HelpMe: Student Help Seeking using Office Hours and Email

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ABSTRACT

Office hours and help sessions provide students with the important opportunity to obtain feedback and guidance while connecting with instructors and peers. However, these out of class help sessions are often underutilized due to problems such as inconvenient times and locations, long wait times, and student misconceptions on their purpose and value. Managing office hours for large classes is difficult for instructors and may result in poor student participation. It is crucial to adopt approaches to manage help sessions more effectively and encourage student attendance. This research examines current problems with help sessions and implements an office hours management system called HelpMe. Interactions in office hours and emails are analyzed to determine the types of questions asked. Student surveys demonstrate a significant change in student perception of office hours, increased engagement, and valuable data on effective practices for deploying office hours.

CCS CONCEPTS

• **Social and professional topics** → **Computing education**; • **Applied computing** → **Education**.

KEYWORDS

office hours, help seeking, student engagement, email

ACM Reference Format:
Kevin Wang and Ramon Lawrence. 2024. HelpMe: Student Help Seeking using Office Hours and Email. In *Proceedings of the 55th ACM Technical Symposium on Computer Science Education V. 1 (SIGCSE 2024), March 20–23, 2024, Portland, OR, USA.* ACM, New York, NY, USA, 7 pages. https://doi.org/10.1145/3626252.3630867

1 INTRODUCTION

Synchronous out of class help is instrumental to student learning. Instructor office hours increase retention, lead to higher student satisfaction and confidence, and positively impact student outcomes [6, 15, 22, 24]. Studies have shown that office hours participation improves students' interest in the discipline [8]. Teaching assistants (TAs) support office hours and help provide important connections with students in support of their learning. Large classes typically utilize many TAs as a solution to the expanding enrollment numbers in computer science [5].

SIGCSE 2024, March 20–23, 2024, Portland, OR, USA

ACM ISBN 979-8-4007-0423-9/24/03…$15.00
https://doi.org/10.1145/3626252.3630867

Unfortunately, office hours are often underutilized and unequally accessed [16, 20, 23, 24]. Nowadays, students prefer email or other online communication over live help sessions, as physical presence results in issues of travel and waiting in line [20, 24]. For many questions, online communication or Internet searches are more efficient than in-person help sessions. Although online office hours improve convenience, accessibility, and efficiency, long wait times and challenging management often discourage students from participating [17, 18, 23]. There is also a mismatch between intended usage and student perception [24] with most students not attending as office hours are perceived to be only used as a last resort.

Email and other asynchronous communication outside of the classroom cannot replace synchronous help sessions. Students miss out on essential interaction opportunities with peers and instructors. Asynchronous email communication can also be overwhelming for instructors, especially for large classes, and is often very inefficient when resolving issues related to programming. It is valuable for students and instructors to minimize asynchronous communications and instead answer questions during help sessions.

This research designed and evaluated the HelpMe queue system for managing and engaging students during help sessions either virtually or in-person. Improving office hours, including online office hours, has been investigated previously due to its high importance. A queue system was developed for CS 50 at Harvard [17] and office hours virtualized [18]. Issues included non-descriptive student questions and long wait-times. My Digital Hand [23] managed help sessions across three universities, and researchers provided recommendations: make sure students are ready when engaging with instructors, TAs keep help sessions brief and focused, and provide question context to support TAs when a student has many questions. Using the data from the system, a comparison of in-person and virtual office hours was performed that showed no relationship between office hours attendance and student performance.

Our contributions are in several areas. First, from the systems perspective, the HelpMe system provides the key features that make help sessions more convenient for students; it improves queue visibility, especially online, ensures fairness, reduces waiting times, and provides efficient interactions. It also has optimizations including question categories and analytics, interaction timers to encourage shorter interactions, ability for TAs to help multiple students with the similar question at once, and a queuing process that encourages students to write more descriptive questions. The system was evaluated for usability and its impact on student behaviour.

The second contribution is studying how the deployment of the HelpMe system affected student perceptions of the value of help sessions and their course performance. Through student survey data, data on system interactions, and analyzing instructor emails, a complete picture is achieved on student help seeking. No prior

research studied both the interactions with an online queue system in help sessions and student-instructor email behaviour.

This work answers the following research questions:

- **RQ1:** How are students using help sessions?
- **RQ2:** Does the HelpMe system improve student satisfaction with help sessions?
- **RQ3:** Does the HelpMe system change student perception of help sessions and email interactions?
- **RQ4:** Does increased help session attendance affect student performance?

2 BACKGROUND

2.1 Problems with Office Hours

Help sessions face significant challenges and are struggling to stay relevant, especially in the era of generative AI where answers are readily available. Research has shown that students tend to use office hours only for specific questions such as troubleshooting [22]. There is also confusion among students over communication with professors outside of academic settings [24]. An analysis of student help seeking [14] shows a strong majority of interactions happen within three days of a deadline with students primarily focused on implementation rather than planning and understanding. Getting students focused on learning rather than deadlines is a challenge.

In-person office hours are becoming outdated in the modern technological context. Smith *et al.* [24] found that the most common reason of avoiding office hours is inconvenience with students asking questions such as "Is it worth it to commute 30 minutes to ask a 5 minute question?" It also poses problems for commuter and minority students [16, 18]. Thus, many instructors have found that online office hours are valuable. Early virtual office hours research has proven the effectiveness of online office hours such as the virtualization of CS50 office hours at Harvard [18]. However, the same research also noted that online office hours do not solve all problems. Students often claim long wait times, lack of physical interactions, and confusion over online queues [18]. Email and other asynchronous communication are still often the preferred ways of communication [16]. Virtual office hours only solve some of the student engagement issues with physical office hours.

There are mixed results whether help seeking including participation in office hours and Q&A forums has a negative [25], positive [7, 10, 26], or neutral effect [8, 9] on performance. Factors include assignment difficulty, student prior knowledge, and the type of help seeking [4, 7].

2.2 Improving Help Sessions with Technology

Technology has been used to improve the efficiency and visibility of help sessions such as the CS50 Queue [17], My Digital Hand [23], and [13, 19]. An open source system [21] developed at Northeastern University was adapted to develop the HelpMe system used for this research. Many universities have deployed queuing technology.

The key advantages of online queuing systems are visibility for instructors and students, management of questions and student ordering, and data reporting on wait and help session times. These advantages greatly outweigh the extra time required for students to enter their questions in the system. Prior research has highlighted issues such as long wait times as discouraging student engagement. Virtual office hours have been shown to have attendance peaks around deadlines [10], and increased help session attendance is not always correlated with improved student performance [8, 10]. There is limited understanding on how to most effectively deploy these systems in practice, and if the systems change student behaviour on help seeking [24]. Students often still have a high volume of questions over email and reducing the email volume is often beneficial [12]. There has been limited analysis on the types of questions asked over email [11], and no studies have analyzed both office hours and email interactions.

2.3 Instructional Environment

Our research was conducted in an upper-level elective computer science course in the area of database systems. The course had 99 undergraduate and 8 graduate students. All students were third year or above, and the majority of students in the course were computer science majors. There was a two-hour help session from 2 to 4 pm every weekday (10 hours/week). The two course TAs each covered two of these five online sessions. The instructor covered one session as a hybrid in-person and online help session and also assisted with some online TA sessions when wait times were longer.

Similar to many upper-level courses, the course had weekly software development assignments that students were expected to complete on their own time. Previously, the course had a scheduled computer lab time for TA assignment support that was removed due to low student participation and replaced with on-demand virtual office hours. To encourage more student participation and reduce procrastination, students were able to receive bonus marks on an assignment by completing it several days ahead of the due date and attending a help session to receive a code review and grading. This approach allowed for more effective feedback to students from instructors, and shifted some of the help session activity earlier in the week rather than the last few days before an assignment was due. Since the help sessions are replacing a lab time, they may be very busy as they are the primary method for receiving support from the instructional staff. The instructor was also accessible by email. TAs were not accessible by email by university policy.

3 HELPME SYSTEM

The HelpMe system provides a visual queue to students and instructors as seen in Figures 1 and 2. A course may have multiple queues for different purposes. The interaction of help sessions may take place in-person in an office or lab, or may be virtual using systems such as Zoom. In either case, the process starts with a staff (instructor or TA) opening a queue on the HelpMe system and checking in to signify that they can provide help. The staff observes students waiting in line and can help any student currently waiting in line (see Figure 2) by clicking the blue help button for the student. The actual interaction proceeds as the instructor opens a breakout room on Zoom/Teams for the student or works with the student in-person. After the help session is completed, instructors click the finish helping button and continue to find more students to help.

Students start with joining an active queue through a question form (see Figure 1) that asks them to provide information on their question. A key feature is that the student's place in line is guaranteed based on when they start the question not when they complete

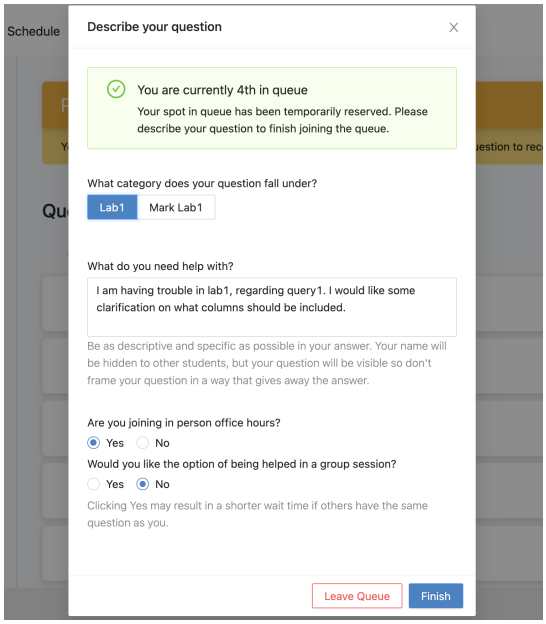

Figure 1: Student View

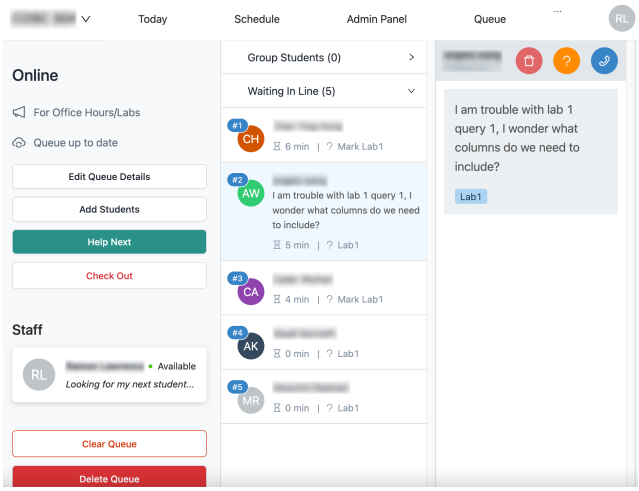

Figure 2: Professor View

it. This encourages students to write more descriptive questions. Questions are also categorized in the system. Categories are configurable by the instructor.

Once a question has been submitted, a student has visibility on the queue and their position. When a staff member comes to help a student, the student is notified by the system. After the help session is completed and the instructor closes the session, the student interface goes back to the initial queue. Students see their place in line, staff status, and the text and wait time for questions. Student names are not visible. Staff have access to question details, student names, and admin data.

The system has a configurable question timer set at 15 minutes that reminds instructors to finish and close help sessions once the time is reached. Prior research [23] demonstrated that help sessions often are too long due to students expecting ongoing help while they are developing. It is preferred that students get focused help then spend individual time working on the problem before getting more help. This results in improved student learning and reduces long interaction times that result in long wait times. Overall, the key improved features include the question categorization, help timer, and enhanced analytics.

4 METHODOLOGY

This research uses both survey and quantitative data. The data was collected and processed in accordance with a university approved ethics study. The primary quantitative data is from the HelpMe system, which provides details regarding instructor-student interactions including wait and help session times, types of questions, time of day when questions were asked, and user information. The second set of quantitative data is from the exam and overall grades of consenting participants.

The class was informed of the research study and asked for consent to use their data in the study. Of the 107 registered students, 67 students (62%) consented to analysis of their grades in connection with their help sessions. Help session data collected by the system was analyzed for students that used the system (N=83). The instructor and TAs were trained on how to use the HelpMe system with focus on ensuring that help session times were less than 10 minutes and preferably between 5 and 8 minutes. Students were instructed that all in-person and virtual help sessions would be organized using the HelpMe system. Students who did not register a question themselves in HelpMe were manually added by the staff before being helped in a session. The HelpMe system collected help session interactions throughout the course.

The process of collecting email interactions was done manually through the HelpMe system by the instructor. Whenever the instructor responded to a student email, a help session item would be manually added to the queue. After the email was completed, the question was closed. Wait times do not apply to email interactions, but help session times are accurate. The emails were analyzed and classified according to content categories. Email interactions occurred outside of allocated help session times and are analyzed separately from the other data.

The calculation of the help session times was based on the question opening and closing times. Times less than 30 seconds are eliminated as these often reflect situations when no help was given. Any time above 40 minutes was capped at 40 minutes. Sessions should typically be ended after the 15 minute timer expires. However, staff sometimes forget to close a question after helping.

A survey was provided to the students in the last two weeks of class regarding their opinions on the HelpMe system. The survey data was used to answer questions such as current student perceptions towards office hours and the efficacy of the HelpMe system. The survey also contained the 10 general questions from the System Usability Scale (SUS) [3] to evaluate system usability. We received 40 valid survey responses.

5 RESULTS

5.1 Help Session Utilization

RQ1 analyzes how students are using help sessions. Figure 3 categories the questions asked in help sessions: administrative (e.g., personal, illness, deadlines), assignment, general course content, and exam questions and marking, while Figure 4 shows questions asked through email. Categorization was collected on assignments and course content topics and aggregated into these higher categories. Categories were specified as part of the question creation by the student and validated during analysis. The breakdown shows that the majority of help sessions are related to assignments. There was a total of 539 help sessions and 146 emails to the instructor.

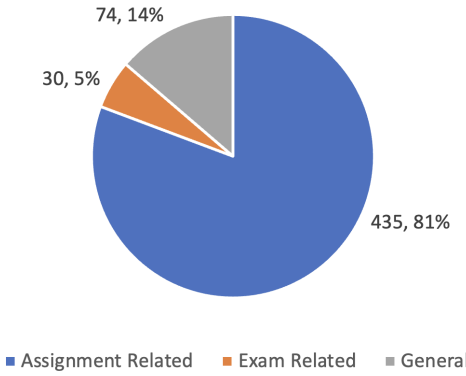

Figure 3: Help Session Question Categorization

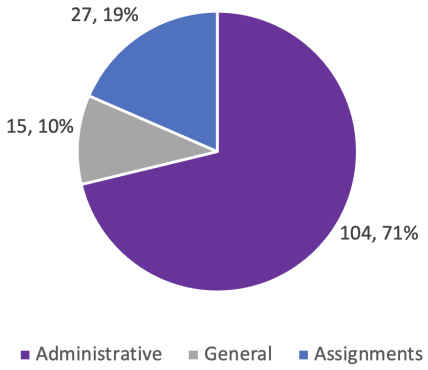

Figure 4: Email Question Categorization

Consistent with research on office hour utilization [23], there is a large variance in help session engagement. 19% of students account for 64% of total sessions, while 54% of students accounted for only 4% of total sessions. Figure 5 shows the breakdown of student utilization of help sessions.

The survey asked students about the reasons that deter them from attending help sessions in general using a multiple-select question. The results are in Table 1. Overall, these inconveniences line up with previous research showing issues with commute and wait times as primary factors [1, 24].

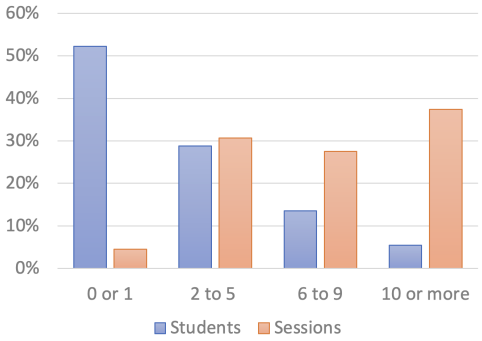

Figure 5: Student Session Breakdown

Table 1: Reasons that Deter Students Attending Office Hours

Reasons	Agree
Commute not worth the time for a short question	68%
Not an effective use of time	33%
Long wait times	28%
Confusion over queuing/waiting	25%
Instructor did not provide useful help	23%

Figures 6 and 7 show the help session and wait times. The efforts to reduce help session time had an impact. The average wait session time was 357 seconds and help session time was 433 seconds.

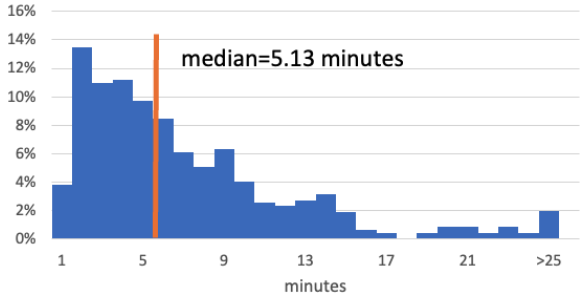

Figure 6: Help Session Duration

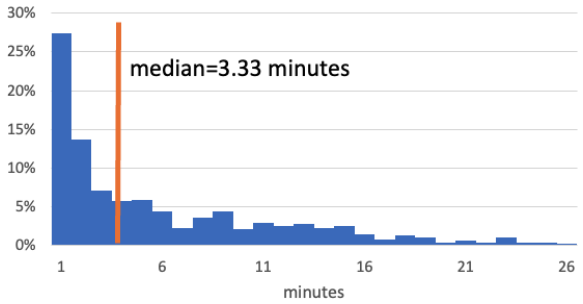

Figure 7: Wait Time Distribution

5.2 Student Satisfaction

RQ2 measures student satisfaction with the HelpMe system and the virtual and in-person help sessions that it supports. The survey contained questions comparing their experience with the HelpMe system and help sessions used in other courses. Table 2 shows that students were highly positive of the HelpMe system and its impact on help sessions including improved visibility and efficiency.

Table 2: Queue System Satisfaction

Question	Score
The HelpMe system provided more visibility on my wait and service times for office hours.	4.44
The HelpMe system improved office hours compared to other courses.	4.26
The HelpMe system helped make office hours more efficient.	4.26

Students' scores on a scale of 1-5: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree.

The survey allowed the determination of a System Usability Scale (SUS) score for the system that reflects a user's subjective ranking of a system's usability. A score greater than 70 indicates a system is moderately user-friendly [2]. HelpMe had a SUS score of 77.6 based on 40 responses showing the system had good usability.

Many survey comments point out that the system is extremely helpful especially in the aspect of high visibility. For example, one student commented that "I enjoyed knowing where I was in line and being able to see the statistics for average wait times." Another positive impact related to fairness as students understood where they were in line and did not fear being missed or forgotten, especially in virtual help sessions. Constructive feedback related to the integration between the system and the actual place of help (Zoom for virtual sessions). This was addressed by informing students of the direct links to virtual sessions accessible from the queue system. The increased student satisfaction when using a queuing system is inline with the benefits seen by similar systems (CS50 Queue [17], UIUC [13, 19], My Digital Hand [23]).

5.3 Student Perception

RQ3 investigates student perception on help seeking with focus on their preferred methods for seeking help and their perspectives on synchronous help sessions. Table 3 contains data on students' preferred help seeking methods before and after the use of the HelpMe system. Originally, students preferred email to get questions answered. Student perception towards help sessions changed with the introduction of HelpMe. While only 24% of students originally preferred office hours offered without a queue system, 63% would prefer office hours with the HelpMe system, a statistically important change in attitude towards synchronous office hours. The majority of students claimed that the reason for not attending help sessions previously is due to long wait times and a need to commute. Students are selective on the type of questions asked and how frequently they engage with help sessions. The perceived benefit must be much greater than the time involved.

Table 3: Preferred Help Seeking Channel: Before and After

	Before	After
Office Hours	24%	10%
Email	42%	16%
Did not seek help	22%	10%
After class	12%	0%
Office Hours with HelpMe	N/A	63%

This shift in perception can be attributed to conveniences provided by the system as well as using virtual help sessions. Student comments such as "Quick, easy, simple. No commute, got my questions answered and went on with my day." highlighted the convenience that encourages students to use help sessions more.

Despite reducing the volume of questions answered over email, a consistent number of emails (about 1 per/day with peaks during exams) occurred throughout the course. Fundamentally, students ask different types of questions through email compared to synchronous help sessions (see Figure 4). Emails to instructors are often personal and student-specific relating to missed deadlines and classes, illness, accommodations, or performance on exams and assessments. The asynchronous and impersonal aspect of email communications makes it easier for students to communicate difficult subjects. Even a very efficient help session system is highly unlikely to divert this communication from the email channel. Only 19% of emails related to assignments and were a very small number of the total number of questions asked in help sessions.

5.4 Student Performance

RQ4 evaluates if increased attendance in help sessions has an impact on student performance. Figure 8 presents data on final exam grade versus the number of attended help sessions. There is a slight positive trend in help session attendance on grades. This positive trend is also present in the overall course grade. Students with zero or one help session have an average grade of 73%, below the overall class average of 78%, and significantly less than students with two or more sessions (80%). The difference between the two groups is not statistically significant ($p = 0.068$ for two-tail two sample t-Test). There is a small performance improvement for students that more actively engage in help sessions. In comparison, there is no general trend with email, and a slight negative bias when students engage in significantly more email communication.

There are several possible explanations for these results. First, the help sessions were presented to students as not only places to receive help but also for feedback and marking on assignments. Instructors would perform a code review and mark an assignment before the due date for a small mark incentive [27] if students finished early. This encouraged more student interactions and frequent attendance during help sessions. With the small and predictable wait times, students were able to easily attend and receive feedback. Students less engaged in the course are less likely to attend help sessions, and this weak engagement correlates with overall performance. In contrast, higher levels of email communications may reflect lower performance as these communications are often triggered due to student issues in the course (illness, missed deadlines, exam issues) that are independent of the material and assignments.

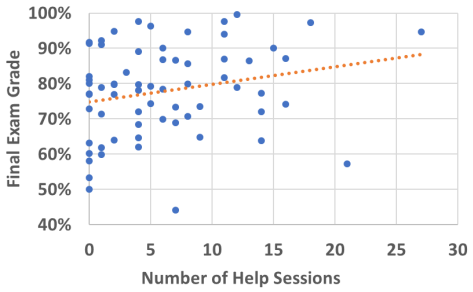

Figure 8: Student Performance on Final Exam Compared to Help Session Usage

6 DISCUSSION

Consistent with previous research on instructor satisfaction with an online queuing system in office hours [13, 17, 23], staff who used HelpMe saw the benefits of a queue, especially managing help sessions with many students. A key benefit was more detailed questions provided by students that was flagged as an issue in prior work [9, 17, 23]. By securing a place in line when they start a question not when they complete it, students were encouraged to write more descriptive questions and enter the help session more prepared for help. The visibility of the queue and expected wait times further improved efficiency as students were aware and notified when they would be helped so they were prepared for the session. This visibility also allowed instructional staff to dynamically join help sessions to help with long wait times.

The HelpMe system supported both in-person and virtual help sessions. Virtual help sessions were more efficient than email due to the ability for screen-sharing with the collaboration software used (Zoom). Help sessions are predominately related to assignments, so ensuring efficiency for code sharing and review is critical.

The system in conjunction with instructor help policies resulted in reasonable wait and help session times. The system strongly encouraged a maximum 15 minute session time, and students were instructed to re-queue if more help was required. TAs were told to focus on quick, focused help and have students work independently for a time before returning for help. This encourages more independent thought and learning from students and reduces usage. Even though some power users remain high consumers, their impact is reduced by limiting individual session time.

The student survey showed high satisfaction with the HelpMe system and its use in help sessions. It was effective in achieving student behaviour change from using asynchronous, email communication to using synchronous help sessions supported by HelpMe. The survey data is strengthened by the general low volume in email communication throughout the course. If the help session is easy and efficient, students will attend.

The HelpMe system is designed to make help sessions more efficient, which in itself is not expected to impact student performance. The slight positive impact on student performance is attributable both to improved efficiency, encouraging more student attendance and engagement, and how this efficiency allowed for a distinctive engagement technique. The TAs were able to conduct code reviews and mark assignments before the due date during help sessions as they had the capacity due to low wait times [27]. The correlation of improved performance with more help sessions is heavily influenced by awarding students who attend for feedback. This naturally results in more highly engaged and high performing students to attend when in other cases they would not.

The positive feedback on the HelpMe system is both an impact of the system and the flexible nature of virtual help sessions. The low wait times were a factor of the system efficiency but also its deployment. The TAs were trained to reduce help session times. Reduction in wait times cannot be solely credited with the system itself. Macwilliam and Malan found that long wait times can happen especially when a queue system is implemented, as office hours become more convenient [17]. The queuing system simplifies management of high-volume office hours, but the solution to long wait times requires dynamically allocating resources better to serve students. This was achieved by having TAs dynamically join the support queue in times of surge demand.

The use of an upper-year class for analysis differs from first year courses as upper-year students have established help seeking preferences and generally require less assistance. Analyzing data from an upper-year course provides different insights compared to first year, but results may not be generalizable to first year classes where students require more assistance. However, training the instructional staff to explicitly monitor session times is generalizable, and may have a large impact on introductory programming courses where some high demand users often want the TA to perform pair programming with them.

The HelpMe system benefits organizing help sessions for large and small classes as it provides visibility and statistics on student/instructor interactions. This data can be used to determine if particular topics cause students more difficulty and to monitor TA performance in responding to student questions. The instructor found logging emails through the system provided a quantitative measure on student support time that was not previously available.

7 CONCLUSIONS AND FUTURE WORK

The positive impact of queuing systems to help organize and improve virtual and in-person help sessions has been highlighted in previous work [13, 17, 23]. The contribution of this research is demonstrating how some of the ongoing issues in managing large help sessions can be mitigated by system refinements (timer cutoff, question queuing policy, question categories) and deployment features (TA training on reducing session times, flexible staff allocation based on workloads). The result is high approval of the HelpMe system used to facilitate the help sessions and a significant change in student perception towards the value of synchronous help sessions compared to asynchronous email communication.

A unique aspect of the analysis is a comparison to student usage of email and data demonstrating how some questions are diverted to help sessions rather than email. By maintaining low wait times, students were more likely to engage in help sessions and staff were able to provide improved feedback and code reviews. It is these factors that most likely led to slight performance improvement.

Future work will improve the HelpMe system and investigate how the data can be used to improve TA performance and allocation. HelpMe is available at https://github.com/ubco-db/helpme.

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