Academic Help-seeking as a Stand-alone, Metacognitive Action: An Empirical Study of Experiences and Behaviors in Undergraduate Engineering Students

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Abstract

Contemporary research investigating academic help-seeking behavior (HSB) is predominantly K-12 in focus. Few studies have examined HSB within an undergraduate engineering context. Primary efforts are quantitative which, due to typical engineering demographics, limits the voice of minority constituents. The purpose of this research is to develop a rich, empirical understanding of engineering students' lived experiences of HSB ensuring the perspective of underrepresented groups. Self-efficacy (SE) and self-theory of intelligence (STOI) were examined as inputs into HSB.

This qualitative research is based on interviews of students' perceptions and constant-comparative techniques drawn from grounded theory. A multi-approach sampling method was used to ensure varied experiences, equal gender, and ethnic diversity. Results indicate a diversity of themes related to SE and STOI as influencers to the metacognitive action of help-seeking resulting in internal conflict during a recursive HSB decision process. Additionally, results emerge casting HSB as a must-learned skill for engineering students. Gender and ethnic concerns are discussed.

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 must have: "an 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; … and an ability to engage in life-long learning"[1(p41)]. In order to achieve these objectives, it is incumbent upon engineering education programs to be concerned with all aspects of a student's performance and well-being. In addition, 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[2] and the NSF[3]. Given that help-seeking behavior is correlated to academic achievement[4,5], help-seeking becomes significant not only to ABET but also to the engineering student and to the engineering profession; however, help-seeking is often not the chosen course of action.

Due to motivational influences, classroom context and social factors, academic help-seeking often becomes help-avoidance[6-8]. When asking for help is perceived as lack of mastery, "No matter how hard I try, there is some schoolwork I'll never understand"[6(p530)], or is perceived as lack of ability, "… other students may think that I am stupid if I ask for help in mathematics lessons"[9(p292)], a paradoxical result is that those in most need of help are those most likely to avoid asking for help[6,10-12]. These issues become more pronounced when gender, ethnic background[13-15], and competitive majors[5,16] are applicable factors.

The purpose of this qualitative study is to understand the academic help-seeking response of engineering students enrolled in a large Southeastern United States research university where

help-seeking is defined as adaptive help-seeking or help-seeking avoidance. Specific questions are:

1) What motivates students who actively seek help? Conversely, what dissuades students from actively seeking help when in need of assistance?
2) What differences, if any, are based on gender or ethnic background?

Literature review and theoretical framework

While ample research exists investigating help-seeking behavior (HSB) in education, the majority is quantitative in nature and focused at the K-12 level[17-24] with fewer examples at the college level[4,5,16,25]. Very little research examining HSB has targeted engineering majors. The most pertinent research has examined aspects of self-efficacy in context with broader issues related to academic achievement, to persistence, or to retention[7,26-36] with very little focus on HSB.

Review of germane literature reveals a number of theories underlying the individual's choice to seek or avoid help. Self-regulated learning (SRL) proposes learning as a self-directed process in which learners transform mental abilities into academic skills[37-40]; however, for the purposes of this study, self-regulated learning does not get to the heart of help-seeking behavior (the decision); instead, it looks at the processes and strategies an individual uses to improve academic skills with HSB as a component input. The framework for this study is rooted in self-efficacy (SE). SE is a constituent, key element of interpersonal influences. According to Bandura[41(p191)], self-efficacy determines "whether 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 experiences". Influencers of self-efficacy are derived from performance accomplishments (personal mastery experiences), vicarious experiences (seeing others perform without adverse consequences), verbal persuasion (suggestions of expectations), and physiological states (fear, excitement, relaxation)[41]. In summary, SE may act as an influence to HSB as an agentic action by influencing the student's HSB choice, the perseverance of the HSB, and future HSB based on prior results.

Self-theory of intelligence (STOI), championed by Carol Dweck[21,42] concerns the idea of intelligence as either fixed, also called entity theory, or malleable, also called incremental theory[43]. A person with a fixed view would need to "look smart and, at all costs, not look dumb"[21(p3)]; therefore, this may lead to help-seeking avoidance when faced with a help-seeking situation. (Dweck's view also happens to match the experiences of the PI with students.) Conversely, a person with a malleable view perceives intelligence as something to be increased in the moment and "will readily sacrifice opportunities to look smart in favor of opportunities to learn something new"[21(p3)]; therefore, this may lead to adaptive help-seeking[44,45]. Bandura's SE theory and Dweck's (STOI) form the foundation of the study's theoretical framework for viewing help-seeking as a process.

Starting with the work of previous researchers (primarily in K-12 contexts)[20,46-48], help-seeking was presented as an independent act by the help-seeker. Coalescing much of this research, Karabenick & Berger[45] present help-seeking as an eight step process (Table 1: Help Seeking Process[45(p240)]). Karabenick & Berger suggest that successful *learning* (our emphasis) may be tied to implementation of help-seeking steps for adaptive help-seeking. In their view, help-seeking is

considered as part of the learning process of an outside construct; that is, they do not consider help-seeking as its own stand-alone metacognitive action (agentic construct) having SE and STOI as influencing factors. Reviewing the steps of the help-seeking process, most research is concentrated around steps (3-7) by using surveys and/or observation. Determining if help is actually needed (steps 1-2) and if help-seeking proceeds (steps 3-7) are critical in the help seeking process. While HSB is set in motion by some catalyzing event such as a low grade[48], 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.

Table 1: Help Seeking Process[45(p240)]

Stages of the HSB 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	õ	õ
(3) Decide to seek help: Yes/No	õ	Strategic Planning
(4) Decide on the type of help: avoidant or adaptive	õ	õ
(5) Determine whom to ask for help	õ	õ
(6) Solicit help	Performance	Self-control
(7) Obtain help	õ	õ
(8a) Evaluate help received	Self-reflection	Self-judgment
(8b) React to help received	õ	Self-reaction

Karabenick & Berger call out[1] for further research referring to 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 factors within steps (6-7) examining perseverance of help-seeking, what drives the help-seeking journey, and what happens during and after step (8).

Using the lens of our[2] theoretical framework, this qualitative, empirical study will specifically address 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; and 4) examining HSB in an engineering education context.

Research design methods

We bring an interpretive perspective based on an ontology of realism and an epistemology of constructionism. Realism as an ontology is the õbelief that reality and its components exist independent of any consciousnessö[49(p113)]. In other words, there is a world that is real in which we, as people, interact with each other and with the components[50]. Constructionism states that all knowledge, all meaningful reality, is based on human interaction with other human beings

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[1] Along with Karabenick and Berger, many quantitative studies call out for more qualitative inquiry in order to expand on questions left unanswered by other methods[7,15,33,46,75,85689].

[2] To aid in description, when õIö is used it refers to the primary investigator (PI) who performed the interviews, and when õweö is used, it refers to both researchers.

and their world in a particular context[51]. Interpretive research is a õí social inquiry that derives knowledge claims from the interpretation of lived experiences of individuals or groups. As such it is a subset of qualitative research that assumes that social reality is locally and specifically constructedö[52(p628)]. Crotty states õThe 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 compatibleö[51(p11)]ô see also, Maxwell[53].

Data collection

This study uses semi-structured, one-on-one interviews to understand the experiences and perspectives of the student. This allows for an interpretive approach to make meaning of these lived experiences using the interview as a collaborative mechanism[49,54]. Roulston[55(p76)] describes using interviews to aid in õresearch for understandingö with the research questions driving the approach. Since we are seeking to interpret, and make meaning of, HSB from the perspective of the student in the context of an undergraduate engineering environment, this study will be an interpretive, qualitative, interview study[49,52,55,56].

Semi-structured interviews allow for flexibility in question order and direction based on data from the participantsøresponses while providing a conversational, comfortable atmosphere[57660]. A preconceived question list including a suggested order of questions provides scaffolding; however, 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[49,55,61]. Throughout the data collection process, the form and function of the questions were reviewed against the data and adjusted as needed to better align the questions so that they capture data pertinent to the research questions[62]. Changes in the question list were archived to show this progression.

After the student reviewed and signed the IRB approved consent form, I discussed the interview process. Next, I asked the student to draw a picture that in some way described what receiving academic help meant to them. This was not timed and the drawings were not analyzed as data for this study; however, I asked questions concerning the drawing about 10-15 minutes into the interview process. This seemed to open up new avenues of inquiry during the interview. We will explore using student drawings of help-seeking as a means of data capture and analysis in future studies, and we encourage other researchers to consider this approach as well.

Participant selection

Participants for the study were chosen using purposeful sampling with maximum variation and criterion based protocals[49,58,59]. Criterion sampling selects individuals of interest based on a set of inclusion or exclusion factors, and maximum variation attempts to broaden the participant base. In this study, gender and ethnic background were used as part of a maximum variation selection strategy. Inclusion criteria include students who are: undergraduates with designated majors as engineering; willing to be personally interviewed and audio recorded for approximately 90 minutes; willing to be available for a short follow-up interview, if needed; willing to voluntarily sign the IRB approved consent form; and were not students of the PI. Prior to the three step sampling process described below, I conducted a pilot interview of three students who met the inclusion criteria.

1) Identify students

A study announcement email was sent to all undergraduate engineering students describing the research and asking for response from those interested. The PI visited representative classes across the engineering majors to describe the study and ask for response from those interested. A total of 206 students expressed interest (113 from email and 93 from class presentations).

2) Establish criteria qualification and questions used for purposeful sampling.

The PI sent an invitation to participate in a Qualtrics (qualtrics.com) survey to all 206 students. This survey confirmed criteria qualifications and asked three questions related to help-seeking. We used these responses to help ensure a broad spectrum of help-seeking feelings. A total of 110 students completed the Qualtrics survey. Of these, 4 did not satisfy the criteria leaving 106 qualified students.

3) Purposeful sampling and maximum variation

The Qualtrics responses provided a maximum variation of views, 50/50 gender, and mix of ethnic backgrounds. Random selection was used to pick from the 106 students for gender, ethnic background, and HSB view response. Using these results, the PI personally contacted 21 students by email from which 17 became participants for a total of 20 students which allowed for the data to reach saturation[58]. Each student received a $25 Amazon gift card after completing the interview. No other benefits were provided.

Although all 20 students were interviewed, 10 students were selected (Table 2: Student Participants for data analysis. We analyzed the data after selecting the group of 10 so that the analysis did not affect the selection. We will follow this group of 10 by analyzing data of the remaining students as part of the comparative process and verification of findings. Overall, we believe this unique sampling technique ensures an empirical approach having a broad representation of gender, ethnicity, and spectrum of feelings related to help-seeking behavior in engineering students.

Table 2: Student Participants

Pseudonym	Gender	Ethnic Background	Interview Length
Ben	Male	Caucasian	77 min
Cameron	Male	Caucasian	91 min
Donna	Female	Caucasian	86 min
Edward	Male	African American	49 min
Ian	Male	Caucasian	73 min
Jill	Female	African American	77 min
Linda	Female	Asian	61 min
Robin	Female	Caucasian	57 min
Steve	Male	African American	94 min
Ursa	Female	African American	75 min

Data management

Data relating to prior literature are maintained on Mendeley. Excel was used to annotate key items related to the literature along with charts and concept maps which were drawn on paper. Interviews were captured using two digital recorders (ZOOM H1 and ZOOM H4). The audio files were transcribed by a professional service. The PI reviewed, validated, and anonymized each transcription by carefully listing to each recording and comparing to the transcribed results. Any edits were made by the PI and tracked in a separate file. The transcriptions are stored on the PI's password protected computer and cloud based Google Drive. The transcripts are loaded into NVivo 11 software to aid data analysis by providing a means for organizing the data, capturing codes (called nodes in NVivo), synthesizing results, searching for patterns, and archiving the evolution of the analysis. Field notes were hand written immediately after each interview and after the initial transcription review.

Data analysis

The analysis draws from grounded theory using the constant comparative method[63,64]. Holton[65] described the constant comparative method as involving three types of comparisons. First, using descriptions emerging in vivo from the data along with a priori codes, incidents are compared to incidents to establish underlying categories or concepts. Second, previous concepts are compared to incidents from new data which may require creating additional concepts and/or refining previously generated concepts. The objective at this point is saturation of concepts as new data are collected. Finally, the third step is comparing concepts to concepts. It is a continual, recursive process until the data indicate saturation of concepts[66].

The PI first coded using in vivo and topic codes. This was followed by grouping codes into categories. During the categorization process the two investigators discussed the categories as they emerged from the codes providing peer review for the study[58]. After an initial set of categories emerged, the PI examined categories having a large number (>20) of codes and looked for sub-categories. After coding was 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. This provided an ever emerging, expanding, and contracting code and category list throughout the process. By saving the entire NVivo record after coding each student, we were able to archive the evolution of the analysis.

The last step was to identify major themes relating to the categories. These themes have components from different categories all relating in some way to the theme. õA theme captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data setö[67(p82)]. The two investigators collaborated on these themes, the underlying sub-themes, the flow of the themes, and the priority with respect to the results reported. Themes and sub-themes were titled based on in vivo codes from the data.

Memoing was used to aid data analysis. Memoing and coding allow recurring patterns in the data to emerge. These repeated patterns characterize the data and precipitate primary themes to evolve from the data. The researcher interprets these themes in context of the study using the theoretical framework and the voices of the participants[56,68].

Assessing data quality

Merriam[69(p25)] describes internal validity as asking the question, õAre we observing or measuring what we think we are observing or measuring?ö. To safeguard internal validity, called credibility by Lincoln & Guba[70], triangulation and member checks were used. Triangulation for this study is achieved through number of participants and demographics of the participants which provide a rich mix of experiences for the study. The collection of data over different time periods strengthens triangulation. Member checks help to ensure that the participantsø views are accurately captured in the findings, and as already described, the co-investigator provided peer review during the analysis process.

Similarly, a number of strategies are available to strengthen external validity[58] or transferability[70]. This study uses rich, thick description along with actual quotes from the participants in the results and discussion. õWith such detailed description, the researcher enables readers to transfer information to other settings and determine whether the findings can be transferredö[58(p252)]. This study also uses careful selection of participants to maximize variation.

With respect to reliability, Merriam[69(p27)] states that although õreliability refers to the extent to which research findings can be replicated, í the more important question for qualitative researchers is whether the results are consistent with the data collectedö. For this study, the sampling methods are fundamental to the research questions; therefore, a dense description of the methods aid in the consistency of the findings.

Results

With the research questions 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 studentsø help-seeking response. Academic help-seeking behavior in engineering students is represented by conflicting influences which represent both penalty, primarily represented by conflating self-worth with help-seeking, and reward, primarily represented by understood benefit of help-seeking. Undergirding help-seeking behavior is the process or action of help-seeking which, according to the students, may or may not be understood, developed, or mastered. Theme titles and subtitles are represented from in vivo responses which attempt to capture the essence represented by the entirety of codes within the theme.

THEME I examines self-reflection, forethought, and experience related to deciding if help is needed; HSB drivers are also presented. THEME II reflects conflict associated with help-seeking which may demotivate or prevent help-seeking. THEME III examines social related factors which could act to either persuade or dissuade help-seeking. THEME IV examines how help-seeking is a meta-cognitive learned skill.

THEME I: õI hate not understanding things.ö

THEME I is the only theme in which students were unanimously represented in each of the three sub-themes. Engineering students are often assumed to be top students in most college programs. Even so, these students do find themselves in situations where academic help is needed. Although the student acknowledges and accepts there is an academic need, the student must make a decision in light of his/her priorities, motivations, and concerns.

I.a õI need academic helpö

All participants described or defined their own self-assessment, or forethought, of needing academic help with õunderstandingö, õgradesö, õI donøt knowö , and õI canøtö as examples. Experiences and self-reflection are expressed by students which aid in this acknowledgement.

> õif I need help on something or if Iøm not getting something, usually I ó I realize that thereøs a test coming up or something, like I donøt have time to just sit there and struggle. I have to understand it, so somebodyøs got to explain it to me. Like even though I want to get it on my own, itøs probably not ó Iøm sort of reasonable enough to understand that Iøm ó I need help in order to get it quickly.ö Donna

Donnaøs statement could, by itself, represent many of the themes in the results. She includes the thought, õeven though I want to get it on my ownö, which foreshadows the conflict within the student when faced with a help-seeking situation. The drive to do it õon my ownö is positioned against õI donøt have time to just sit there and struggleö, and õI have to understand it.ö These are oppositional influences and motivating drivers to not seek help and to actively seek help. These themes are explored in the remainder of the results.

The concept of õunderstandingö is a thread throughout many of the conversations with the students. In fact, using the word count utility in NVivo, õunderstand(ing)ö is the number 9 most commonly used word in all of the interviews for five letter and higher words which is remarkable for a 10 letter word (understand).

> õThe purpose of asking for academic help? The purpose of it is just for ó for the student to be able to understand ó to be able to understand. To understand the concepts, understand the subject. Because thatøs what youøre here for.ö Steve

Ursaøs help-seeking self-reflection coalesces many of the thoughts concerning need of academic help. Examples of forethought and experience as input are evident.

> õWhen I donøt ó when I just ó when I know that I donøt get ití when my grades donøt come out as hot as Iød like them to. When Iøm working on something that I thought I knew but now Iøm there and Iøm trying to do this work and itøs like I guess I donøt know it as well as I thought I did.ö Ursa

I.b õItøs going to be worth itö

Value, benefit, or worth is a personal thing; however, it was a prevalent theme for help-seeking. For many of the students, the benefits are equated with filling the understanding gap, positive influence on grades, or improving strategic, long term standing. These assessments relate to personal experiences within SE; however, the students show us that this is not enough to ensure that the student actually seeks help.

Grade improvement and õbetter understandingö are immediate benefits to help-seeking.

> õI expect to have a better understanding of the thing that Iøm struggling with. I expect to ó to not be struggling afterward.ö Cameron

"I guess if my grades were starting to get like really bad, then I would probably… go and ask for help more because then I would realize I can't do this on my own anymore and I need more help." Robin

For other students, help-seeking relates to more strategic events such as graduation or professional life.

"if I'm put in a situation where I do need to, I will make a decision not based on emotions but based on what would benefit me most, like in the future." Linda

Students viewing experiences as cathartic also see benefit related to struggle, sacrifice, and personal drive.

"I just had to pick myself up and realize yeah, I'm going to have some hard times and down days and yeah, engineering's going to cause me some sacrifices… It may be hurtful and it may not seem now, it'll be alright in the end… But I know when I get my diploma, it's going to be worth it." Jill

If the student makes the decision to seek academic help, the help seeking action is driven by compelling factors to completion.

I.c "I have that drive"

Once started, students describe help-seeking in ways relating to "drives", "filling a hole", and equating personal achievement with results. These drives are compelling, powerful, and help to ensure that once the decision to seek help is made, the help-seeking process moves to closure. This sub-theme helps to scaffold the idea that help-seeking is a stand-alone, metacognitive action.

Ian's driving influences to improve or keep his perceived standing versus other students also relate to a theme discussed later concerning personal rank compared to other students.

"I mean, I always want to be at the top of the bell curve. I – I'm not happy with being at the average, I guess. So that's a motivator." Ian

Students also express the idea that hard work and effort is part of the reason that they are in an engineering program.

"I've always felt like if you don't really put every – all your effort into it, you – why – why are you really doing it in the first place? So I've just always put all my effort into it." Donna

The drive to fill the hole caused by lack of understanding is strong and, often, emotional.

"I can find the answer; there is an answer out there somewhere. It's not going to be easy but it's going to be there. And what drives me is like just completely like – it's like having a puzzle piece and just wanting to get that last piece, like completing the puzzle piece. And then when you get the puzzle piece completed, you just have that satisfaction that I've completed it. Even though it wasn't easy, I got it completed. And just the

satisfaction along that feeling is what motivates me, what drives me to find the answer." Jill

For Linda, the need to have a question answered overtakes other priorities.

"let's say I need to write a paper but if I have something else on my mind, like how do I do this, — I'm not going to be able to write my essay. I'm going to be — I need to solve that first because that's an immediate question that I need to solve and then be able to work on my paper." Linda

Many of the students responded that they would continue to pursue an answer until found. We will also see (in THEME IV) that students will adapt and implement recursive attempts to complete the help-seeking process.

"if I don't understand — like if I want an answer, I want an answer and like that's — that — that's 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 and making like one, you know, cohesive grasp on it for me, that is — that's what drives, because I don't want to think that I have a solid foundation or a solid grasp of something and then I go to the next step and it turns out like I'm missing a leg or I'm missing a bit. That doesn't help me at all. I have to make sure that it's complete — like grasp is solid." Ursa

Student responses in THEME I relate to mastery experiences, forethought, and help-seeking as an action with inputs starting the help-seeking process and drivers to complete the help-seeking action once started.

The help-seeking process is powerful for students. During the interviews, I noted urgency and compassion describing the need for academic help and drivers to pursue academic help if the help-seeking decision is to act. We use the phrase, "if the help-seeking decision is to act". The research questions relate to help-seeking action and help-seeking avoidance. The next two themes offer insight relating to help-seeking avoidance in the face of acknowledged need to seek academic help. These themes are different in the major constructs but similar in that they act to conflict with the statements made by the students concerning acknowledged need of help. It is this conflict which, we believe, ultimately determines the decision to actively seek or avoid help.

THEME II: "I'm flawed but that's okay"

If the research results stopped at THEME I, all students understand when help is needed and the benefits of help; however, the students described emotional feelings and conditions related to self and social concerns resulting in conflict with the need and benefits to seek help. The theme title relates to the emotional, often self-deprecating view of needing to seek help, but at the same time, there is a realization that it is necessary and "okay", both of which offer a precarious balance for the student. The views are inward looking and often relate directly to Dweck's STOI as having an effect on action independent of what self-efficacy inputs might indicate. These effects can be positive or negative depending on the view.

II.a "Afraid of being judged"

When faced with reflecting on help-seeking experiences, feelings of judgement, embarrassment, or a sense of stage fright were often expressed by the engineering student cohort exemplified by "eyes", "looking", and "center of attention". (Researcher comment: I noted many times in the interview that although I would ask a question related to their own feelings, the student would often relate the answer to the third person instead of first person).

> "people are fearful of others judging them for asking a question. I don't know why that's innate in a lot of people all – like over time, it seems to get worse. But – I guess people feel that– everyone's looking at them because they're asking a question, so they're looking to see, you know, who it is or looking at them to hear it." Ben

Donna and Linda expand on what might cause embarrassment.

> "people sort of feel like they're on stage in front of class, if they're asking a question. Like everybody's looking at them, sometimes people don't like to be the center of attention. It might not necessarily be embarrassment as much as like discomfort." Donna

> "Because I just imagine like eyes looking at me and I'm not an attention seeker, so I get really nervous when there's like so many people just looking at me. So like I just imagine that – back of my head, just people looking at me whenever I ask questions." Linda

Robin offers another explanation relating view of intelligence with judgement. Robin's view actually relates to multiple themes in the results: judgement, view of intelligence, and conflict (Theme II) and comparison with others (Theme III).

> "a lot of people are probably afraid of being viewed as less intelligent for asking a question. I would say that's probably it. Even though I don't think that's the case, but – like I don't think that they're any less smart for asking a question. I feel like that's how they're afraid of being judged." Robin

Steve bridges the sub-theme of judgement/embarrassment with that of the student's view of their own intelligence (also in Robin's thoughts above).

> "one of the reasons why I don't want to ask questions, because I was scared that I was going to look like I was behind and I– felt intimidated by – some students were able to grasp it quicker. So I kind of felt like I didn't want to look – I didn't want to look like the person that didn't understand or look like the person that's behind." Steve

II.b "Flaws in your character"

This sub-theme relates to the student feeling emotions or having views that are often self-deprecating in some way. Thoughts relating to "not perfect", "flaws", "stupid", and admitting "I can't do this on my own" relate to this sub-theme. Not all students expressed experiences or feelings in this area, but for those that did, strong, climatic emotions are resultant.

Ben, often short on words, expressed this thought without flinching.

> "I'm – I'm not feeling any regret or anything, I'm just feeling like I don't know everything, I'm flawed but that's okay." Ben

Ben's self-reflection calls himself õflawedö, and in the same breath, says õthat's okayö and says he does not õ(feel) any regret or anything.ö This directly relates to an internal conflict concerning help-seeking and what it means to Ben to admit that he needs help.

Other students expressed similar thoughts concerning help-seeking and how it exposes character or personal attributes but also an inner strength.

> õImperfection. It's admitting that there's ó you will have flaws in your character, in your knowledge and it also admits that you're willing to learn more, you're willing to expand your knowledge. Like you're willing to not just stick with what you have, you're willing to grow more on it and just develop yourself as a person.ö Jill

Linda equates reaching out to others with feeling õlesserö.

> õI do feel a little lesser than myself, I guess, because the fact that I have to ask this question to understand this concept while everyone else is getting it without asking the question.ö Linda

II.c õMaking yourself vulnerableö

In this sub-theme students recognize there is õa struggleö, õstressö, and self-acknowledgement of conflict by using phrases like õbut, that's okayö. We believe this idea of vulnerability is, perhaps, the actual crux of the help-seeking decision. If vulnerability can be overcome by other inputs, help-seeking can proceed.

Edward seems to imply that knowing hurts more than asking; they both hurt, but if you don't ask, it hurts more.

> õme not asking for help, knowing that I need help, would hurt me more than asking for help and that's a good thing to ask because it's going to help me in the future.ö Edward

Although Ian indicates it is okay õto go and askö, he argues that he does not feel guilty and stupid which may relate to conflict relating to those feelings. He also explicitly calls out stress as a result of not seeking help. Ian's debate within himself appears to expose inner conflict.

> õif it's something that I really can't figure out, I feel okay asking a question because then it's probably pretty difficult. So then it's okay to go and ask ó I don't feel like guilty or stupid or anything like that. If it's something ó if I've got like a homework assignment due and there isn't time to go and get help, then I can feel very stressed out not understanding it or not being able to answer it.ö Ian

Robin equates help-seeking with not learning õto the best of my abilityö.

> õI normally like to try to figure things out on my own because I feel like if I ask for help then I'm not really learning it to the best of my ability, so I've never really been one to ask questions.ö Robin

She also equates help-seeking with õbeing human. I don't think there's anything wrong with getting helpö (Robin). Robin also exhibits inner conflict concerning help-seeking.

Jill summarizes her struggles related to help-seeking.

> õThe struggle is revealing yourself, exposing yourself, reveal ó like making yourself vulnerable. Saying hey, I need you, I need your help. And just opening up. I think thatøs the struggle. People have a hard time, struggling, opening up themselves. And probably a lot of people have experienced or had a bad memory where they made themselves vulnerable and they ended up getting broken and hurt because of the person. So I can understand why some may struggle asking for help.ö Jill

Jilløs response exposes the vulnerability in help-seeking expressed in different ways within THEME II and corresponds to personal experiences related to SE and STOI inputs. Although some experiences relate to perceived views of intelligence, Jill indicates it is õopening up themselvesö to others exposing and confronting these views which leads to vulnerability, humbleness (expressed by other students), and the overall õstruggle asking for helpö.

THEME III: õNobody wants to be the person thatøs behindö

THEME III is more outward looking and represents how the student ranks himself or herself compared to others, feels about whether or not they are õdoing college rightö, and vicarious comparisons of what other students do or think. There are also aspects of social influences within this theme. No sub-theme is unanimous across all students. While THEME II primarily relates to help-seeking deterrents, the elements related to THEME III may act as persuaders or dissuaders to help-seeking behavior depending on the perceived relationship to others.

III.a õI really wanted that cordö

Students expressed the importance of understanding where they rank compared to others in the class. In some cases, as in Benøs case (below), this desire may motivate a student to ask for help if the help-seeking action relates to being õthe bestö; however, it may also discourage help-seeking if, as in Robinøs case (below), the student does not want to know where he or she stands in relation to other students.

Ben exemplifies the drive to õbe the bestö in comparison to others.

> õI have that drive to always get the best score possible and mostly just impress myself, not even to necessarily impress others but just to show that I am, you know, one of the top students, I can be the best and that drive just keeps me doing work and making sure I study and stuff like that, so that way I can be the best.ö Ben

Linda thought back on her high school graduation and exposed motivation deeply seated in how she ranked compared to her classmates.

> õIn high school, if you got ó 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 cord.ö Linda

> õAnd what do you think that represents for you?ö   (My, PI, response)

> õThat I am above average (laughs).ö Linda

While some students are concerned with "being the best", others are equally concerned about not being "that guy that's behind."

> "I'm thinking about what they think about me and I don't want to be thought of as that guy that's behind or that guy that's a little bit slower than everybody else. I know you shouldn't — worry about that but I do at times and it's just — I guess it's human nature, you know? You just — want to be within the crowd that understands. You don't — you never want to be that — that black duckling or that person that's just kind of out on the outskirts who's just trying to figure it out — So I feel intimidated by that." Steve

Donna and Edward are concerned about if others are struggling or not and how this affects his feeling about asking a question.

> "like if somebody's struggling with something, like the whole class might be — it's easier to figure out how other people are feeling in a class about — and you can find people that are feeling the same way about something. And I wouldn't feel as bad asking it" Edward

> "— if I'm among a group of people that also don't understand, I am much more likely to ask for help from a professor. Just because we're all sort of sitting there together, struggling." Donna

Robin views comparison to others in a very reserved way. She does not want to know where she ranks compared to classmates.

> "I tend to not like to compare my grades to other people. Like I don't want to know how my friend's doing in the class because I feel like— if they're not doing very well in the class, then I would be like oh, well it must be a hard class. Then I shouldn't expect to get a very good grade. And then if I get a bad grade, instead of thinking like oh, well I— should try harder, I might think like oh, well it's hard a class so I can't really expect to do much better. So I try not to let other people really influence me as far as how they're doing in the class." Robin

Robin indicated to me that "she'd only ever asked for help one time." She only reached out when every other approach on her own did not provide an answer. Robin does seem to provide an example of help-seeking avoidance influenced by a "fixed" view within STOI.

III.b "I'm not doing college right"

Student responses within this sub-theme relate to their own assessment of doing academic related activities the "right" way. The student's perception may be related to what the student believes others believe is the correct way to proceed. If the student is concerned about doing something incorrectly, it may relate both to SE and to STOI inputs influencing behavior.

Cameron compares himself to his roommate and decides he's not doing it "right".

> "there's no clear differentiation between which class I'm in. It's just like random things. I would never go back and look at my notes or anything like that. And so I — you know, comparing myself to him, I got the impression hey, I'm not doing college right." Cameron

Steve is conflicted and does not understand why his classmates "know that and I don't know that". He relates how it affects his "psyche".

> "I kind of think about like man, I don't know that pretty well, what am I going to do?...it kind of makes me distracted and it makes me think about why don't I learn – why don't I know this stuff– so it kind of messes – messes (laughs) my psyche up– I think back and I'm like why does he know that and I don't know that? Or why am I having more trouble with that? So that – that – that's a little discouraging." Steve

If students perceive they do not measure up to others, perhaps they are in the wrong discipline as expressed by Cameron.

> "I 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." Cameron

III.c "I'm just super concerned about what people think of me"

Students perceive and measure their own self-value based on what others think of them.

Linda relates lack of questions by classmates to understanding; she also connects need to ask a question with judgement and intelligence.

> "I guess I feel like I'm being judged that I'm not understanding the topic. Yeah. And I feel like if they don't have a question to ask, that means they understand the topic and I don't. So maybe I get the sense that they're looking down on me." Linda

Robin's perception of herself as average causes her to equate other's results with her own.

> "I guess I tend to consider myself to be average so I guess– if that person couldn't do the problem then I would assume that oh, maybe I can't do it either because I assume that I'm like maybe an average student– that's just how I think, I guess." Robin

Ursa relates how her desire to "fit in" is strongly related to what people think.

> "Maybe people don't know but every day we wake up, we're 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 I– just want – I just want to fit in and I think that would help me fit in." Ursa

At the end of the interview, Ursa expressed this when I asked her if she had any parting thoughts. She is speaking directly to me, the PI.

> "I don't want you to think of me as a person that – that's 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." Ursa

Ursa is concerned with what I think of her based on our short time together for the interview.

THEME IV: "If plan a and b don't work, there's plan c, plan d, all the way to z."

This theme relates to help-seeking behavior as a learned action or skill. The student may or may not enter college with strong SE inputs of mastered experiences, vicarious examples, or social

influences to efficiently and correctly seek help. The implications of this to help-seeking are profound. Results feed into future help-seeking responses. How the student modifies behavior based on outcomes can affect whether the student continues to seek help and how the student seeks help.

IV.a "It's like putting your big boy pants on"

This sub-theme, represented by all of the students, acknowledges that learning how to seek-help is the responsibility of the student and requires a plan.

> "in college, it's like putting your big boy pants on. It's a whole different situation. And you just have to grow up and realize alright, I can't do what I did then, now I need to step up and do what I need to do so I can pass this class and keep going." Edward

Ben describes help-seeking as a multiple instance process.

> "But if it's a sense of you trying to understand the subject as a whole and you're getting help and you're – then you're probably asking multiple questions and getting multiple instances of help with the professor, like going to their office hours and having discussions over it the entire semester." Ben

Donna, referring to her drawing, describes her help-seeking as a "little process".

> "I guess it did sort of go through my little process but I don't know, if I hadn't thought of like doing it like a comic strip, I would probably – Just have doodled like me with a professor (laughs). But that – yeah, but once I got like the comic strip sort of version, it helped, I guess. It showed my little process of how – who I go to talk to." Donna

Ian discusses the concept of a "good question", what to ask about, and the difficulty that sometimes presents.

> "I think interacting with them, especially with professors. You can tell when you do – when you ask a good question and a professor is happy that you asked a good question that shows that you're like thinking about it the right way or that you understand it, I think, yeah, that is – that reinforces confidence." Ian

Jill describes an iterative approach to finding resources that help for her.

> "I feel like they're also alternative plans, like if one – one resource does not work, you can always resort to the other. And if that resource doesn't work, there's always a plan C. If plan A and B don't work, there's plan C, plan D, all the way to Z." Jill

Steve describes help-seeking as a learning process for him.

> "I think they're – they're courageous (laughs) because I – I couldn't do it. Any time I see a person that does that, I think they're very bold and very brave because I'm learning how to do it." Steve

Ursa describes help-seeking as something that is learned for her.

õwhen youøre trying to learn in the beginning or you have questions, when ó when I go ask somebody and I get an answer, like a direct answer because Iøm seeking help from that person, then thatøs like learned and Iøm like shifting towards that way rather than somebody just telling me to go look it up, then Iøm not getting any help, Iøm getting like the help from myself.ö Ursa

Not seeking help is also a learned skill. Robin õgot used to not asking questionsö and so she does not ask questions. Robin would have to unlearn this skill and learn how to ask questions.

õI think it just kind of stems back to when I was really young, I was really shy so I wouldnøt 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 wasnøt really like a matter of shyness anymore, it was just I was used to figure out things by myself.ö Robin

IV.b õMy own knowledge obviously isnøt good enoughö

If help-seeking is a learned action or process, then learning must come from either outside influences (vicarious examples) or experiences along with modification of new help-seeking actions based on prior results. This sub-theme looks at the former. Students described situations in which their own experiences may not be õgood enoughö but indicators from those around them provided insight into the correct course of action. Instances are described where the input, feedback, and actions of others influence help-seeking in a positive way and a negative way, both of which act as guides for the student on what to do or not to do when faced with similar situations in the future.

Cameron has already related examples related to õnot doing college rightö. Cameron describes social pressures related to doing what youøve seen others.

õI donøt know. I guess just like sort of the ó the social pressure of only doing something that, you know, youøve seen somebody else doí So just like ó just sort of somebody has done it, this is socially acceptable.ö Cameron

If others also donøt understand, it is okay to seek help.

õif Iøm among a group of people that also donøt understand, I am much more likely to ask for help from a professor.ö Donna

Because being õin the same boatö makes it okay.

õBecause sometimes knowing that thereøs other people struggling, it makes you feel a little bit better saying okay, weøre all in the same boat. We can all get through this together.ö Jill

Ursa does not trust her own experience but looks to others for direction.

õIøm going to trust experience ó the experience of people whoøve been there and they know whatøs going to happen versus my own knowledge which obviously isnøt ó itøs not good enough ó í people who have the experience is just another notch of the knowledge that I donøt have and therefore, the peopleøs experience is ó itøs weighted more.ö Ursa

IV.c õAfter you learn from that experience, you probably wonøt do that againö

Vicarious and social influences provide inputs into the help-seeking process related to what is acceptable from an outward looking perspective. The results, if reflected upon by the student, become experience inputs into the decision process for seeking-help in the future. These, along with other experiences, act as inputs into learning what works and does not work related to help-seeking for each student.

The following examples all relate experience as an input into learning how to seek help. The need to õchange it upö (Edward) is often expressed.

> õYeah, acting on instincts. And if I feel like what Iøm doing is right or getting me in the right direction, Iøll keep doing it. Basically just do as ó do what I think is right and then keep going in that direction. If itøs not right and I feel Iøm not doing the right thing, so change it up if itøs not feeling right.ö Edward

> õFor me, it would just make me learn that if one way does not work, find another way. If it doesnøt work, find something else. Keep doing it until I actually find one that actually gets me to where I need to be.ö Jill

If the last method did not have good results, perhaps a change is needed.

> õI wasnøt understanding the material well enough, I should have, uh, reached out to the professor and set up, uh, maybe another ó or a one-on-one session to ask for ó you know, ask for help or go to the tutoring session after ó or go to the office hours after the test to, um ó you know, to get more answers as to what Iøm doing incorrectly, why Iøm doing things incorrectly.ö Ben

Steve relates experience and doing things over and over with getting õbetter at itö.

> õWell, I believe that theyøre learning how to seek help because ó because like ó well, theyøre obviously asking for help and you ó once you do things over and over again obviously, you know, youøre going to get better at it.ö Steve

Similar to Ursa, Steve responded to my õdo you have any other thoughtsö question by reflecting on the interview. He critiques himself concerning prior help-seeking actions. It is a glimpse of the reflection on results process at work which would become an experience input into his next help-seeking decision. He discusses different strategies, learning how to seek help, blocking out professors who gave a bad experience, and ways in which he could alter his next course of action. It is a glimpse into learning how to seek-help.

> õjust by having this conversation, it makes me think back of different things that I could have done as far as me seeking help, different strategies. You know, maybe I shouldnøtí just blocked the teacher out. Not necessarily block them out but just ó just base it off that one experience. Maybe like a lot of situations I have been in, maybe like for instance, I could go over and re-evaluate the question that I asked to them, you know, and ó and I never thought of questioning or learning how to ask teachers ó I neverí thought of it as a skill and learning how to do it and now that I think about it now

as I was able to talk, I thinkí I need to develop it because I think that will help me do a lot better in class.ö Steve

Discussion

Two primary conclusions erupt from the findings for research question one. First, internal conflict resulting from need and benefit of help-seeking is opposed to the perceived view of self and the dependence on the actions and views of others. Second, help-seeking is a learned skill resulting in students struggling with ways to improve, adapting future methods based on prior results, or, in some cases, detouring from help-seeking all together. We address these two conclusions looking back to prior work and forward to pedagogical implications and future avenues of inquiry.

Conclusion one: Internal conflict defines the help-seeking process

Conflict requires opposition. THEME I represents the protagonist for help-seeking, THEME II the antagonist, and THEME III can represent either side in the conflict. Referring back to the Karabenick & Berger[45] HSB steps, what is missing is a recursive, emotional, conflicting decision process as part of the overall help-seeking construct. Help-seeking may be acknowledged in step one, but the decision is not made as neatly and clinically as implied by the steps (2-6) or by what SE inputs might imply. Instead, as shown by the studentsø voices, vulnerability, humility, self-abasement, judgment, embarrassment, and other perceived influences act to change the help-seeking course of action. 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 no concern over opinions of others; however, in the majority of the students interviewed, the converse was true. The õvictorö of this internal conflict is often a decision not to seek active help which ends the help-seeking process. Upon careful consideration, many of these conflicts relate to ranking, intelligence, perception of õbeing behindö, and not doing things õrightö, all of which are constructs described within Dweckøs STOI[21,71]. As previously cited, others have acknowledged conflict related to õlooking dumbö; however, none adequately capture that the student (although we are looking at engineering students, we believe this is applicable to a broader scope) does actually acknowledge the need and benefit of help-seeking first followed by a conflict resolution stage in which õlooking dumbö may be a minority concern among many others described by the students in THEMES II and III. It is during this conflict resolution that the help-seeking decision occurs.

SE 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[72676]. SRL theory would argue that if forethought indicates that an action should proceed it probably will proceed[38,77,78]. If either is necessary and sufficient, all individuals would continue with the help-seeking process; however, within and during the forethought part of the process (steps 1-6), the conflict primarily exposed from STOI constructs (but also from primary conclusion two described below) become factors in those that decide not to seek help. From a SE perspective, this may become a spiral reinforcing the negative decision in future situations. That is, if the decision is made not to seek help, this decision which reduces/removes the internal conflict may reinforce itself the next time a decision to seek help is made. We see examples of this in many of Robinøs statements. Her fixed STOI view is highly

concerned with not knowing how she compares with others and has established a history of not seeking help because of this; it is what she is õused to doö.

We have tried to capture this conflict, this õstruggleö, in the help-seeking process by adding to Karabenickøs steps and providing a model representing HSB as an action with SE and STOI inputs (Table 3: The HSB Process Modified With Study Results. What we see is a conflict resolution during stages (2-5) in the original model. The resolution at any point during these stages could be to stop the help-seeking process (go it alone or ignore the problem) or to decide to actively pursue help. If the decision is made to actively (adaptively) seek help, help-seeking drivers as described in THEME I come into play and help-seeking learning occurs. Of course, if the choice is to not seek help, help-seeking learning also occurs but in a negative reinforcing way.

Table 3: The HSB Process Modified With Study Results

Help-seeking metacognitive process stage	Within SRL Framework Including HSB Learning	From a SE/STOI perspective And HSB Drivers
(1) Determine if there is a problem	Forethought	Self-efficacy inputs
(2) Determine if help is needed or wanted Y/N	Conflict Resolution	Self-efficacy inputs
(3) Decide to seek help: Yes/No	Conflict Resolution	SE & STOI inputs
(4) Decide on the type of help: avoidant or adaptive	Conflict Resolution	SE & STOI inputs
(5) Determine whom to ask for help: Self or External	Conflict Resolution	SE & STOI inputs
(6) Solicit help	Performance/HSB Learning	HSB Drivers
(7) Obtain help	Performance/HSB Learning	HSB Drivers
(8) Evaluate help received	Self-reflection	Self- & Method- Judgement
Still need help?: (1r)	Change in HSB Skill	Feedback into future SE inputs
(1r) Reevaluate the problem	Self-reflection/Course correct	New SE from prior results
(2r) Determine whom to ask for help: Self or External	Performance/HSB Learning	Prior Result, SE & STOI inputs
(3r) Solicit help	Performance/HSB Learning	HSB Drivers
(4r) Obtain help	Performance/HSB Learning	HSB Drivers
(5r) Evaluate help received	Self-reflection	Self- & Method- Judgement
Still need help?: (1r)	Change in HSB Skill	Feedback into future SE inputs

If help-seeking is the chosen course of action, the student is driven to complete the help-seeking objective. This may indicate that the internal conflict, once resolved (this is the studentøs õcrossing the Rubiconö moment), becomes a powerful incentive to mitigate the academic lack of understanding and remove the õstruggleö which then acts as a positive feedback reinforcing the positive decision to seek help in future situations. This is not unlike inputs into mastery experiences within SE. We attempt to capture this within the model by adding a recursive õtry againö loop to the model (1r-5r). In the recursive steps, the conflict resolution having already occurred is no longer present; instead, HSB learning and HSB drivers (THEME I) are at play to resolve the issue. The student continues in this recursive loop adapting, moving from õPlan A to Plan Bí ö (Jill), and õchange it upö (Edward)) until step (5r) is resolved. Step (2r) allows for seeking help by self-help or from external sources. If the decision is to pursue self-help (internet, reading, working problems), it does not imply that the help-seeking process is over. The student continues to step (5r) and evaluates progress. The iterations through the loop may include going

to the professor last after trying all other courses of action (including self-help) which we found in some student responses. The primary motivators in the loop section appear to be the HSB drivers and the HSB learning process identified by the student adapting methods and attempts to resolving the need for academic help.

The model begins to present HSB as a stand-alone action with its own SE and STOI inputs and steps independent of other actions or requirements that may have caused the help-seeking behavior in the first place. The conflict resolution steps are, we believe, critical in the help-seeking process; therefore, a better understanding of critical incidents, feelings, or triggers related to conflict resolution is fundamental to understanding what motivates students to seek or avoid academic help. We equally believe understanding the recursive nature of the HSB process is fundamental in understanding HSB, and we plan to investigate this more fully.

Conclusion two: Help-seeking must be learned, even for engineering students

One of the strengths of qualitative inquiry is that the participants bring with them the real õrealityö and unexpected revelations are the result[49]. In this case, one of the early participants, Steve, expressed the idea of help-seeking as something that he is õlearning to doö. This was an õahaö moment[79] in the interview and for the study and laid the groundwork for THEME IV. Seeing this conclusion emerge felt õrightö and intellectually made sense to us. What was surprising is that we did not expect 19-22 year old engineering students to acknowledge the need to learn help-seeking skills. Although not presented here, we did go back to the data and found where many of the students indicated that they did not need to ask for help in high school due to easiness of high school, much slower pace, and abundance of repeated instruction; therefore, these students may not have learned how to seek help prior to entering a competitive undergraduate environment. By following the theme and going back to the data, help-seeking as a learned skill resonates with the students and with us, and, therefore, is presented as the second primary conclusion from the results.

Overall, this result confirms the call for more qualitative inquiry from quantitative researchers in this field. We believe it not only provides additional context to the model but also strengthens the model and provides additional insight into the help-seeking process especially the way in which students take prior actions of help-seeking and make adjustments, or course corrections, for future help-seeking.

After identifying this result, we looked for aspects of self-efficacy as inputs into this learning process. Based on prior discussion, if HSB is an agentic, metacognitive, learned action, it should have influences of SE. Referring to THEME IV, three sub-themes emerged with the first (unanimous in the student data) expressing the thought of help-seeking requiring learning and the next two related to the SE framework. Based on SRL, positive learning is accomplished with action (a decision is made regarding help-seeking) and self-reflection of results or by instruction or guidance from others[37,38]. We see examples for each of these in the voices of the students. We also believe that the aspect of learning how to do help-seeking may provide additional input into the internal conflict previously described. If a student is well-trained in help-seeking, it may mitigate the conflict, increase SE influences, and result in active help-seeking; however, for untrained students like Ursa or Steve, who believes help-seekers are õcourageousö, lack of skill in help-seeking may catalyze the internal conflict resulting in a decision not to seek help. We, therefore, see these two primary conclusions as independent but also interrelated.

While Karabenick & Berger[45] do discuss self-monitoring of competencies in the adaptive help-seeking process, these relate to the competencies that started the HSB process and not the competency of help-seeking, itself. They also describe work relating to improving how to ask a question (in a classroom context)[80], but the prior work identified does not call out help-seeking as its own learned skill; therefore, we believe this area of inquiry is beneficial both in quantitative and qualitative forms especially regarding college students. Although our results do speak to these questions, we intend to pursue this line of inquiry in future works with an eye towards examining ways in which students course correct their own help-seeking experiences and ways in which classroom structures vis-à-vis groups and professor interaction affect HSB.

Discussion of gender and ethnic concerns

Acknowledging the dearth of prior research on gender and ethnic differences of HSB in engineering students, we examined our results within the themes and attempted to categorize each student based on their descriptions of where they view themselves versus others as well as their perceived views of others towards them (Table 4: View of others related to conflict. THEMES II and III primarily relate to views of self in relation to others and provide emergent findings. Going from left to right, the studentøs views of others also relate to the feelings of conflict regarding the help-seeking decision. We used abbreviations in the table to represent ethnic background with (C) representing Caucasian, (AA) as African American, and (A) as Asian.

Table 4: View of others related to conflict

Compete with others	Collaborate with others	Get reassurance from others	Approval of others	Withdraw from others
õalways get the best score possible and mostly just impress myselfö Ben	õweøre all sort of sitting there together, strugglingö Donna	õSo just like ó just sort of somebody has done it, this is socially acceptableö Cameron	õevery day we wake up, weøre driven by what other people think of us and I want people to think highly of meö Ursa	õI donøt want to know how my friendøs doing in the classö õI tend to consider myself to be averageö Robin
Very little conflict (performance driven) Inwardly focused		Conflict emerges (situational) Balanced focused		High conflict (self-worth) Outwardly focused
Ben (C) Ian (C)	Donna (C)	Cameron (C) Edward (AA)	Jill (AA) Ursa (AA) Steve (AA) Linda (A)	Robin (C)

While we cannot generalize to any other population, we do see most of the female students in the õapprovalö category, and while Donna is in the õcollaborateö category, the middle three categories are similar in that there is an empathy component relating the student with the group. The male students are weighted to the middle and left of the table implying less concern with what others think or do and more concern with relationship of others to getting the job done or õbeing the bestö. Male student conflict with help seeking may be more inwardly focused and concerned more with weighing the need for help-seeking with the academic (grade) standing compared to others or with reassurance that they are on the right path. In female students we see more of an outwardly focused help-seeking conflict with high value placed with the feelings and actions of others. The female students expressed value in friends and knowing where they fit in

relation to others. The difference between the õcollaborateö and õapprovalö category is that Donna sees herself as part of a group õin the same boatö and does not equate her self-worth with others; however, those in the õapprovalö category place the student in a separate clique from others where the student does not want õto be the one who is behindö. It is no longer a collaborative relationship but one of desiring approval or, better stated, desiring no disapproval from others.

Prior empirical work on gender differences typically investigate self-efficacy or academic achievement with help-seeking as an adjunct component[13,15,33,81,82]. One quantitative study found no differences between men and women related to academic help seeking behaviors[83] (which we disagree with based on our results). 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 that female students were more likely to work with others; however, it was important that they felt confident versus peers[13]. Another quantitative study found that 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[18]. These results relate in some way to our findings but ignore motivational factors, internal conflict, STOI, and HSB as a learned skill described in our findings and leave ethnic influences silent.

Ethnic differences related to help-seeking is an understudied topic[15]; this is more pronounced in engineering. Using our sampling technique, we attempted to allow for cultural and ethnic differences to emerge; consequently, our data does provide insight into differences related to the studyøs context. We see all of the African American students in the third and fourth categories with a majority in the õapprovalö category. It is interesting to note that with Linda having an Asian background, all students in the õapprovalö category represent minority ethnic backgrounds in engineering. The two categories denote the desire to do what others are doing and to õnot look badö in front of others; that is, no disapproval is important.

Our results are emergent findings in demographic groups acknowledge by other researchers to be underrepresented in prior research. We believe there are additional results in the data which relate to gender and ethnic nuances and plan to pursue these. We encourage researchers to examine gender and ethnic related concerns in their own qualitative endeavors. Given the typical demographics of engineering programs, quantitative inquiries may not be an available course of action due to sampling concerns.

Implications

Instructors can mitigate the conflict felt by students when needing academic help. Empathy training or role-model exercises in an introductory Freshman class would cast light on the issue to all students. Sometimes being aware of an issue affects a change in behavior by all[84]. If the student recognizes that he or she is experiencing HSB decision conflict, it may allow the student to better self-regulate and direct the conflict resolution within. If students recognize that this occurs in other students and that they are not alone, it may increase empathy in the classroom and provide a more welcoming environment to HSB.

In all cases, instructors must be aware that they set the tone in the classroom for acceptance of HSB. Based on the results in THEME II and III, the classroom environment, peer reaction and

professor reaction all relate to the internal conflict. It is up to the instructor to mitigate this as much as possible especially for female students and students from under represented ethnic backgrounds. With help-seeking as a learned behavior, instruction should be provided either in the syllabus or explicitly taught in the first days of the class describing appropriate methods for HSB and encouraging the same. The instructor may consider the use of anonymous questions or posting questions received so that all students see and receive the benefit of the question and answer. We believe this teaches that HSB is õokayö and also teaches techniques regarding how to ask questions.

Classroom related issues are noted by many students. õAll of those eyesö, õon stageö, õmy friends arenøt with meö, and others all relate to class size. If HSB is a learned skill and is highly influenced by internal conflict, we do a disservice to college students by placing the most vulnerable population, Freshman, in some of the largest classes that they will experience in their college careers. We expect them to know how to seek help. They just need to õput their big boy pants onö as Edward eloquently expressed. In order to positively affect HSB, HSB instruction should be part of the curriculum; additionally, methods to make 300 student classes õfeelö like 20 student classes should be explored such as breaking into smaller sections.

With the emphasis that ABET places on lifelong learning, retention, and issues related to at risk demographic constituencies, it is imperative that engineering courses of study recognize the importance of academic help-seeking. Acknowledging the conflict within the HSB process and treating HSB as a learned skill will enable administrators, counselors, and advisors to initiate positive changes for both concerns.

Future research

We have indicated our own goals for future exploration based on these findings and encourage others to take these results, apply them to applicable contexts, and engage in follow-up research on conflict related to help-seeking, help-seeking as a learned action, and differences, if any, related to gender, SES, or ethnic background. This research was conducted at a large research university. Different institutional contexts may produce additional insight. Based on these qualitative results, we also call out for quantitative inquiry to further explore cause-and-effect and correlational based studies in these areas. These studies could be university, regional or national samples in an attempt to generalize these finding across a larger demographic. Finally, a comprehensive model (qualitative or quantitative) does not exist which fully captures the academic help-seeking process. Although we have added to this model, much waits to be discovered.

Conclusion

Academic help-seeking is an especially important skill for college students within competitive, academically strenuous majors such as engineering. While students can identify the need for help and understand that help-seeking is beneficial, many choose not to seek help even in the face of academic uncertainty, and those that often seek help, also often find themselves with an internal conflict relating to the help-seeking decision. We entered this study attempting to understand what motivates studentsøHSB decisions.

Using a lens influenced by our theoretical framework, we used interpretive analysis from semi-structured interviews to construct meaning with respect to academic help-seeking. Data were analyzed using iterative coding techniques from grounded theory methods. We identified codes emergent from the interviews, grouped codes into categories and from these categories, identified themes and sub-themes from the data. We carefully preserved the data record, confidentiality of the participants, and standards and requirements of the study's IRB.

We identified four primary themes. THEME I represented acknowledgement, benefit, and drivers of help-seeking. THEME II represented inwardly generated conflict. THEME III captured outwardly focused conflict and motivators. Finally, THEME IV presented help-seeking as a learned skill. From these themes we related HSB to prior SE and STOI constructs and presented two primary conclusions. First, internal conflict was presented as a deciding factor in a recursive, help-seeking decision process. Second, the notion of help-seeking as a learned skill, even for college engineering students, emerged as a key finding. We incorporated these finding into an adapted model for help-seeking and we presented HSB as a stand-alone, metacognitive learned action. We included gender and ethnic related concerns based on the findings.

Finally, we examined the results and their implications. In total, these finding should increase the knowledge base pursuant to help-seeking behavior in engineering students and, we believe, in other student groups as well.

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