How Effective is the use of a Discord Server
for an Engineering Learning Center?

Priya Goeser

Professor, Department of Mechanical Engineering, Georgia Southern University

Abstract

Most universities have a student learning community with peer tutoring services on campus. Since the onset of COVID-19 in Spring 2020, these services moved online to platforms like ZOOM and Google Meet/Hangout/Chat rooms. While the move was inevitable, and thought initially to be a temporary solution, as of Fall 2021 it appears to be a longer term one. At Georgia Southern University, the peer tutoring services have been moved to a hybrid format including both in-person and using a Discord server. Discord is a text, voice, and video calls digital communication platform. This work investigates the effectiveness of a Discord server for peer tutoring.

Keywords

Peer tutoring, online tutoring, peer tutoring on Discord

Introduction and Motivation

Peer tutoring has been endorsed as an effective high impact service for improving student engagement, student retention and student performance in all STEM fields, especially in engineering [1-6]. Most universities offer some form of this service: free and/or paid, in-person and/or online. Since the onset of COVID-19 in Spring 2020, these services moved online to platforms like ZOOM and Google Meet/Hangout/Chat rooms. While the move was inevitable, and thought initially to be a temporary solution, as of Fall 2021 it appears to be a longer term one.

Georgia Southern University offers multiple forms of this service under the organization structure of Academic Success Center (ASC). The ASC provides academic support for all students by fostering a positive academic mindset, knowledge of resources, and belonging within the university community. The center oversees tutoring, mentoring, success coaching, learning support, low cost or no cost resources for classes, testing, workshops, and presentations as well as academic skill consultations. The Engineering Learning Center (ELC) is one facet of this center and provides undergraduate peer tutoring services for freshmen and sophomore level engineering courses. The tutors from the ELC also serve as lab assistants and teaching assistants for freshmen lab-based engineering courses. The center serves as a physical space for students to build study groups and creates a sense of community within the college. Historically, all services have been in-person including a combination of drop-in and appointment only. However, this changed drastically in March 2020 due to COVID-19. All in-person services were moved online using Google Meet for the rest of Spring 2020. In Fall 2020 the services were moved to a limited hybrid format and are currently offered in a fully hybrid format.

This work investigates the effectives of online tutoring via a Discord server. Specific questions will be explored: What are the advantages of using online platforms for tutoring? Are online platforms a distraction from learning? What strategies can universities implement to increase the usage of these services online?

The following sections present an overview of the Discord server, the physical space on campus, assessment based on student and tutor surveys including comments from the faculty advisor's perspective, and a few concluding remarks with an outline of future work.

The Discord Server

Discord is a text, voice, and video calls digital communication platform[12]. While it is widely used for social networking among students, it can also be used as a virtual chat room (known as servers) for a specific community [8-11]. There are both free and paid versions of the platform. Currently, only the free version is being used for the ELC and it has been sufficient for the purpose.

The ELC Discord server is available for users by invitation only. Students at Georgia Southern University are provided with a link and/or QR code to join the server. Members are assigned specific roles (student, tutor, professor) as soon as they join. These roles are pre-determined by the faculty advisor who serves as the moderator/administrator for the server. The roles inherently have different privileges on the server. For example, the tutors and professors have the privilege of editing any post, removing someone from the server, setting them on mute or disabling videos if needed. Members must adhere to the rules of conduct on the server including changing their username to reflect their preferred names used on the Georgia Southern University's class rosters. Discord servers are built to have channels which is where the conversations happen. Channels are usually separated by topic to avoid clogging up the chatroom. There are two types of channels: text channels and voice channels.

The ELC Discord server has multiple text and voice channels based on the specific courses covered by the center. These channels can be modified at any time by the faculty advisor. The text channels allow for text-based messages to be sent and answered including one-on-one text conversations. These also allow for file attachments to be sent along with the messages. These can be done either in real-time with immediate responses or with delayed response. The text channels available on the ELC Discord server are: Info-channel, General, Engineering graphics, Solid modeling, Excel, MATLAB, C/C++ , and Tutor chat (accessible only to tutors and professors). The voice channels allow for audio and/or video calls in real time. Voice channels available on the ELC Discord server are: General, MATLAB, SolidWorks, C/C++, and Tutor chat (accessible only to tutors and professors). Students are also able to send direct message to tutors for help. All channels are tracked for usage except the direct messages.

Physical Space on Campus

The Engineering Learning Center has traditionally been a physical space on one campus at Georgia Southern University. The space is a re-purposed conference room with a small group meeting style seating arrangement. The room is available for tutoring during regular business hours on weekdays: Monday-Friday 9 am – 5 pm. The room is open for students to use as a

study hall on weekdays and with permission at other times (weekends and weeknights). The room has 7 PCs that have all relevant software and a Cisco conference system with a 62" monitor. Students can sign-in and sign-out of the room using a swipe-system that is connected to their student IDs. All walls are equipped with whiteboards that are actively used by tutors and students. The room also has a refrigerator, microwave and coffee maker for student use. This space was closed in March 2020 due to COVID-19 and remained closed till the beginning of Fall 2020 when it was re-opened with limited capacity (a maximum of 6 persons in room at a time). The room has since then expanded to its original full capacity (12-15 persons) as of Fall 2021.

Assessment

To assess the effectiveness of both modes of tutoring, a survey was given to both student tutors as well as students in the corresponding courses to complete. No incentive was offered for completion of the surveys. The survey was done intentionally after the mid-semester and after the completion of at least two exams and multiple assignments, so students were comfortable with the availability and use of tutoring via the multiple modes.

Table 1 shows a summary of the suggestions and comments from the ELC tutors (6 responses). Most of the comments are quite predictable. The tutors are just 1-2 years ahead of the students and do not realize that some students can be difficult to deal with. An online environment such as Discord does give the tutor a comfortable boundary.

Table 1: Summary of Suggestions and Comments from Tutors (October 2021)

Q. What are some advantages of in-person tutoring?
It is easier to explain concepts in-person. Tutors are also able to listen, observe body language and understand the student's question better.
Q. What are some disadvantages of in-person tutoring?
The time is certainly limited for in-person tutoring. If the tutor gets frustrated during a session, it is difficult to not show that frustration to the student. In-person implies in real time, so often there is not enough time to think about the problem, solve it over time and then explain.
Q. What are some advantages of in-person help during lab?
Real time feedback builds better understanding.
Q. What are some disadvantages of in-person help during lab?
Students develop a dependency on the tutors instead of trying to work through a problem on their own.

There are often other distractions such as a conversation between other students or the professor and a student in the same room during lab.
Q. What are some advantages of online tutoring via Discord?
Students can ask questions at any time, from anywhere. Tutors can answer questions at any time, from anywhere. Flexibility in time is a big advantage.
Q. What are some disadvantages of online tutoring via Discord?
Explaining concepts online is difficult. It is harder to help unless you have a good document camera setup. Students expect instant responses and get impatient when they don't receive them.
Q. Overall, what is going well and what are some suggestions for improving tutoring services in the future?
It would be useful for tutors to have review sessions for the more difficult concepts. In-person and online via Discord is a good combination. Encourage more students to participate.

The summary of comments in Table 2 are from the students who have received tutoring from the ELC in one or more of the available formats. There are only 30 responses though the tutors work directly with about 70-80 students. While most of the comments further corroborate the comments from the tutors in Table 1, a couple of them are interesting. A couple of the instructors gave students small incentives such as 1 point out of the total 20 points for checking your work with a tutor for a couple of assignments. It sounds like some students appreciated it. Another observation that can be made is that students do realize that their communication skills are not really honed when communicating on Discord.

Table 2: Summary of student comments on the ELC Services Survey (November 2021)

Q. What are some advantages from your perspective on getting help in-person (UH240 or in lab)?
Students can get help in real time and most often the questions are answered immediately. Some complex concepts are easier to understand when explained in-person.
Q. What are some disadvantages from your perspective on getting help in-person (UH240 or in lab)?
Students relying on tutor's help too much.
Q. What are some advantages from your perspective on getting help via Discord?

Discord is a platform most students were comfortable with already.   Easy access and is available at anytime, from anywhere.
Q. What are some disadvantages from your perspective on getting help via Discord?
Sometimes, there is a time lag between when the question is asked and the response is received.   Some explanations are confusing.   It does not help students learn to speak to peers and non-peers.
Q. What are some suggestions that we can implement to improve the services offered?
Offer more times with in-person tutoring.   Provide an incentive for students to go the ELC.

Table 3 shows a summary of the usage data from October 4, 2021 to November 4, 2021. This usage only tracks the conversations via the channels within the ELC Discord server. Most students move to a direct message conversation with a tutor once they have established a connection. These are not tracked for privacy reasons (it is similar to any one-on-one conversation). Currently the server has a total of 110 members.

Table 3: Summary of voice calls and text messages over 30 days

Voice Channels	Minutes used	Text Channels	Number of messages
MATLAB tutoring	428	MATLAB	23
SolidWorks Tutoring	83	Engineering Graphics	101
General	2	General	61

Faculty Advisor's Perspective

The author is the faculty advisor the ELC and agrees with all the student survey results. From the perspective of setting the Discord server and learning its intricacies for the first time, there was considerable preparation work as well as a steep learning curve in the use of the platform. For example, the settings of the roles, server invitations, channels: text and/or voice including any security and privacy settings took several iterations. Some of these such as adding more tutors and adding new student members must be done every semester. The author also monitors the activity on the server every day. Anecdotally it has been observed by all faculty that some students prefer to use the Discord server only to get their work 'checked off' by a tutor quickly with little intention to learn and understand the concepts. In an in-person environment, this is not as easy to do since the tutors are trained to ask appropriate questions and respond based on the answers. Tutors can also only give part of the answer and let the students think through the rest

and come back at a later time. While this scaffolding approach can be done in an online environment, it is not as easy to implement.

An inherent advantage of the hybrid format is that it has allowed the center to expand its services to multiple campuses and expanding its availably will be easier to implement in the future. Overall, the author feels that while the tutoring services and content were certainly not compromised, the tutor-student relationship that is normally developed over a semester was certainly not as it historically has been. Hence, while cognitive learning in a hybrid format is comparable to that of a traditional in-person only format, the absence of the social element needs to be addressed to make the overall learning experience more beneficial and enjoyable for all.

Concluding Remarks and Future Plans

In this paper, the author presents the implementation of a Discord server for peer tutoring services. The services are currently only for freshmen and certain sophomore level courses in the engineering curriculum. Preliminary student and tutor comments show that the server was well used and received by students. The server was first introduced in Fall 2020 and the current plan is to continue its use in a fully hybrid format for the Engineering Learning Center.

Future assessments including student surveys and relative student performance will be used to evaluate and assess this mode. Efforts will be made to implement tools and strategies to enhance the student's experience such as:
- Introduce supplemental instruction sessions offered by the tutors on Discord.
- Post weekly hints including useful resources for topics covered in courses on Discord.
- Expand the availability of tutors on Discord to include weeknights and weekends.
- Instructor-initiated text-based conversations/discussions.
- Office hours offered by faculty on the Discord server.

Once deemed successful, this format for the ELC can address the needs of a larger student body across multiple campuses.

Acknowledgements

The Engineering Learning Center is supported by the Academic Success Center at Georgia Southern University. The funds provided are solely used to compensate the peer tutors for their valuable time.

References

1   Ms. Lakshmy Mohandas, Nathan Mentzer, Aparajita Jaiswal, Shawn Farrington, "Effectiveness of Undergraduate Teaching Assistants in First-Year Design Course", American Society for Engineering Education Annual Conference, Virtual, June 22-26, 2020
2   Dr. Scott Steinbrink, Mr. Adam Finn Nogaj, Dr. Karinna M Vernaza, Dr. Lin Zhao, Dr. Saeed Tiari "A study of the effects of peer tutoring in relation to student GPA", American Society for Engineering Education Annual Conference, Virtual, June 22-26, 2020

3   Yang Yang, Bette Grauer, Jennifer Renee Thornburg, Amy Rachel Betz "Engineering Students' Views on the Effectiveness of Peer Tutors in Scholars Assisting Scholars Program", American Society for Engineering Education Annual Conference, Virtual, June 22-26, 2020

4   Caroline Ghio, Sydney Anne Morris, Hannah Marie Boyce, Bradley Joseph Priem, Paul A. DiMilla, Rachelle Reisberg, "The Impacts on Peer Tutors of Leading Group Supplemental Instruction for

5   First-Year Engineering Students", American Society for Engineering Education Annual Conference, Virtual, June 22-26, 2020

6   Dr. Suzanne Keilson, "Virtual Service-Learning Tutoring Experience for Engineering Undergraduates" American Society for Engineering Education Annual Conference, Virtual, July 26-29, 2021

7   Discord, https://discord.com/company

8   Craig O. Stewart, Maryam Darbeheshti, Stephanie S. Ivey, David J. Russomanno, Miriam Howland Cummings, Gregory Edward Simon, William Taylor Schupbach, Mike S. Jacobson, Tom Altman, Karen D. Alfrey, Katherine Goodman "An Initial Exploration of Engineering Student Perceptions of COVID's Impact on Connectedness, Learning, and STEM Identity" American Society for Engineering Education Annual Conference, Virtual, July 26-29, 2021

9   Frank Vahid, Joe Michael Allen, "An online course for freshmen? The evolution of a successful online CS1 course", American Society for Engineering Education Annual Conference, Virtual, June 22-26, 2020

10   Milo Koretsky, "Student Responses to Remote Teaching During the Covid-19 Pandemic: Implications for the Future of Online Learning" American Society for Engineering Education Annual Conference, Virtual, July 26-29, 2021

11   Erica J. Marti, Eakalak Khan, Amit Gajurel, Neil Christian Ledesma Tugadi, "Building a Sense of Community for Freshman Civil Engineering Students" American Society for Engineering Education Annual Conference, Virtual, July 26-29 2021

Priya T. Goeser

Priya T. Goeser is a Professor of Mechanical Engineering at Georgia Southern University-Armstrong Campus, Savannah GA. She received her Ph.D. in Mechanical Engineering from the University of Delaware and her B. Tech in Mechanical Engineering from the Indian Institute of Technology, Chennai, India. Her current research interests are structural health monitoring, functionally graded materials and innovative teaching methods in engineering education. She is the faculty advisor for the Engineering Learning Center.