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Engineering Tutors' Perspectives on How to Increase Engineering Students' Utilization of Peer Tutoring – A Work-in-Progress

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Work-in-Progress: Engineering Tutors' Perspectives on How to Increase Engineering Students' Utilization of Peer Tutoring

Abstract

Many universities offer free tutoring services on campus for students to access when seeking additional help in their courses. The tutors are typically upper-division students who previously did well in the courses they can provide help with. Unfortunately, on campus tutors are often underutilized by engineering students, limiting the impact tutors can have on retention and building community. The purpose of this study was to work with engineering tutors at a small, private university to identify tutoring and course related strategies to improve tutor effectiveness and increase student utilization of tutors.

We conducted an exploratory focus group with four engineering tutors to elicit their perspectives on effective tutoring and identify perceived barriers to student utilization of tutors. Data from the focus group was audio-recorded, transcribed, and analyzed thematically. The tutors expressed ways that they could become more involved with the courses they tutor and better prepared to help students seeking tutoring. The tutors emphasized greater course integration as a key factor in their effectiveness by suggesting access to the course learning management system (LMS), assignments, and opportunities to be in the classroom as learning assistants during active learning sessions. Some engineering faculty at the university where this study occurred began implementing some or all these strategies in their Fall 2025 and Spring 2026 courses. Additional focus groups will be conducted with tutors and faculty to assess the effectiveness of these strategies and what modifications or additional approaches might be needed. We believe the findings and lessons learned from this work are not unique to the university studied and could be beneficial for new and established faculty and departments looking for ways to provide their students with more effective tutoring support.

Introduction and Background

Retention of undergraduate engineering students has been an ongoing challenge as most STEM students who drop out of their programs do so in the first two years [1-3]. A recent National Student Clearinghouse report found that STEM majors have a 50% probability of completing their degrees in four years and indicated a need for greater support of STEM students [4]. Many universities hire students to be peer-tutors as a free resource for students seeking additional help in their courses. These tutors are typically third- and fourth-year students capable of tutoring first- and second-year courses [5]. Peer tutors are a valuable resource available to many engineering programs in helping retain students [6-7]. Unfortunately, peer tutors are often underutilized by engineering students [8-11].

Previous research on tutoring has primarily focused on the learning and retention benefits students receive from peer tutoring [1, 6-7, 12]. Another area of high interest in the literature has been the academic and professional benefits tutors gain in being a peer tutor [7, 12, 13]. There has

been less research focus on why university hired tutors are underutilized despite these mutual benefits for students and tutors. Research in this space has typically focused on the students' perspective, primarily noting students' lack of knowledge about services and self-perceived stigma [8, 14-15]. Interestingly, one study found that even when students have a positive attitude towards tutoring, they were still unlikely to seek out tutoring voluntarily [8]. There has been little research focus on the tutors' perspectives as to why they are underutilized and what ideas they have to improve their accessibility for students.

This study seeks to leverage peer tutors' perspectives to identify effective strategies for engineering programs and instructors to implement to increase student utilization of peer tutors. The context for this study is a small private university offering undergraduate engineering degrees in mechanical, electrical, civil, and environmental engineering, and computer science. The university typically hires 5-15 engineering tutors to cover courses in these programs each semester. These tutors receive training from the directors of the university tutoring center at the beginning of each term and then work 5-20 hours/week throughout the semester depending on their availability. The tutors provide hours that students can book appointments with them in advance (at least two days out) and drop-in hours. All tutoring sessions occur at a centrally located building on campus distinct from the engineering building.

The engineering school at this university does not offer graduate degrees. Therefore, while some courses do have teaching assistants (TAs), all the TAs are undergraduates, limiting availability in upper-division courses. Budgetary constraints in recent years have further limited the number of engineering courses with TAs and reduced the TA role to primarily grading. This means that the university-hired tutors are the primary resource for peer support of engineering students.

The school of engineering at this university used to hire, train, and host tutoring services in the engineering building as recently as the 2021-2022 academic year. Beginning in the 2022-2023 academic year, engineering tutors became managed by the university's center for student academic support for a variety of reasons beyond the scope of this paper. This transition has led to fewer engineering tutors being hired and utilized less frequently but will continue to be the mode of operation for the foreseeable future. To increase utilization of tutors within this context, we conducted a focus group with engineering tutors asking for their thoughts on how they could be supported to improve their accessibility.

Methods

All twelve engineering students employed as tutors in the Spring 2025 semester were recruited via email and asked to respond to a Doodle poll to provide their availability for a 1-hour focus group. The tutors were informed that their participation was voluntary and were incentivized to participate with free snacks and drinks during the focus group session and that their insights will benefit future tutors. The study was approved as exempt by the University's Institutional Review Board.

Six recipients responded to the Doodle poll and four of those six had a mutual time available for the initial exploratory focus group. Demographic information of the participants is provided in Table 1.

Table 1. Initial Focus Group Participant Demographics

Tutor	Year	Engineering Major	Primary Tutoring Discipline	Semesters Employed by Tutoring Center	Gender
T1	Sophomore	Civil Engineering	Math	1 Semester	Female
T2	Junior	Civil Engineering	Mechanical Engineering	2 Semesters	Female
T3	Senior	Civil Engineering	Civil Engineering	2 Semesters	Male
T4	Senior	Mechanical Engineering	Mechanical Engineering	4 Semesters	Male

The primary tutoring discipline is what course prefixes the participant was primarily hired by the university to tutor for. This may differ from the student's major. For example, T1 is a civil engineering major, but as a sophomore she has not taken many civil engineering specific courses yet and therefore was hired to primarily tutor math courses. Similarly, T2 has not taken many civil engineering specific courses because she switched majors from mechanical to civil engineering after her sophomore year, which is why she was hired as a mechanical engineering tutor. Any tutor is allowed to help students in any course during drop-in hours if the tutor is comfortable enough to do so. Students scheduling appointments with tutors in advance are more likely to schedule with tutors in the discipline for the course they are seeking assistance on.

The initial exploratory focus group was conducted by two engineering faculty members with expertise in interviewing and qualitative research methods. Both faculty members were also tutors during their undergraduate education, which helped develop rapport with the participants during the focus group and improved the likelihood of authentic responses to questions [16]

Focus groups were chosen because they allow for a group of participants to share their perspectives and develop new insights through group dialogue with the other participants and moderators [17-18]. It was anticipated that the tutors had similar and unique experiences, which a focus group can more readily identify and distinguish during data collection than one-on-one interviews can [17,18]. Furthermore, with the goal of the focus group being to identify strategies that could help make the tutors more effective and accessible, the session operated as a collaborative brainstorming process amongst the tutors and faculty interviewers.

A semi-structured interview protocol was developed to guide the focus group with set questions, while also allowing the faculty interviewers and participants to ask questions that

emerged organically throughout the discussion. Some sample questions from the semi-structured interview protocol are bulleted below:

- What could engineering faculty do in general or in specific courses that would help make you more effective as a tutor?
- What could students seeking tutoring do that would make you more effective as a tutor?
- What barriers do you see students encountering when it comes to getting help from tutors? What ways do you think those barriers could be removed, or minimized, if at all?
- What would help make you more accessible to students seeking tutoring?

The initial exploratory focus group was audio-recorded and transcribed by a third-party transcription service. The transcription was checked for accuracy and then inductively coded by each interviewer independently. Inductive coding was chosen because the goal of the focus group was to identify strategies that the tutors perceived would improve their accessibility to students which could not be known beforehand to deductively apply a codebook to [19]. The interviewers then met to discuss and identify emergent themes across their inductive codes to confirm or refute their respective interpretations [19]. Only one focus group has been conducted to date with plans to conduct more focus groups at the end of subsequent academic years to assess strategies identified and implemented from the first focus group and identify new strategies moving forward. The thematic analysis for the initial focus group therefore focused on the tutors' perceived barriers to their accessibility by students and salient strategies for addressing those barriers that emerged across questions and/or participants in the focus group. These are presented in Table 2 and discussed further in the next section.

Table 2. Emergent Themes from Exploratory Focus Group with Tutors

Perceived Barrier	Strategies for Addressing Barriers
Tutor is unable/unprepared to answer students' questions.	• Designated tutors for high volume courses. • Providing tutors with course assignments, rubrics, and/or solutions. • Adding tutors to LMS for courses they can tutor. • Incorporating tutors in high volume courses as in-class learning assistants.
Students' familiarity with tutors available for their classes.	• Designated tutors for high volume courses. • Adding tutors to LMS for courses they can tutor. • Incorporating tutors in high volume courses as in-class learning assistants.
Students' perceiving tutors as resources for help on assignments only and not mentorship/guidance.	• Incorporating tutors in high volume courses as in-class learning assistants.

Limitations of this study are the currently small sample size and reliance on qualitative data from a single focus group with no parallel quantitative data. While the sample size of four tutors was small, it was representative of a third of the engineering tutors recruited and appropriately sized for a focus group [17,18]. We intend to continue conducting focus groups with engineering tutors at the end of this academic year and beyond until saturation of responses occurs [20]. Even beyond saturation, we are discussing with the tutoring center making these focus groups a regular occurrence at the end of the academic year to supplement the data the tutoring center collects. The tutoring center typically collects data on number of visits, which courses students are seeking tutoring in, and which tutors students are meeting with. These data are still being processed from the Spring 2025 and Fall 2025 semesters due to a transition in leadership at the tutoring center that led to a new way of collecting data. As this study progresses, we intend to utilize the tutoring center data to assess whether the strategies identified in the focus groups are effective at increasing engineering students' utilization of peer tutors.

Preliminary Results and Discussion

During the initial focus group, the most prevalent theme the tutors discussed was not always being prepared for the topics that students seek their help in. When students schedule an appointment in advance, they are prompted to provide the course they are seeking help in and can upload assignments and provide additional details for the tutors to have an idea on what to prepare for. However, the tutors said that students regularly do not provide any context beyond what course they are seeking help in when scheduling appointments, making it difficult to prepare. For these situations and drop-in visits, the tutors spend a good amount of time figuring out what the student is working on and how to help them, which the student may perceive as inefficient use of their time. To address this, one of the tutors expressed wishing they had tutors designated for each class:

> I feel like having designated tutors for each class because the tutoring center tries to make sure each discipline of engineering is covered, but they don't always have a tutor on hand for all classes. -T2

While each tutor is primarily designated by their discipline, students can also see what classes each tutor can tutor in when scheduling appointments. Drop-in visits, however, might lead to students seeking help for a class that no tutors are available for. It is unrealistic that the tutoring center can ensure that there is a tutor designated for each engineering class but could potentially hire more tutors capable of covering high volume courses and schedule their drop-in hours to cover a wider range of availability.

The tutors mentioned they still work with drop-in students seeking help for courses that the tutors are not experts in but could be more successful in doing so if the tutors had access to class resources. As one tutor suggested:

> Being able to get assignments for yourself or being able to look at the rubric would be very helpful. -T4

This led to discussion about adding the students to specific courses learning management system (LMS) as a relatively easy way to facilitate access to course resources. The effectiveness of this strategy at helping the students prepare would depend on the instructor's utilization of the LMS. A well-managed LMS would allow the tutors to see what topics the course is currently covering, view assignments, and potentially study rubrics and solutions prior to scheduled appointments. For drop-in appointments, having LMS access would allow the tutor to view course resources on their own device without having to ask the student to email documents to them or share a screen to view documents one at a time.

Regarding providing tutors with access to solutions, this would require a considerable degree of trust between the instructor and tutor to ensure tutors do not give out the solutions and answers without properly teaching the student. One of the tutors mentioned they are trained to not just give answers:

> That's what our training entails. Don't just give them the solution. You want to figure out the best way to guide them there. -T3

While such training is reassuring and providing solutions could help the tutors be more prepared for students, this strategy would need to be managed on a case-by-case basis with each course, instructor, and tutor(s) rather than a blanket recommendation.

Aside from whether the tutors can confidently guide students to a solution, they did express providing value to the students in helping them identify which topics in their courses are important for their majors. As one tutor stated:

> I got a few civil engineering students coming in for math, but it was nice to tell them, 'Oh, you won't ever really use that, but this other thing, you have to know this because this goes into these later classes.' So, I can guide them into really focusing on that and making sure they focus on the right things. -T1

Such guidance can be beneficial for students struggling with their early STEM courses and not being aware yet of what topics are most important to deeply understand for their major. Providing this guidance was something the tutors were passionate about and believed that if students were more familiar with them as mentors, then students might seek their help more, not only for assignments and studying, but also for advice in navigating their major. To address this one tutor suggested:

> I'd probably go to a friend or even the professor before I went to the tutoring center because you don't know the tutor. If there's a way that maybe we could have tutors shadow in the intro classes maybe the first or second week. If we could have tutors come in and TA in a sense for once a month or just to get familiar with the students. That way the students will know the tutor and feel more comfortable with them. -T3

This idea of being a learning assistant in the classroom was something all four tutors were excited about and interested in potential opportunities to do so in the future. As a result of this, we asked the tutoring center if engineering tutors could bill an additional hour per week or flex one of their drop-in hours for being a learning assistant in a course they tutor. The tutoring center said there was budget for this going into the 2025-2026 academic year. Incorporating the tutors as learning assistants in the classroom would have the mutual benefit of keeping the tutors more informed and prepared for the content being covered in those courses and familiarize students with tutors that they could get help from at the learning center. Many of the tutors at this institution are also TAs for certain courses and we distinguish TAs from learning assistants in that TAs are primarily responsible for grading and typically have minimal contact with students, while learning assistants are primarily responsible for aiding students in real-time during class activities.

Going into the Fall 2025 semester, engineering faculty were encouraged to add relevant tutors to their course LMS, consider providing assignments, rubrics, and solutions to tutors they trusted in advance, and invite tutors into their classroom as learning assistants during active learning sessions. The latter of these has been identified in previous literature as being beneficial for students' and tutors' learning [12, 21].

Unfortunately, in the Fall 2025 semester, only a few of the engineering faculty did any of these things. Three engineering faculty added tutors to their course LMS and two faculty had tutors in their classroom as learning assistants. While we do not want to force any faculty member to implement any of these strategies, we do want to provide a stronger nudge for the instructors of the first and second-year engineering courses that our students typically struggle with. One of those courses frequently mentioned by the tutors in the focus group was an introductory programming course required for all first-year civil, environmental, electrical, and mechanical engineering majors. This course has two instructors teaching multiple sections in the Spring 2026 semester. After sharing findings from the focus group with these instructors, they agreed to add five relevant engineering tutors to their course LMS, share solutions of program scripts with those tutors, and invite them into the classroom on days where students have dedicated class time to write and edit their code.

While implementation of these strategies so far at our institution has been limited, we think these strategies should help tutors be more prepared to help students and thereby improve the student experience with tutors and in turn increase student utilization of peer tutors. However, it is possible that incorporating tutors in the classroom may also reduce student visits to the tutoring center as they are able to get peer assistance in the classroom instead. While not all faculty will be able to work directly with tutors or their university's tutoring center, we encourage faculty to reach out to the personnel responsible for peer-tutoring on their campus and see if tutors can work as learning assistants in the classroom. We were pleasantly surprised when we found out our tutors could bill that time. If budgetary constraints limit this option, ask if the tutors can occasionally substitute one of their billed weekly drop-in hours with being a learning assistant for a course every other week or so. The tutors in our focus group wanted these opportunities in the classroom, and

we suspect many other tutors will too because of their interest in teaching and helping students. If incorporating tutors into courses is not available for others, then at the very least we recommend inviting tutors during the first few weeks of the term to introduce themselves to students in person so that students start to become more familiar with who the tutors are. This is also a great way for tutors to pitch the benefits of being a tutor to help recruit future tutors.

Limited data could be provided by the university's tutoring center for evaluating the effectiveness of the strategies implemented in the Fall 2025 semester because the tutoring center transitioned to a new way of collecting visitor information in the Spring 2025 semester. This transition led to incomplete data that are still being processed for the Spring 2025 and Fall 2025 semesters. The data available so far indicates a significant increase in engineering student visits to the tutoring center with engineering students visiting the tutoring center 65 times in the Spring 2025 semester and 119 times in the Fall 2025 semester. Only one of those 65 visits in the Spring 2025 semester was for a class where the instructor implemented one of the identified strategies from the focus group in their Fall 2025 offering. Data from the Fall 2025 semester are still being processed and cannot currently discern which courses those 119 visits were for. Therefore, it is too early to know if the strategies implemented in the Fall 2025 semester meaningfully contributed to the increase in visits from the Spring 2025 semester.

Conclusion and Future Research

The purpose of this research is to work with engineering tutors to identify ways to help them be more effective tutors and increase student utilization of their assistance. Prior research on peer tutoring has primarily focused on the benefits peer tutoring provides for students and tutors, but little research has explored tutors' perspective on what they think would make them more accessible and helpful to students. We began this process with an initial exploratory focus group with four engineering tutors at a small private institution. From this focus group, we identified a relatively easy strategy of simply adding tutors to course LMS so that the tutors can more readily access course content when preparing to help and while helping students. Another beneficial strategy to consider is inviting tutors into the classroom as learning assistants occasionally so that students become more familiar with tutors and the tutors become more aware of and experienced with course content. University tutoring centers might even be able to pay tutors to work as a learning assistant in specific courses.

Future research for this work in progress entails conducting more regular focus groups. Initially we planned to conduct a focus group at the end of each year but are considering conducting them after each semester to allow tutors to provide their perspectives on specific engineering courses that are only offered in one semester each year while that experience is still fresh in their minds. We also plan to supplement the strategies identified from the focus groups with data collected from the tutoring center to better assess the impact of these strategies. Focus groups with engineering students that visit the tutoring center or interviews with tutor-student pairs could also be conducted to see if these strategies were influential. Additionally, focus groups with engineering students not

utilizing the tutoring center would help identify their perceived barriers to seeking tutoring. Finally, we want to follow up with engineering faculty either through interviews or surveys on why or why not they implemented any of these strategies. All the strategies identified so far require faculty buy-in. Future focus group questions will focus on identifying strategies that require minimal or no faculty support.

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