fixed views of intelligence. There were no Caucasian, male students holding primary views in the last three categories. These are strongly rooted in an ñé urgency to prove yourself over and over. If you have only a certain amount of intelligence, a certain personality, and a certain moral characterð well, then youôd better prove that you have a healthy dose of them. It wouldnôt do to look or feel deficient in these most basic characteristicsò (C. S. Dweck, 2000, p. 6).

Results in context with gender and ethnic concerns

While our initial framework of self-efficacy and self-theory of intelligence do inform our prior findings(Herring & Walther, 2016a), we do not believe the framework adequately captures the essence of the struggles, emotions, and concerns of those students, especially those holding the views: ñReceive guidance from othersò, ñReceive

no disapproval from othersò, and ñWithdraw from othersò. Aspects of self-efficacy and self-theory of intelligence are present in each of the category definitions; however, they do no map across all categories for self-conflict; they do not adequately explain the emotional and personal experiences related by the students; and they do not inform the gender and ethnic representations with the categories. We, therefore, looked to additional theory to better inform our results. Based on the studentsô lived experiences, acknowledging the needs and benefits of help-seeking are not enough to ensure students seek help. The results (Table 5.2) indicate a predominance of female and minority students holding views for the right three categories. No Caucasian, male students hold primary views for ñReceive no disapproval from othersò, and only females students represent ñWithdraw from othersò. The last three categories represent higher self-conflict and greater avoidant help-seeking in the initial help-seeking decision (Herring & Walther, 2016a). We contend the self-conflict found in the students may be the influence of societal stereotypes and prejudices impinging the studentsô choice to seek help. This influence has been identified as stereotype threat.

Stereotype threat

"For some reason I didnôt score well on tests. Maybe I was just nervous. Thereôs a lot of pressure on you, knowing that if you fail, you fail your raceò ð Rodney Ellis, African American State Senator (Texas) in a 1997 interview.

Stereotype threat occurs when members of stereotyped groups find themselves in situations or environments in which their performance or behavior can confirm the negative beliefs that their group lacks a desired or valued ability. The context threatens the student with being judged, being negatively stereotyped, or validating the stereotype

(Aronson et al., 1999; Steele, 1997a). Stereotype threat is ña threat in the airò and is especially vexing because it affects those who identify themselves with a domain; that is, they hold the skills and abilities to self-identify as belonging to the domain. Their vulnerability to stereotype threat is not from doubts of ability or credentials but from identifying with the domain and the concern about being stereotyped within the domain (Steele, 1997a). Finally, it is not necessary for the student to believe the stereotype. He or she only needs to be aware of the stereotype (a social stereotype defines this) and care enough about performing well in the context of the domain so as not to affirm the stereotype (Aronson et al., 2002).

Prior empirical studies provide support for stereotype threat affecting women in math-intensive majors like engineering (Bell, Spencer, Iserman, & Logel, 2003). African American college students faced stereotype threat in situations where intellectual abilities were perceived to be measured (Steele & Aronson, 1995). Stereotype threat was found in Latino students concerned about their scholastic abilities (Gonzales, Blanton, & Williams, 2002). In summary, prior studies support the idea of stereotype threat occurring in situations in which measurement of abilities intersects with expectations of performance in the social context of a domainð such as a highly competitive major.

The students in our study exhibited stereotype threat in their thoughts and experiences. Jill said,

> like for my major engineering, not a lot of females are in the field, especially African American, Black females. So to find someone whoôs like the same race or same gender as me actually helps because they know that the odds seem to statistically be against us.

She clearly identifies her domain, ñengineeringò. She acknowledges her social identity, ñAfrican American, Black femaleò and ñusò. She identifies the stereotype, ñthey know the odds seem to statistically be against us.ò In her thoughts on help-seeking, Jill calls out her concern about ñnot doing the best I canò, ñnot living up to the potentialò, and ñnot living up to the standards expected of me.ò Jillôs words could be Rodney Ellisô (quote above). Her perceptions closely align with the attributes of an individual within a domain and context experiencing stereotype threat.

In this context, it is important to note none of the interview questions asked students about their own gender or ethnicity in help-seeking. We believe the initial framework and care in the methods resulted in interviews which resonated with the students and allowed for lived experiences such as Jillôs to emerge. As part of research quality, Walther et al. (2013) described the idea of communicative and pragmatic validation. The initial framework we brought to the study informed the interview questions, methods, and defined the social reality. The framework was not narrowly focused; it allowed a broad breadth of experiences to emerge based on what resonated with the students. The co-construction of meaning during the interview process required trust from the students. In summary, we believe Jillôs lived experience and those to follow point to communicative and pragmatic validation indicating that the study maximized the chance to see the full reality (Walther et al., 2013).

Steve, an African American male, describes his environment in high school as not having opportunities of others, ñwe didnôt have as much opportunities as some other kids may have had, soé within some of the math courses Iôve taken, theyôve taken the AP course already so theyôve been already kind of advanced as far as that subject.ò In

response to help-seeking, Steve says, ñI donôt want to feel like Iôm the ï the person thatôs struggling behind. It kind of like almost shuts me downé it kind of messes ï messes (laughs) my psyche upò. In order to manage stereotype threat, the student can either succeed in the domain thereby not validating the stereotype or disengage (disidentify) with the domain if the student believes lack of performance may validate the social belief. This disidentification is a disengagement from the domain in order to cope with the threat of underperformance (Aronson et al., 2002). Steve exhibits disidentification. Similar to one who might say ñmath is for nerdsò to cope with poor math achievement (Aronson et al., 2002), Steve considers prior opportunity differences in AP math courses as justification (perhaps, rightly so) of why he is behind. Steve withdraws by ñshutting downò when needing to seek help in front of his domain peers. Nina exhibits similar coping mechanisms when she sees herself diverging too far from her peer groupôs norm. She ñshrinks into her deskò. She ñfeels isolatedò. Aronson (2002) describes this as a ñdivestment of self from one or more domains of achievementò (p. 114).

Stereotype threat is not limited to one demographic. It can occur in any person holding a self-perceived place within a societyôs perception or is aware of it (Steele, 1997a; Steele & Aronson, 1995). Cameron dropped out of high school, received his GED, and was the ñfirst one in our family to go to collegeò. He wants to ñset a good exampleò for his younger brother. While Cameron is a Caucasian, male engineering student, he identifies other Caucasian, male students as ñWASP-y guys [that] are more confident in that they will do well and that they have the resources to do well.ò He continues, ñSo like these are people coming in knowing the college game and knowing the college culture and so maybe know how to leverage that better.ò Cameron is

concerned about doing what is ñsocially acceptableò. With respect to help-seeking, Cameron says, òpeople who are not doing well will lose confidence and not feel that they have the potential to be a good engineer or good at this aspect of engineering.ò The implication being that these people may need to leave engineering. Cameron exhibits disidentification attributes and is concerned with validating his place within the domain dominated, according to Cameron, by the ñWASP-y dudesò.

Students summarized their feelings of needing to seek help with the following one-word responses: ñflawedò, ñimperfectionò, ñfailureò, ñfrustrationò, ñstupidityò, and ñignoranceò. Aronson et al. (1999) emphasized that it is sufficient to be concerned about oneôs own ability while being identified with a domain to be stigmatized by stereotype threat. Stereotype threat brings about fear motivated by these perceptions and captures the studentsô conflict associated with the rightmost views in the table

Discussion

Self-efficacy theory suggests that if the mastery experiences or vicarious examples are highly positive with respect to an action, the individual will pursue the action and exert more effort and emotion into the action (Bandura, 1986, 1997; Jansen et al., 2015; Usher & Pajares, 2009; Wood & Bandura, 1989). When the action is help-seeking behavior, all students acknowledged the need for and benefit of academic help-seeking; however, when placed within the social and domain context requiring help, students often choose to avoid help.

We discussed aspects of fixed intelligence impinging on help-seeking in our model describing the help-seeking decision in which self-conflict was identified as a key contributor (Herring & Walther, 2016a). While our theoretical framework informed the

general model, we felt additional theory was needed to clarify the results when looked at through the lens of gender and ethnic background. However, the additional theory is not ñinstead ofò but ñadds toò our prior framework and brings stereotype threat into the discussion relating to help-seeking behavior. In fact, recent work examining first generation college students suggest low social class students that feel threatened by stereotype threat may adopt a performance, or fixed, focused mindset and use avoidance strategies as a result (Jury, Smeding, Court, & Darnon, 2015). As performance degrades under stereotype threat, the individualôs expectations about his or her ability may falter lowering any self-efficacy based inputs (Bandura, 1997) which may be present resulting in a negative reinforcement of motivation and persistence (Steele & Aronson, 1995). We see examples in many of the students. Adding to Cameronôs experiences described earlier, he is concerned about his abilities and wonders if he is ñdoing college rightò. He compares himself to his roommate and says, ñyou know, comparing myself to him, I got the impression hey, Iôm not doing college rightò. Henry is concerned engineering is ñreally challenging, and Iôm not sure if I can do it.ò Jill believes, ñI may not be cut out for the rigorous levelò. Steve ñshuts downò and it messes up his ñpsycheò. Oliver said, ñYou just donôt want your classmates to see you failò. Nina feels ñisolatedò. All of these point to ability concerns in students with minority status within the domain. In a major as exacting as engineering, this can lead to academic concerns and impact intellectual performance (Steele & Aronson, 1995).

When viewed through the additional lens of stereotype threat, we can better identify the essence of self-conflict for the students in our study. Students with self-described achievement views, ñCompeting with othersò, or more neutrally focused,

ñCollaborate with othersò, may not be affected as strongly by stereotype threat in that these students a) are not part of the socially defined stereotype, or b) have strong self-efficacy or malleable view of intelligence (C. S. Dweck, 2000) , or c) succeed enough within the domain (Steele, 1997b). As the view of others becomes driven more by ñReceive guidance from othersò, ñReceive no disapproval from othersò, or ñWithdraw from othersò, more fixed views of intelligence (C. S. Dweck, 2000) and low self-efficacy (Bandura, 1997) are prevalent which may be catalyzed by or coordinate to stereotype threat.

It is worth repeating no person is defined by one view or defined by having stereotype threat. While we attempted to identify a primary and secondary view for each student, interpreting the view was dependent on the studentsô responses during our interview session and for our context. Our context of interest was help-seeking behavior within an engineering domain. While research shows stereotype threat negatively impacts womenôs performance in engineering (Bell et al., 2003) and African American college students when faced with tests of perceived intellectual ability (Steele & Aronson, 1995), any student can be faced with a situation of stereotype threat even when it may not normally be a factor. For example, a study of white men with strong math ability demonstrated stereotype threat was measurably present when the participants were told before the test that ñAsiansò were better than ñWhitesò on difficult math tests (the stereotype threat) compared to those that took the test with no mention of Asian math ability (Aronson et al., 1999). If this is possible in a highly skilled, majority group (math for White males), consider walking in Jillôs or Ursaôs shoesð African American, female, engineering students. Ursa said to me after the interview ñI donôt want you to think of

me as a person that ï thatôs lazy. I want you to think highly of me. Not too highly but I want to be just like the same level as everybody else.ò Her internal burden was for me not to perceive her in light of the negative constructs implied by her own words. Perhaps this was due to me being a Caucasian, male, with many years of experience in engineering asking her questions concerning academic need in the context of her engineering major. Stereotype threat almost demands her concern.

Aronsonôs (1999) work emphasized situational and environmental context matter for stereotype threat. For our students, we see more female and ethnic student primary views to the right of our table indicating that, within the context of engineering, female and minority students represent a demographic within a domain (engineering major) encouraging stereotype threat. These results are not surprising considering the engineering demographics noted in the introduction. Finally, students from perceived, low achieving, social classes (including first generation college students) face magnified aspects of identity conflict such as disidentification caused by stereotype. The threat can be magnified in high achievement groups like engineering when aspiring members of the domain face the prospect of social pressures or discrimination from two groups: the group from which they previously belonged and the members of the new domain they are attempting to enter (Jury et al., 2015).

The demographics found in the data (Table 5.2) paint a picture of gender and ethnic differences regarding the self-conflict construct. We contend the self-conflict associated with help-seeking decisions for gender and minority students (including socio-economic status like Cameron, for example), may be primarily influenced by stereotype threat within the engineering domain. When added to the struggles brought on by fixed

views of intelligence, the resulting self-conflict blocks help-seeking for these students and may result in academic deficiencies and retention issues with engineering as students doubt their abilities within the domain and withdraw as a coping mechanism.

Conclusion

The results of this study extend previous research of academic help-seeking behavior for gender and ethnic perspectives. In many studies, engineering student demographics prohibit useful quantitative results for minority constituencies due to small ñnò sample sizes. Our study was designed to gain an empirical, qualitative understanding of gender and minority studentsô experiences and motivations of academic help-seeking behavior.

Starting with our model identifying a predominate, self-conflict component to the initial help-seeking decision (Herring & Walther, 2016a), we expanded our theoretical framework to include stereotype threat. We contend the addition of stereotype threat to self-efficacy and self-theory of intelligence defines a framework better modeling the influencing factors in the self-conflict construct especially for female and ethnic students. However, we acknowledge limitations in our study and offer ideas for advancement.

Context and domain are primary inputs into our findings; therefore, this may limit applicability of our findings to other areas of interest. Our participants were students from a large Southeastern United States research university. As previously discussed with Ursaôs comments, my identity as a Caucasian, male, experienced engineer influences the results of the interviews. Interviews conducted by a different researcher with the same students may provide different results.

We did not enter our study with stereotype threat as part of our framework informing our interviews. Perhaps this decreases presupposition bias as previously discussed; however, a new study examining stereotype threat as an a priori focus may provide additional insight. We believe qualitative studies in a non-threatening environment may provide additional insight of stereotype threat in minority constituencies independent of help-seeking behavior. Finally, different institutional cultures (historically minority colleges, for example) may extend research in these areas for minority students.

Implications

Building on prior work, our results suggest stereotype threat is an impediment to positive academic help-seeking behavior. Stereotype threat is situationally dependent based on known societal beliefs (Steele, 1997a). While it is quite difficult to affect change in widespread societal beliefs, situational factors within an institution or classroom can be changed. For example, prior work has shown classroom and department situational factors influence womenôs persistence in engineering majors (Goodman et al., 2002). Steele (1997a) has presented demonstrable recommendations called ñwise schoolingò strategies for instructors to reduce stereotype threat summarized as:

1) Engendering positive relationships with students by expressing optimism about the studentôs abilities to succeed. Positive, domain reaffirming role models confirm the studentôs place in the domain.

2) Provide challenging work (at an achievable pace) over remedial instruction. Challenging work shows respect for the studentsô abilities. Remedial work suggests they are not regarded as capable within the domain.
3) Affirm ñdomain belongingnessò by stressing intellectual potential especially through acknowledging expansiveness of intelligence (malleable view). Care should be taken this is not done in context of social ability.
4) Value multiple perspectives in project assignments, test questions, and class discussions.

Many of these techniques complement ideas from self-efficacy theory as ways to build master experiences and provide positive vicarious experiences and social inputs (Bandura, 1997). The techniques work within the scope of intelligence theory by deemphasizing performance related comparisons and emphasizing mastery learning (C. S. Dweck, 2000). Many engineering classrooms may not have minority role models; therefore, we encourage engineering departments to ensure a role model contact in the studentôs academic endeavor. Jill emphasized the importance of an African American, female role model in her field. Tina, Karla, and Pam emphasized the importance of female engineering role models in building their confidence and motivation.

Sometimes being aware of an issue affects a change in behavior by all (Higgins & Rholes, 1978). For example, a study by Aronson (2002) presented promising results attempting to influence a more malleable self-theory view in African American college students by exposing the students to their own self-theory predispositions. If the student is self-aware to their own help-seeking internal struggles, it may allow the student to better self-regulate conflict and guide the initial help-seeking decision. If students

recognize the struggle occurs in other students, classrooms may become less judgmental environments which may act to reduce self-conflict. These techniques relate to recommendation (3) above. An introductory, Freshman class emphasizing: training in help-seeking behavior, empathy or role-model exercises, and encouraging self-reflection and discussion of stereotype threat may have similar results described by Aronson. We are intrigued by the opportunity to positively affect studentsô perceptions of their capabilities offered by this research and call out demonstrable efforts within institutions and for more investigation, qualitative and quantitative, in this area.

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(contained within main bibliography)

CHAPTER 6

EPILOGUE

Synopsis

Reflecting on the start of this journey, I must acknowledge my inner fire had become an ember. While my jobs in industry had value; any value was ephemeral. If I could place my lived experiences into a crucible, I would want the burning of the dross to expose lasting impact, something that makes a difference. This study has done this for me. Where else can I have life-changing impact and influence on others save for a study like this? For me, it has been a zephyr which has rekindled my ember into a fire.

The study explored academic help-seeking behavior in undergraduate engineering students at the University of Georgia. My two research questions were:

1) Why do engineering students make the decision to seek or avoid help?
2) What are the gender and ethnic dimensions to help-seeking?

A theoretical model and two manuscripts resulted from the research.

The literature review Chapter 2 presents my view of a theoretical model depicting help-seeking as an action within social cognitive theory and self-regulated learning with self-efficacy and self-theory of intelligence as primary influencers. This model informed my interview questions and methods. My plan is to publish a much smaller form as a concept, theoretical paper for help-seeking. Manuscript one, *Engineering academic help-seeking: An empirical study of gender and ethnic influences in undergraduate engineering students*, examined help-seeking behavior in all students without considering

gender or ethnicity; however, the sampling methods ensured representation of equal gender and broad ethnic backgrounds. The goal was to generate a model representing the help-seeking decision. The model includes three primary influencers to the initial help-seeking decision. It is the initial decision which is the crux of the help-seeking process. I identified self-conflict as a fundamental construct to examine in the second manuscript, *Engineering academic help-seeking: An empirical study of gender and ethnic influences in undergraduate engineering students.* This paper examined the self-conflict associated with the initial help-seeking decision with gender and ethnicity as lenses. The initial theoretical framework did not adequately inform the findings; therefore, I examined additional theory from which I believe stereotype threat resonates with the findings.

Impacts

The target audience for these articles includes practitioners, researchers, administrators, and counselors engaged in the pedagogical process with engineering students for the context of this paper. However, I believe the results may apply and be generalized to broader collegiate level contexts especially in environments where the constructs of the model from manuscript one or potential stereotype threat from manuscript two may be present. It is my expectation this research can inform new ways of helping students understand themselves, accept each other, and achieve greatness.

Broader impacts to society are significant. The research directly relates to ABET skills involving: problem-solving capabilities, ability to work on multi-disciplinary teams, effective communication skills, and recognition of the need for and ability to engage in life-long learning. The educational impacts of the results are not only for use by educators in the classroom but by industry in career-based instruction supporting

ABET criteria along with closer collaboration between academia and industry. Research results leading to implications for individuals, instructors, and classroom dynamics offer strategies to positively affect help-seeking. Successful implementation will give students tools for life-long learning along with problem-solving skills; provide students better standing in the competitive STEM workforce; allow instructors better insight into their own influence on help-seeking behavior; illuminate social and environmental influences impacting the teacher-student relationship; affect student retention in a positive way; and arm institutional leaders with data leading to better academic advising, class constructs, and pedagogical methods.

Reflection on the Process

In examining literature for this study and my qualitative research classes, I read many articles in which my response was: ñSo, what?ò. I entered into my study wanting to clearly provide an answer to the ñSo, what?ò question. My desire was to be faithful to the participants, to prior research, and to honor the reader by providing a study which might resonate and apply to his or her context.

I spent quite a bit of time refining what I wanted to understand about academic help-seeking in engineering students. This level of understanding led to my research questions. However, I did not ñfinalizeò my methods until I acknowledged my stance and the theoretical framework of the study. I am confident my choice of research design and analysis strengthens my approach to answering my research questions, allows me to acknowledge and remain true to my paradigmatic stance, honors the participants and data, and is symbiotic with my theoretical framework.

My research questions required a great deal of care with the sampling procedures, interview protocol, and the analysis. My research was not a grounded theory study (Charmaz, 2014; Glaser & Strauss, 1967) in which literature and theory do not initially inform the study. As described, I entered into the research with a modeled, theoretical framework; however, with respect to the data analysis, I felt comfort in referring to and following aspects of grounded theory techniques. These analytical methods are well documented and acknowledged by the qualitative research community; however, grounded theory techniques are not limited to just grounded theory studies and are applicable to many contexts and methods (Charmaz, 2014). It is this flexibility that allowed me to start with a foundational analytic framework and apply it to my study. For a novice qualitative researcher, this makes it ñeasierò. There is a recipe to follow with the understanding the ingredients in the recipe are flexible to the context.

My issues related to the analysis applies to all aspects of the methodological framework; it is time-consuming, rigorous, and somewhat overwhelming with the amount of data generated both in collection (over 23 hours of audio and 450 pages of single spaced transcripts plus field notes on each interview) and in analysis (hours and hours, make that days and days, of working in Nvivo). The analysis started during and immediately following each interview. It continued with transcription verification. I individually coded each student. Before going to the next student, I compared results of the current coding with prior coding. This process required much thought and time while grappling with the data just like Charmaz promised. Although I believe I entered into the data collection and analysis with ñeyes wide openò, I only now understand the effort required, and Iôm just scratching the surface of my analysis capabilities.

I believe my process honored the data set by using in vivo codes where possible allowing the studentsô own words to tie directly to the analysis (Holton, 2010). I used both descriptive and in vivo codes with the categories and subcategories. I used in vivo codes to identify the primary themes and sub-themes with actual quotes building the themes. Using the CCM allowed me to consistently and recursively check my coding with prior results which is a strength of the method. In addition, I used NVivo as both an analysis tool and a way to archive the progression of the analysis by saving a complete record of the NVivo data set after coding each student.

I used focused codes, or categories, and themes to help select relevant parts from the whole. Items that resonated with the students are often found across students. However, frequency does not imply importance. A single instance can be exemplary if it helps with understanding (Charmaz, 2014). Fundamentally, if the data resonated with the research question and with the students, it is important in some way and was acknowledged by the results and the discussion.

Representation of the data used rich description and was interpreted using the participantsô own quotes building the themes which were used to form the construct for my interpretation (Kvale, 2007). Results were discussed in view of the theoretical framework with implications presented based on the findings. I tend to like models which is another reason I felt comfortable with GT based analysis techniques; therefore, I framed the results in a model for manuscript one and a table for manuscript two. I believe visuals allow for less ambiguity in the dissemination of the results within the discussion and implications.

I must comment on going back to the literature for manuscript two. The fact that it is ñokayò to allow literature to inform the results is a strength of qualitative research. About midway through data analysis, I knew that self-efficacy and self-theory of intelligence would not adequately inform the results for gender and ethnicity. Ideas of self-doubt were present within these theories, but too narrowly focused. Stereotype threat mapped tightly to the data and the results. I did consider dominant culture theory; however, it did not account for Cameronôs experiences. Stereotype threat allows for self-conflict even within what might be regarded as a dominant class. I am confident stereotype threat will become a dominant area for my future research. The trajectory of the second paper removed any lingering doubts for me about the power of qualitative inquiry.

In thinking about what worked and did not work for me, I look to planning, or scheduling, the work. I learned nothing in this process is a ñ10-minute jobò. I could not just jump in and out of the data like I would do when working math related engineering problems. The analysis required contemplative thought and time to ruminate on the data in front of me and how it related to data I analyzed yesterday, last week, or last month. There continued to be much reading and reflection on prior work and how it related to my findings. I needed the peer review with Dr. Walther to grapple with items within the data and how best to present the findings. In summary, what worked is being immersed in the data (Glaser & Strauss, 1967; Maxwell, 2013) while the converse did not work, at least for me.

One aspect that surprised me is my bias and how it related to the research process. Iôve discussed this with Dr. Walther multiple times. Surprisingly, Iôve determined bias is

not a ñfour letter wordò. It was my strong bias that drove my desire to understand help-seeking. For example, my personality, my drive, prevents me from not asking questions. I donôt understand what prevents others from asking questions even in the face of acknowledged difficulty. I found this incongruity in classroom situations and in my two sons. This bias caused the question which created the catalyst for my study. Since I understand and acknowledge my bias, I was able (I hope) to mitigate this during the design methods and analysis. I believe being true to the data, my participants, and my OCD personality to do things the ñright wayò helps. In fact, a strong bias may actually be easier to handle. It is like an ñelephant in the roomò to carefully watch whereas a weaker bias may be like a thief in the night waiting to strike. So, for me, bias was both a positive for launching inquisitive actions and a potential negative to be monitored as part of the research process.

Working on a manuscript format dissertation has provided me a ñtrial by fireò glimpse of professional academia. Is it for me? I think so. As I said previously, my fire has been rekindled. I believe this path provides a way to have lasting impact in studentsô lives. Who wouldnôt want that?

Next Steps

I have merely scratched the surface of my research questions. Not wanting to fall into the trap of Maslowôs hammer: ñI have a hammer; therefore, everything is a nailò, I see results of this research mapping to other areas. I plan to use the results of this study as a pilot in order to pursue stereotype threat in help-seeking behavior and in other areas relating to group dynamics and decision making. I would continue this research by

conducting both single location and multisite studies using both qualitative and quantitative methods.

Two additional research paths are of interest to me. First, help-seeking learning as input to the initial decision is worthy of research. A majority of the students admitted not knowing how to seek help since they never needed to ask for help in high school; this admission was a surprise. From a self-efficacy perspective, mastery experiences are compelling in the decision process (Bandura, 1997). Understanding the help-seeking learning process in freshman students may lead to beneficial results for student learning and may relate to the ñonboardingò process of new engineers in industry. Second, the help-seeking model presents a recursive loop in which the student continues to pursue help if the initial decision is to seek help. Understanding this behavior may provide additional insight into how students engage in and retain difficult concepts once they have committed to making an initial ñI can do thisò decision.

While my initial study has provided me some tools toward these research endeavors, I have much to learn. Chinese philosopher, Laozi, is attributed with saying: ñA journey of a thousand miles begins with a single stepò. I have taken my first step.

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APPENDICEES

APPENDIX A

EMAIL INVITATION FLYER

Calling All Undergraduate Engineering Students

Amazon Gift Card!

Subject: Recruitment for interviews, Amazon gift card incentive for participation

Attention: All undergraduate engineering students

Engineering Education researchers at UGA are investigating the role of help-seeking behavior in engineering learning. We are looking for undergraduate engineering students to volunteer to participate in one-on-one interviews to reflect on their learning experiences. Students selected for interviews will receive a **$25 Amazon gift card** as a thank you for their participation. We will begin contacting students for interviews in the coming weeks.

Sign up now to participate! Deadline 9/11/2015

Send email of interest to hsbstudy@engr.uga.edu

Questions to:

Chris Herring, at chris.herring@uga.edu.

APPENDIX B

PARTICIPATION CONSENT FORM

Informed Consent to Participate in Study **Number:** STUDY00002186:_____

I, _____, agree to participate in a research study titled **"Academic Help-seeking Behavior in Engineering Students"** conducted by Chris Herring from the College of Engineering at the University of Georgia. I understand that my participation is voluntary. I can refuse to participate or stop taking part at any time without giving any reason, and without penalty or loss of benefits to which I am otherwise entitled. If I decide to stop or withdraw from the study, the information/data collected from or about me up to the point of my withdrawal will be kept as part of the study and may continue to be analyzed, unless I make a written request to remove, return, or destroy the data that can be identified with me.

The purpose of this qualitative study is to understand the response to uncertainty, doubt, or apprehension when faced with academic adversity by engineering students enrolled in the University of Georgia College of Engineering. At this stage in the research, the response of interest is generally defined as the help-seeking behavior of engineering students where help-seeking can also be help-avoidance.

There are no benefits I may expect from my participation in the study.

If I volunteer to take part in this study, I will be asked to do the following:

- Participate in a personal, one-on-one, audio recorded interview with Chris Herring for up to 90 minutes
- Participate in a short, follow-up (15 minutes) interview, if needed

My grades and class standing will not be affected in any way in any courses by my decision about participation.

No risks, discomforts or stresses are expected from participation in the study.

You will be eligible for a gift card as a thank you for your participation after completion of the interview and possible follow-up.

Any information that is obtained in connection with this study and that can be identified with me will remain confidential. Pseudonyms will be used to protect the names of individuals and wonôt be identified in any reports of the study. Interviews will be audio-recorded. The researcher will copy the recording and transcribe them for the research records. Transcriptions may also be done by professional transcribing services. As a participant, I have the right to review the recordings made as a part of this study for accuracy.

Only the researcher will have access to the data collected, which will be kept in a locked filing cabinet on a secure business premises for a period of three years, with no other person able to use or access the data. Electronic files will be stored on the password protected computer of the Principal Investigator or secure servers.

The researcher will answer any further questions about the research, now or during the course of the project, and can be reached by telephone at: 706-248-1235.

My signature below indicates that the researchers have answered all of my questions to my satisfaction and that I consent to volunteer for this study. I have been given a copy of this form.

Chris Herring
Telephone: +(1)706-248-1235
Email: chris.herring@uga.edu
Study email: hsbstudy@engr.uga.edu

_____ _____
Signature Date

_____ _____ _____
Name of participant Signature Date

Additional questions or problems regarding your rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 629 Boyd Graduate Studies Research Center, Athens, Georgia 30602; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

APPENDIX C

PARTICPANT DEMOGRAPHIC SHEET

Completed by Researcher:

Study Number:STUDY00002186: _____

Pseudonym: _____

Completed by Student:

Each response declared by student:

Gender: _____

Ethnicity: _____

Academic year: _____

GPA: _____

Major: _____

APPENDIX D

QUALTRICS SURVEY

Chris Herring Study - Group ALL

Q1 This is a very quick survey (just the questions on this page). It is voluntary for you to complete it. Your answers will be kept confidential. The following questions will be used to qualify participants for the study based on certain criteria. Please answer truthfully ï your responses donôt influence the likelihood of your selection for the study. There are no right or wrong answers. Since the study has a limited number of available interview slots, not all qualified participants will be selected. Thank you for your willingness to participate

Q2 Are you willing to complete a 90 minute one-on-one interview with Chris Herring. You will need to schedule a two hour window for the interview along with pre- and post-interview items.

❍ Yes (1)
❍ No (2)

Q3 Are you willing to sign a consent form for the study (after reading it, of course)?

❍ Yes (1)
❍ No (2)

Q4 Are you an undergraduate engineering major at the University of Georgia?

❍ Yes (1)
❍ No (2)

Q5 What year are you in college?

- ❍ One (1)
- ❍ Two (2)
- ❍ Three (3)
- ❍ Four (4)
- ❍ 5+ (5)

Q6 What is your Gender? This is to ensure diversity in the study.

- ❍ Male (1)
- ❍ Female (2)
- ❍ Choose not to answer (3)

Q7 What is your ethnic background? This is to ensure diversity in the study. (Racial categories from UGA admissions application form.)

- ❍ White (not Hispanic or Latino) (1)
- ❍ White (Hispanic or Latino) (2)
- ❍ Black or African American (including Africa and Caribbean) (3)
- ❍ Asian (including the Indian Subcontinent) (4)
- ❍ American Indian or Alaska Native (5)
- ❍ Native Hawaiian or Other Pacific Islander (6)
- ❍ Middle Eastern (7)
- ❍ Other (8)
- ❍ Choose not to answer (9)

(NOTE: Two of the next three questions used scaling/sliding tools on Qualtrics. The first is a speedometer which allows the student to select the number by moving the needle. The third is a smiley face that transitions from full frown to full smile in five phases.)

Think back on a class which was difficult for you. How many times during the semester did you approach the professor or TA for help? (0 = never, 10 = 10 or more times)

Assume you are in an engineering classroom situation. The professor is lecturing on the subject, and you are confused. How likely are you to stop the professor and ask a question during the class?

Not at all likely — Extremely likely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

How does asking for help make you feel?

APPENDIX E

INTERVIEW PROTOCOL

Table A.1*: Interview Questions and Map*

STUDY#: STUDY000021866:	SE	M	V	S	P	STI	F	M	HSB	AHS	HSA	Hypothetical	Devils Ad	Ideal Pos	Interpret
1 What is your favorite academic subject and what do you think makes it so?		x												x	
2 What is your least favorite academic subject and what do you think makes it so?		x												x	
3 Think about your academic motivators and describe them.	x				x	x								x	
4 Think about your academic experience and describe what demotivates you in a class you are taking.	x				x	x									x
5 Think about and describe what would be the ideal classroom environment for you?	x				x									x	
What contributes to the confidence level of your success in an academic subject? (Experience versus People) (Does a 6 final grade impact confidence?)			x	x										x	
7 How have other people contributed to your confidence level in these subjects?				x											x
8 How have other people influenced you academically?					x										x
Let's look at the drawing you made prior to the interview. Please describe it. (What is your expectation of from ...?) (You 9 drew a xxxx situation, why is this comfortable for you?)										x				x	
Describe for me the academic culture in the college of engineering. Does the culture influence whether or not you ask for 10 academic help? What does influence you?									x						x
What if you are having trouble understanding material or concepts in a class, what do you do? (Are you comfortable asking questions in class?) (Do you?) (Can you think about and describe?) (Describe 2-3 reasons why you would not ask 11 questions in class)	x					x			x		x				
12 If a class assignment seems too hard for you, what do you do?	x					x			x		x				
13 What do you believe is the purpose of asking for academic help?										x	x		x		
14 How do you know that you need academic help?	x														x
15 Think about and describe how you feel if you need to ask for academic help? (Probe emotion)						x			x			x			
16 Think about and describe how you feel if classmates can see and know that you ask for help?				x		x			x			x			
17 Suppose you need to ask for help, from whom do you feel is it best to get help? Why? How do you decide?				x					x			x			
18 Complete this thought: "Getting help is an admission of...."						x			x						x
19 Complete this thought: "When I see a classmate ask for help, I think..." (How do you feel when a classmate asks...)?				x		x			x			x			x
20 Ideally, when you ask for academic help, what do you expect from the helper? (Who is in control of the process?)				x						x	x	x			
21 When you see others facing a difficult academic situation, how do you feel?				x	x							x			
22 Think about a specific difficult academic situation and describe how you handled it.		x							x					x	
23 Think about and describe a time when someone advised you to ask for academic help and your response to the advice.					x				x					x	
24 How would you describe your view of intelligence?						x									x
25 Suppose you heard someone say, "I'm just a "C" student". How do you respond? (Or, "I'm not good at math"...)							x						x		

	STUDY#: STUDY00002186:	SE	M	V	S	P	STI	F	M	HSB	AHS	HSA	Hypothetical	Devils Ad	Ideal Pos	Interpret	
26	If you see someone attempt a difficult problem, how would you feel about attempting the problem? (Influences? confidence?) If instructor gives a difficult problem and asks for volunteer…?			x									x				
27	Think about approaching a new or uncertain situation. How do you make a decision? (experiences? Other people?)	x					x								x		
28	Think about a time when you did not do well on an academic assignment. What do you believe caused the result? (Did you reach out for help?)	x					x			x						x	
29	You hear someone say, "I'm not concerned about the grade because I'm learning something new." What do you think?								x					x			
30	What do you think about a person's intelligence If a person asks a question seeking help? Is help-seeking related to intelligence? Is Help-seeking a learned skill or process?						x			x			x				
31	You hear someone say, "Intelligence cannot be changed. It is what it is." What do you think about that statement?							x						x			
32	When the instructor asks, "Does anyone have any questions?" What happens? Why? Influences? What makes people comfortable? What makes people uncomfortable?			x	x					x			x				
33	Think about and tell me about the last time you needed help and you asked for help. How did you feel after asking?	x					x				x					x	
34	What do you believe influences you to ask for help?										x					x	
35	Think back and tell me about a time when you should have asked for help but did not. If you did a debrief on yourself, what would you do differently in a similar situation?	x					x					x				x	
36	What do you believe influences you to not ask for help? (probe burden if it comes up…)											x				x	
37	Think back and describe a situation when you asked for help but did not really need it. What motivates you to ask when you do not need it?											x				x	
38	How do you feel about asking for help based on the students in the class with you?			x	x		x			x						x	
39	How do you feel about asking for help based on the instructor? Gender matter?			x	x		x			x						x	
40	You hear someone say, "I'm thinking of dropping the class because I'm not doing well". What is your response to that? What could do differently? Have you been in that situation? What influences? What could you do differently?			x			x							x			
41	When choosing a class, how do you decide which class to take if there are multiple sessions?	x	x										x				
42	What do you believe is appropriate to ask for when obtaining academic help?										x	x			x		
43	What do you believe is not appropriate to ask for when obtaining academic help?										x	x			x		
44	How do you think results from help-seeking in your past college classes influence your help-seeking response today?	x								x						x	
45	If you think back on how you sought help in high school versus college, what is the difference?	x								x						x	
46	In what way is help-seeking a stand-alone action or not a stand-alone action? Does it have a beginning-middle-end? Contextual? Problem, class, semester…									x					x		
47	Let's say you decide to ask for help, what drives the process to completion? (Motivational factors?)									x			x				
48	Thinking back on our discussion, what is the right decision with respect to asking for help?									x					x		
49	Is there anything else you would like to tell me based on our conversation?																
50	Would you like to give feedback on the interview process?																

APPENDIX F

CODE TREE

Sources refer to students. A ñ20ò under sources indicates all 20 students were represented by at least one reference code. References are occurrences of codes (nodes, in Nvivo). Total codes were 1291. The symbol in the second column indicates I have a memo written for that category. The focused codes discussed in the results of the manuscripts were identified from the occurrence of categories across all students and relevance or impact on the results.

Table A.2: *Top Level Categories*

Name			Sources	References
Comparison to others			20	105
Help Seeking Preventers			20	115
Help Seeking Feelings			20	105
Motivational Factors			20	64
Experience as input			18	49
Help Seeking as Action			18	81
Intelligence			17	80
Professor			15	60
Social influences			14	57
Help Seeking Starters			14	49
Vicarious Experiences			14	37
Demotivational Factors			14	21
Help Seeking Drivers			13	47
Help seeking do it myself			12	22
Difficult Situation			12	28
Classroom Environment			11	28
Help seeking source			11	33
Engineering culture			11	39
Helper expectations			11	13
I Can Do It Myself			10	32
Academic Subjects			10	18
Help Seeking Influences			10	21
Others Know I ask for help			10	15
Help Seeking Appropriate and Not appropriate			10	20

Help seeking not really need		9	9
Help Seeking in Others		9	19
Help seeking social triggers		9	19
Peers		9	15
Question Inhibitors		8	23
Confidence positive		8	8
Asking a good question		8	23
Choosing a class		7	17
Help seeking past classes		7	8
Grades Versus Learning		7	15
Understanding		6	8
Self Realization from interview		6	8
Group work		5	12
Help seeking differences gender		5	8
Help seeking differences ethnic		5	7
Gender in stem field		5	8
Help Seeking Thoughts		4	8
Environment impact		2	6

I will delve into the focused code/category ñcomparison with othersò. It is found in all 20 students and has a total of 105 codes. The category contains seven sub-categories each represented by ñNameò heading and two codes not with a sub-category. I will now go down another level with ñAA Comparison to others Iôm behindò

Table A.3: *Level One Sub-category/codes*

Name			Sources	References
Comparison to others			20	105
Name			Sources	References
AA Comparison to others I'm behind			10	21
Name			Sources	References
AA Comparison to others we're the same			10	21
Name			Sources	References
Comparison to others confidence			9	10
Name			Sources	References
AA Comparison to others judging			8	17
Name			Sources	References
AA Comparison to others competitive			8	19
Name			Sources	References
AA I'm not sure I belong here (imposter)			6	9

Name			Sources	References
Help Seeking 1-1 easier			4	4
Comparison to others I don't like to compare myself to others			1	1
Self-worth based on being able to do it			1	1

Next is the final level of the coding tree for this path. Looking at the first code ñComparison to others black ducklingò, the actual code is ñblack ducklingò. The hierarchy name for this node is: ñComparison to others/ Iôm behind/ black ducklingò. Each of the categories flows down to the individual codes in similar fashion. I do not include them all here due to the size of the trees. I believe one example provides the method and structure used for the study.

Table A.4: *Level Two Sub-category/codes*

Name			Sources	References
AA Comparison to others I'm behind			10	21

Name			Sources	References
Comparison to others black duckling			1	1
Comparison to others don't want to be person that's behind			1	1
Comparison to others don't want to feel below them			1	1
Comparison to others they are more advanced			1	1
Comparison to others they are already asking questions			1	1
Comparison to others Nobody wants to be behind			1	1
Comparison to others I'm with people who are behind			1	1
Comparison to others I'm not getting it fast as everybody			1	1
Comparison to others I'm not on the same level			1	1
Comparison to others Don't want to be below the normal			1	1
Comparison to others I'm one of the slowest kids			1	1
Comparison to others inferior			1	1
I might be doing something wrong			1	1
I want to go towards the class average			1	1
i'd feel stupid			1	1
I might be average			1	1

APPENDIX G

EXAMPLE MEMOS

Comparison to others

The student is influenced in some way by comparing his/her position/ranking/place with other students. Based on being equal, behind, ahead or other similar factors, the student's decisions are influenced.

This may be a vicarious input or social input from SE theory. It may also relate to reasons to start or not start HS behavior. These may also be reasons not to seek help. Vicarious experiences node is related. I believe many of the examples in this category relate to the internal conflict related to deciding whether or not to seek help.

Help-seeking preventers

HS preventers are feelings, situational factors, circumstances, social issues, environmental issues, etc.. that prevent a student asking for help. They know they need help but do not ask for help.

These should relate in some way to: 1) SE inputs, 2) Intelligence theory inputs, 3) Results from previous HS experiences as input to next decision, and 4) HS as an action.

Other nodes may also influence this node: motivating factors, Help Seeking starters (which act against this node), Professor, Comparison, and others.

This node may also influence other nodes: confidence, experience, HS sources, do it myself, and others

This should be a fundamental category/theory for the study

Help-seeking as an action

Part of the theoretical framework of the study views help-seeking as a stand-alone action. That is, there is a decision to seek or to not seek help as an action. Once started, the action has a beginning, a middle, an end; however, the end may lead to new actions.

The action has drivers to conclusion, motivating inputs, and strength of resolve-- just like any other action. Many of the other nodes relating to help-seeking starters, preventers, and inputs will relate to this thought as well.

Prior work from Zimmerman (Self-Regulated Learning) and Bandura (Social Cognitive Theory) and Self-Efficacy relate directly to this idea.

Experience as an input

Experience as input relates to the experiences/history which a student has and brings with them when making a decision.

Relates to past experience as input into SE theory.

Experience may motivate/persuade/encourage action. It may also demotivate/dissuade/discourage action. It may also affect how much effort is put into action.

Relates to confidence; however, even with a good outcome (high grade), it may not equal experience relating to future high expectation of results especially if the high grade was in an easy class and required memorization over learning concepts.

APPENDIX H

SAMPLE OF FIELD NOTES

These are the field notes for the interview I conducted on 092215 along with notes when I validated the transcription against the audio on 10/4/15. In this example, I was a little frustrated with how the interview went. The participant was reticent to open up and I was challenged somewhat with this. The notes on the transcription validation show where I made edits to transcription along with thoughts on where I should have probed or asked follow-up questions. I concluded by giving a very brief reflection on my performance.

09/22/15

Very goal oriented. Wants to speak more than one language.

Two new followup questions generated during interview
- What is obligation of helper/helpee?
- How do you know that the act of help-seeking is complete?
- ONE typo to fix.

How did interview go?
It was very soft-spoken and uncomfortable to begin the study. Before interview he wanted to know what the questions were.

His answers were rather short and became/grew shorter as the interview progressed.
- I found myself growing weary in the interview due to his shortness of answers and having to think about questions to ask in the moment to pull out more information.

Very concerned about grades and seems to associate grades/results with interest and purpose.

Interesting: dropped a class based on 3 tests only. Likes classes with multiple assessments: quizzes, tests, drop lowest grade, etc...

The interview only lasted 1 hour with a 10 minute break so, more like 50 minutes. I'm a little discouraged by that! ☹ Grr

(*) So for a similar student, I will need to really dig out more data by asking for specific examples after the leading question.

I guess the good news is that the transcription cost will be less. :)

It would be interesting to count # times he referred to grade(s).

Acknowledge intelligence is contextual. Maybe changeable. However also indicated that a "C" student may be a "C" student due to intelligence. So, aspects of fixed and malleable.

I believe he is strongly performance based for goals.

Does not mention mastery or experience (little if he does).
(*) Does mention grades, "✓" mark vs "x" as motivator.

Liked the analogy to fish. Probably heard this in psychology class?

Was uncomfortable drawing a picture. However, I still see this as valuable and it did have him think about the help-seeking process and why one asks for help.

092215

In his case, asking for help comes primarily after a bad grade ~~this~~ event.

His drawing and examples referred to help-seeking as post-bad-grade events.

Will need to see how often "Understanding" is used as an indicator or reason for help.

Self-efficacy drivers appear to be present especially with trying something hard. I also believe "interest" may be a different way to look at Mastery experience?

09 2215 First review of transcript 10/4/15

29 Goals 44 I know what I'm doing
44 Interest 49 A Purpose

49-66 There was more here but I did not know how to get to it.

96 Your just a number, don't find as students.

101 removed inaudible mark
157 " "

197-199 I should have probed! I really was not "in the moment" with this interview!

243 removed inaudible mark 2nd inaudible sounds like "peference"
287 " "
293 " "

411 Should have probed "friendlier"

Overall - this was first interview that I really struggled to get meaningful responses. It fatigued me, and I was not "in the moment"!

APPENDIX I

IRB APPROVAL FORM

Phone 706-542-3199

Office of the Vice President for Research
Institutional Review Board

Fax 706-542-3660

APPROVAL OF PROTOCOL

June 9, 2015

Dear Joachim Walther:

On 6/9/2015, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title of Study:	Academic Help-seeking Behavior in Engineering Students: A Qualitative Study
Investigator:	Joachim Walther
IRB ID:	STUDY00002186
Funding:	None
Grant ID:	None

The IRB approved the protocol from 6/9/2015.

In conducting this study, you are required to follow the requirements listed in the Investigator Manual (HRP-103).

Sincerely,

Larry Nackerud, Ph.D.
University of Georgia
Institutional Review Board Chairperson