

Adoption of an Online Queue App for Higher Education: A Case Study

Dr. Karin Jensen, University of Illinois, Urbana-Champaign

Karin Jensen is a Teaching Assistant Professor in bioengineering at the University of Illinois at Urbana-Champaign. Before joining UIUC she completed a post-doctoral fellowship at Sanofi Oncology in Cambridge, MA. She earned a bachelor's degree in biological engineering from Cornell University and a Ph.D. in biomedical engineering from the University of Virginia.

Dr. Jennifer R. Amos, University of Illinois, Urbana-Champaign

Dr Amos joined the Bioengineering Department at the University of Illinois in 2009 and is currently a Teaching Associate Professor in Bioengineering and an Adjunct Associate Professor in Educational Psychology. She received her B.S. in Chemical Engineering at Texas Tech and Ph.D. in Chemical Engineering from University of South Carolina. She completed a Fulbright Program at Ecole Centrale de Lille in France to benchmark and help create a new hybrid masters program combining medicine and engineering and also has led multiple curricular initiative in Bioengineering and the College of Engineering on several NSF funded projects.

Prof. Lawrence Angrave, University of Illinois, Urbana Champaign

Lawrence Angrave is an award winning Teaching Professor at the department of computer science at University of Illinois at Urbana-Champaign (UIUC). His interests include (but are not limited to) joyful teaching, empirically-sound educational research, campus and online courses, computer science, engaging underrepresented students, improving accessibility and creating novel methods to create, adapt and enhance learning opportunities and learning communities.

Karle Flanagan

David Mussulman, University of Illinois, Urbana-Champaign

Dave is an Instructional Technology Facilitator with the University of Illinois at Urbana-Champaign's Engineering IT Shared Services. He helps instructors select and adapt the courses to technologies to enhance student learning and course administration.

Dr. Christopher D. Schmitz, University of Illinois, Urbana-Champaign

Dr. Christopher Schmitz was born in Pana, Illinois in 1969. He received his B.S. with university honors and M.S. (fault-tolerant adaptive systems) in ECE from the University of Illinois. From 1995-1997, he joined TRW Space and Electronics Group in the areas of satellite communication and antenna systems before returning to the University of Illinois. He completed his Ph.D. in the area of multiuser communication in 2002. Since that time, he has served the College of Engineering and the Department of Electrical and Computer Engineering as academic professional, visiting lecturer, lecturer, and, currently, senior lecturer and chief undergraduate advisor. His research interests are in adaptive digital signal processing, digital communications, and education pedagogy.

Prof. Wade Fagen-Ulmschneider, University of Illinois, Urbana-Champaign

Wade Fagen-Ulmschneider is a Teaching Assistant Professor of Computer Science at The University of Illinois at Urbana-Champaign (UIUC). With a passion for data, he serves as the lead instructor of CS 225 (Data Structures) and works with students on numerous data visualizations that have accumulated over 10,000,000 interactions. In 2016, he was selected as one of the National Academy of Engineering's Frontiers of Engineering Education scholars; in 2017, he was awarded the Collins Award for Innovative Teaching; and he has been consistently ranked as an excellent instructor by his students for the past ten years.

Adoption of an online queue system for education: a case study

Introduction

Across the country, student enrollments continue to increase. A major concern with increasing student numbers is maintaining quality of the student experience. Faculty employ both pedagogical approaches and educational technologies to reach ever-increasing numbers of students. While numerous approaches have been successfully deployed in the classrooms of large enrollment courses (e.g. iClickers [1]), office hours are often administered in the traditional method which does not account for, nor take advantage of, large student enrollments. As our large courses continue to grow larger, office and lab hours become crowded. Traditionally, students raise their hand or add their name to a whiteboard list to get assistance from course staff. In these settings, course staff may find themselves repeatedly answering the same or similar questions. Students may wait for long periods before getting help from an instructor. Shy students may be hesitant to ask for help or be overpowered by more aggressive personalities. While some office hours are crowded, others have very few students coming in, and rarely do we capture any analytics on utilization or usefulness of these one-to-one interactions with students. To facilitate office hours in large courses, we have developed an online queuing software for educational use [2]. While the tool was initially developed for office hours in large enrollment courses, the Queue has been adopted in several additional use cases including advising, peer learning, and active learning. In these early adoption cases we have identified benefits of implementing the Queue in educational settings, including saving time for students and instructors, and expanding learning environments beyond classrooms and faculty offices. Further, the Queue can collect rich data that can help instructors identify common questions or “muddiest points” [3]. Instructors can use this data to assess course delivery, content, and performance of course staff. Overall, these benefits and features of the Queue provide educators with an easy-to-use tool for working with large student numbers. Here we present our initial findings on use of the Queue in diverse education settings at the University of Illinois Urbana-Champaign.

Description of the Queue

This Queue is an open-source application that allows students to add their name to a digital queue. Students add themselves to this queue via a web page and can access this page using their cell phone, tablet, laptop, or any other computing device.

Walkthrough of the Queue

Instructor setup of Queue

In order to set up a Queue, the instructor needs to request a Queue space through <http://queue.illinois.edu>. After the user has created a space, the instructor can set up Queues for any of the use cases listed below. To create a queue, the instructor clicks the “+ Create Queue” button and gives the affiliation such as CS Advising or a course number like CS 225 (Figure 1A). The instructor can name the Queue to signal to users what the intended purpose is of the queue. The queue can also be assigned a designated location, if desirable. Once a queue is created, the instructor can launch the queue by clicking on it and clicking “Join” to mark themselves as “On-Duty Staff”.

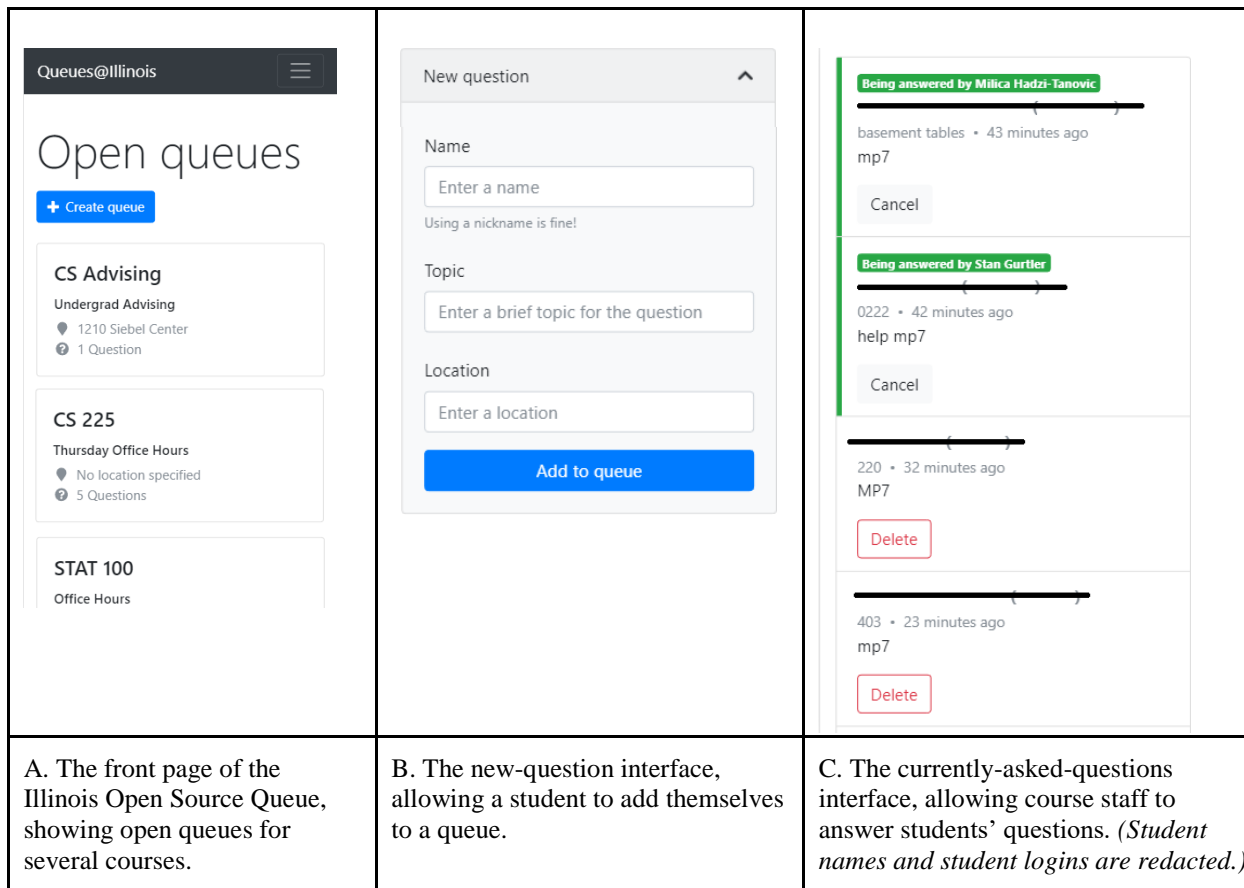


Figure 1. Queue interface as viewed on a cell phone.

Student interaction with Queue

Instructors can provide a direct link to a queue or students can search for the queue using the course name or affiliation. Once the student clicks on the queue of interest, she can ask a question and see other questions in the queue. Students must enter their name, or a nickname, to identify themselves in the queue. Note that the instructor will see their university ID, but other users will just see the nickname that a user chooses. Students then enter a topic or keyword for the question and a location and click “Add to the queue” (Figure 1B). Students can see how many are in line and watch to see how quickly other questions are being answered (Figure 1C). While a student is waiting, she will see her nickname moving up in the queue and then will receive a notification when she is next in line. This is useful when the student needs to come to the designated location, like an advising office or instructor office, to see the instructor or advisor in person. Once the student’s question has been answered, the question is marked done and it is removed from the list.

Use Cases for the Queue Office Hours

Traditionally, office hours of large courses consist of many students packing into one or more rooms and writing their name on a list to receive help from a Teaching Assistant (TA) or another

course expert (“course staff”). In doing so, students must interrupt their workflow when they need assistance, the physical space may not be large enough to accommodate all students, and no records are kept on the utilization of the office hours. Using the Queue, students can queue up to receive help from course staff. In many courses that use the Queue, students will note their location within the building and course staff will go to the student and help the student where the student is currently located (i.e. “computer lab N seat 13” or “whiteboard near the third floor stairwell”). In doing so, the student does not need to pack up to go into office hours and continue in their workflow, office hours are no longer limited to the capacity of a single room, and the Queue application records the interaction to allow for analysis of the effectiveness of office hours.

Peer-Led Team Learning

Peer-Led Team Learning (PLTL) is a teaching-and-learning technique that leverages student teamwork to develop mastery of the course material [4, 5]. Rather than merely watching the “expert’s solution” as is done in traditional lectures, students interacting in PLTL find that they can formulate their own solutions of complex problems by building upon basic knowledge. One difficulty in offering an optional resource like PLTL is in forming groups of six to eight members who are committed to the sessions to ensure a strong community bond is formed. In a class of several hundred students, each with a different and often-changing schedule, choosing times and finding rooms for these sessions requires coordination and flexibility for both instructors and students. By using the Queue for the PLTL sessions of a large engineering course, students easily reinforce their commitment each week or relinquish their spot to a student who may place greater value on the PLTL session. We have found that, in practice, the use of the Queue will maintain a core group of about four committed students while allowing others to join at will, quickly training them in the process of PLTL while maximizing PLTL attendance. The ability for a student to add a specific question or topic to their Queue entry allows the instructor to adept the upcoming session thereby increasing student satisfaction with the content and reducing attrition.

Academic Advising

The Queue has been used for drop-in academic advising office hours in multiple departments at the University of Illinois Urbana-Champaign. Without the Queue, advisors often have a long line of students waiting outside their offices. Advisors can allow students to add themselves to the queue to sign up for drop-in advising. After they add themselves, students can view the Queue to estimate their wait time. After adding themselves to the Queue, students can go somewhere more convenient to work until it is their turn for their appointment because they can view where they are on the Queue and be notified when they are next in line. Advisors can also see the name of the student who signed up, as well as their question, which allows them to be more prepared to help the students.

Active Learning

One course instructor of a sophomore problem-solving class decided to use the Queue in class. The instructor was teaching a problem-solving class with several worksheets that required the entire class period to solve. The classroom was set up for students to sit in tables of nine, each with a display and whiteboard for problem solving. The instructor noticed that students would often be holding their hands up for a long time and it was hard to keep track of who had their hand up first and impossible to tell who had a quick question versus a more in-depth

question. Further, students who were closer to the instructor could skip the line and get attention sooner than students further away. The instructor set up a Queue to manage questions in class and make the process of moving around answering questions more transparent. Students could post questions with their name and table number so that the instructor could determine when they asked for help, what question they had, and what common issues were arising at multiple tables with the in-class activity. When two tables posted the same question, they were encouraged to join forces and work on the topic until the instructor could join them. This often ended up resolving the question without instructor intervention. Students appreciated knowing where they were in line and often enjoyed the peer teaching from a group who could help them.

Benefits of the Queue

Across these current use cases, we have identified the following benefits of the Queue system.

Save time for both students and instructors

Time is at a premium for students, instructors, and staff. The Queue organizes both students and instructors to maximize student learning when time is restricted.

Group Formation and Peer Learning

Numerous studies have shown the benefits of peer learning, but this can be challenging to facilitate in large courses with several hundreds of students. The Queue allows students to identify other students or groups who have the same or similar questions. This could be used to help students form small groups to discuss their question(s) and then work with an instructor. Similarly, the Queue could also be used to facilitate students answering other students' questions where participation or bonus points could be offered in a gamification approach. The Queue also allows for dynamic changes in group membership for activities limited to a maximum group size.

Analytics

The Queue can collect rich data that can help instructors identify common questions or “muddiest points” [3]. Instructors can use this data to assess course delivery, content, and performance of course staff. They can also use this data to staff their office hours accordingly because it allows them to identify the busiest times and determine staffing needs.

Accessibility

As an open source software package that does not require any special equipment, the Queue is easy to deploy in any course or educational setting with Internet access. Screen readers for visually impaired will be supported using aria HTML attributes. Additional considerations for web accessibility are in progress.

Space

Faculty offices are designed for small meetings and office hours can quickly become standing room only. The risk of overcrowding and long wait times grows with larger class sizes, both of which may discourage student attendance in office hours. The Queue addresses these issues by allowing alternative spaces to be used for office hours. Students can list their location in the software, allowing course staff to answer questions beyond a small office.

Reach more students

In crowded office hours, shy students may be hesitant or overpowered by more aggressive personalities and not get access to course staff. Additionally, the Queue uses web standard accessibility tags allowing for students with disabilities to add their names to the queue in a way where adding their name to the whiteboard may prove difficult or impossible based on their disability. Further, students with social anxiety or related challenges may find it easier to participate in office hours or ask for the help that they need using the Queue.

Conclusions and Future Work

While the Queue was originally developed for office hours in large enrollment courses, it has evolved to support several use cases in academic environments. Since its implementation in Fall 2017, use of the Queue has expanded to over a dozen courses and four advising offices. Students who use the Queue in one context (e.g. course office hours) can easily transition to using it for other purposes (e.g. active learning), making adoption of the Queue easier for instructors, advisors, and others who use the platform. Future work is needed to examine the wider range of use cases and to collect instructor feedback to improve the platform. Future research is needed to understand student use and perceptions of the Queue, as well as evaluation of the Queue in supporting student learning and engagement. Overall, we find the Queue an invaluable tool to improve the student and faculty experience, particularly for large-enrollment courses and programs.

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