



PTAS Project Report (for REGULAR PROJECT GRANTS)

Project Title: Developing digital and hybrid mathematics support for long-term improvements in quality and accessibility

Project type:

A Research Project (research focus on particular dimension of teaching, learning, assessment)

Principal Investigator : Dr David Quinn

Schools/department : School of Mathematics

Team members (including Schools and Departments) :

Dr Steven O'Hagan (School of Mathematics)

Dr Konstantina Zerva (School of Mathematics)

For further details, please contact: Dr David Quinn (d.quinn@ed.ac.uk)

Report

What did you do?

The PTAS funding enabled us to appoint an undergraduate research assistant who played a significant role in the collection and analysis of data.

Quantitative data was gathered from Microsoft Teams covering four semester of the synchronous support. In the summer of 2021 our research assistant helped to develop tools for this analysis which were also used for the academic year 2021-22.

Qualitative data was gathered from three surveys. In the summer of 2021 we surveyed students who had access to the online service in the academic year 2020-21. This sought to understand students' attitudes towards the service, what they saw as pros and cons of accessing the support online, their perceived likelihood of using online or in-person support in the scenario that both are available, and their thoughts on how the service could be improved. A similar survey was offered to students in 2022. We surveyed the tutors who worked in the support service. Here we sought to understand their perspectives on how students engaged, the challenges they faced and their thoughts on how the service could be improved.

What did you find out?

The service (MathsBase) was offered through a Microsoft Team with a channel for each course supported. Students who accessed the support would join a video call with a tutor. Typically, each call was between one student and one tutor. The data for two courses in semester 1 2020-21 was deleted before the start of the project so any range which includes that semester will not represent all activity.

The support service is offered to all students taking a course offered by the School of Mathematics

in years 1 and 2. These students are enrolled on degree programmes from several schools and the number of distinct students per school who accessed the support service at least once is given in Figure 1. Of note, the majority of users are from outside the School of Mathematics.

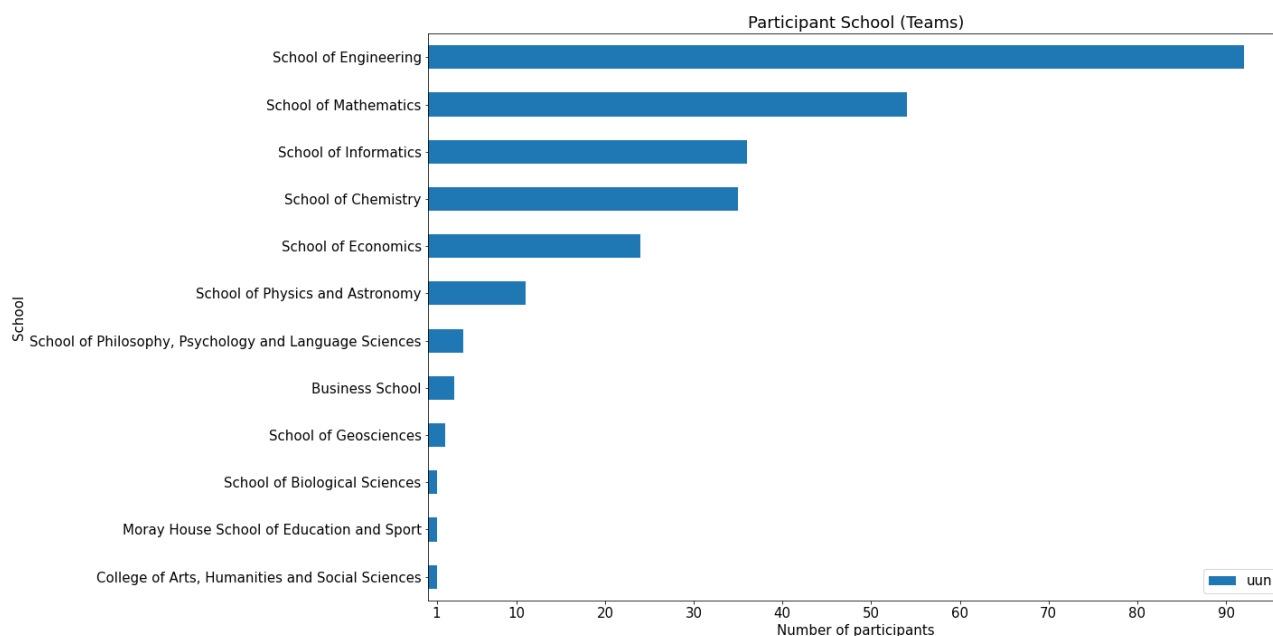


Figure 1: Number of distinct participants by school 2020-21 and 2021-22

The data from Teams allows us to see how often each user accessed the service. Figure 2 shows the distribution for each of the two years of the service. When including additional support offered for the August exams there was a total of 1342 visits. The modal number of visits by users is 1. This emphasises the importance of students' first experience so that students who choose not to return do so because they do not need the support and not because of a undesirable first experience. On the other end of the scale there were 18 users who used the service at least 20 times and 53% of visits were from students who visited the service at least 10 times over the two years the service was offered online.

To understand what would be the optimal hours to offer the service we considered the number of distinct users per hour summed over the semester, this is represented in Figure 3. Note that the data for Semester 1 2020-21 is incomplete so the activity is underrepresented by this graph. The data here presents a worrying trend in engagement. Comparing the semester 2 from each year, as these both have complete data, we saw a significant drop in visits. The survey, discussed below, shows a shift in attitude away from online and the industrial action in 2021-22 will have reduced activity on some courses and reduced availability of tutors.

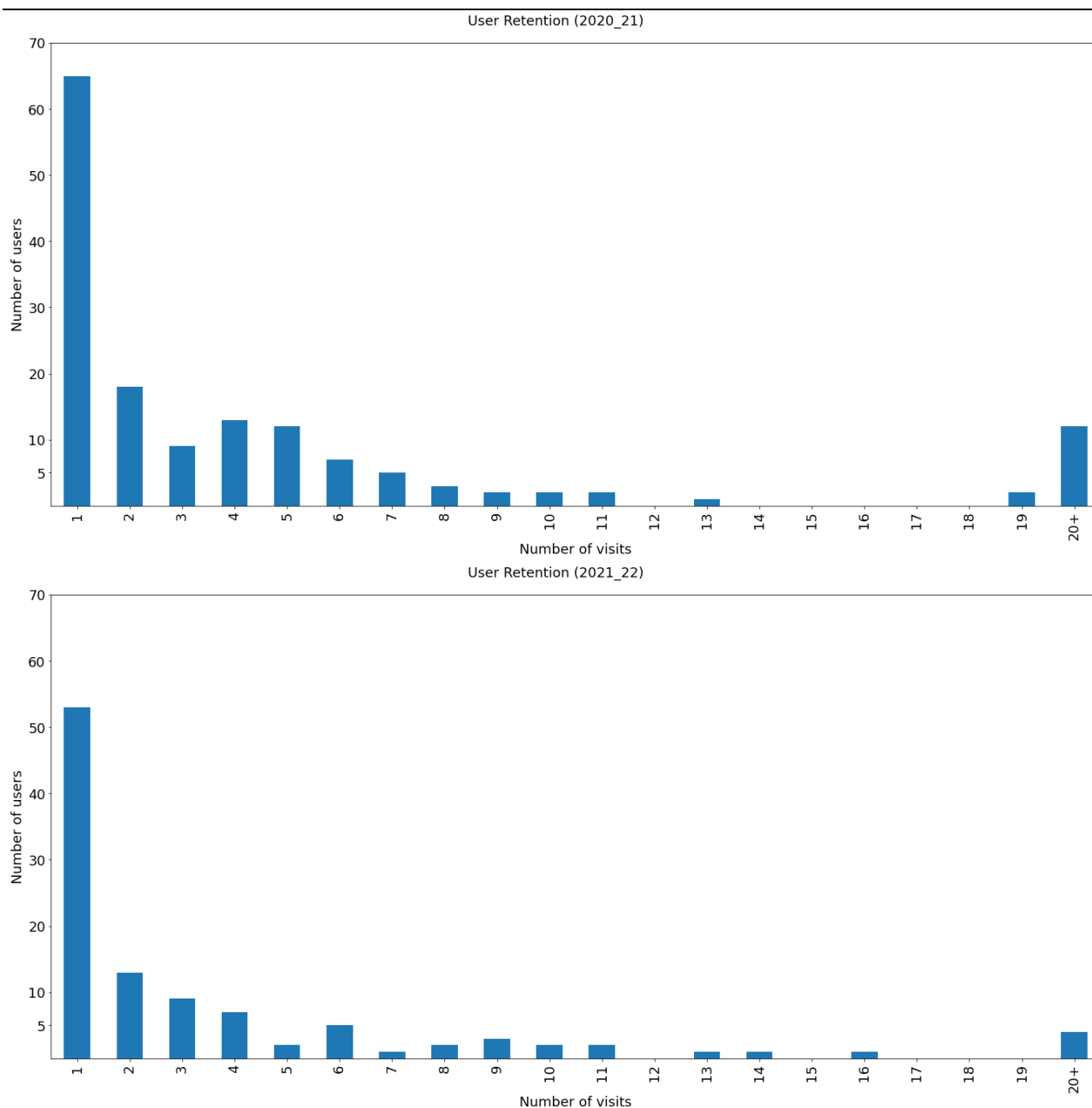


Figure 2: User retention

Visits to the service lasted 16 minutes on average (inter-quartile range 9-27 minutes). Data from the tutor survey suggest the majority of visits were for support on a topic directly connected to an assessment question, although it was not uncommon for students to seek support on a specific topic / question not linked to an upcoming assessment.

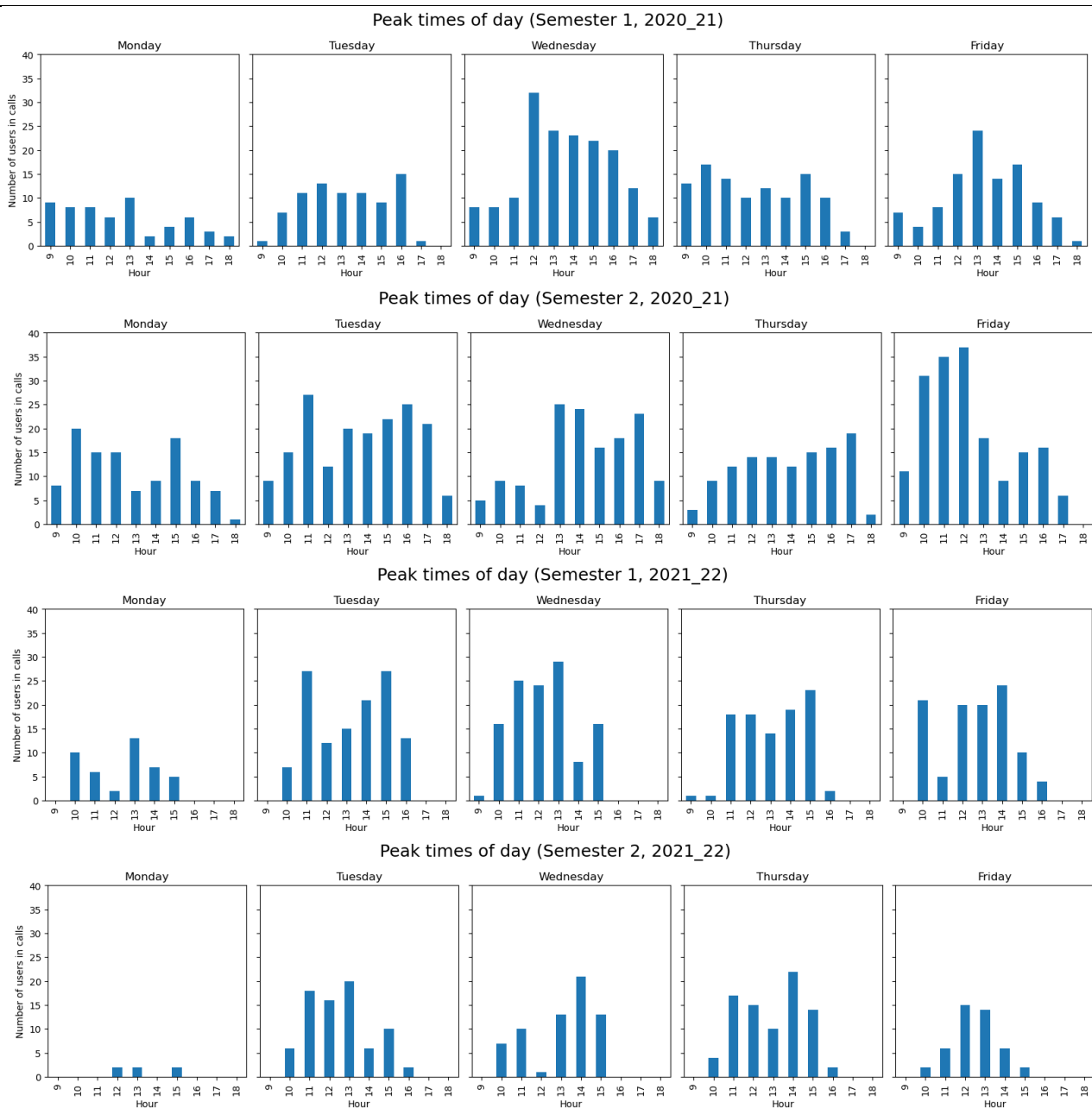


Figure 3: Users per hour, summed over each semester

The data from Teams is complemented by student surveys completed in 2021 and 2022. These surveys were offered to all students who access to the service. In 2021 we invited 1848 students and received 140 responses, 63 of identified as having used the online service. in 2022 we invited 2046 students and received 92 responses, 33 of whom identified as having used the online service.

In 2022, 25% of respondents who had used the service said that had used it “once or twice”, in contrast to 18% shown by the Teams data. In 2021 this was 17% in the survey and 11% from

Teams. This suggests the survey responses are skewed towards those who used the service less often.

Despite the drop in number of users evidenced by the Teams data, student satisfaction with the service did not change significantly, though it was lower in 2022 (Figure 4). In either instance user experience was generally positive.

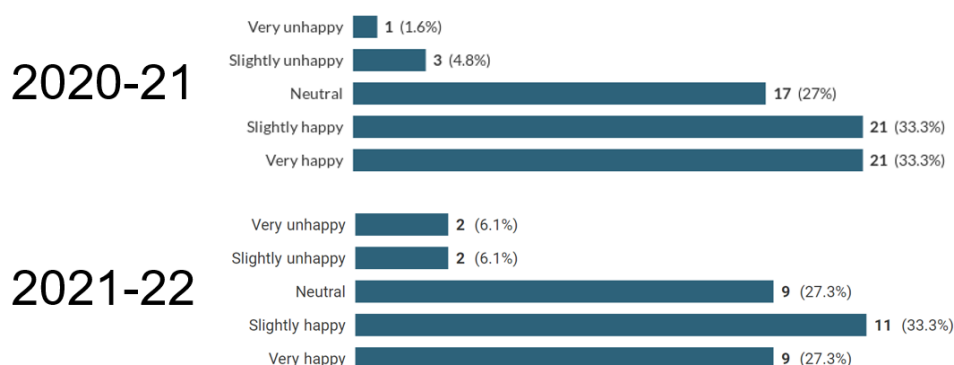


Figure 4: Responses to "How happy are you with the online service overall?" for each academic year.

At least 20% of survey respondents to each survey reported they had not heard of the service before, suggesting a need to advertise the service better.

Survey respondents were presented with the scenario that both online and in-person version of the support were available and asked, for each online and in-person, to rate how likely they would be to use that service. The responses are given in the heat maps in Figure 5, with the number in each cell giving the percentage of responses.

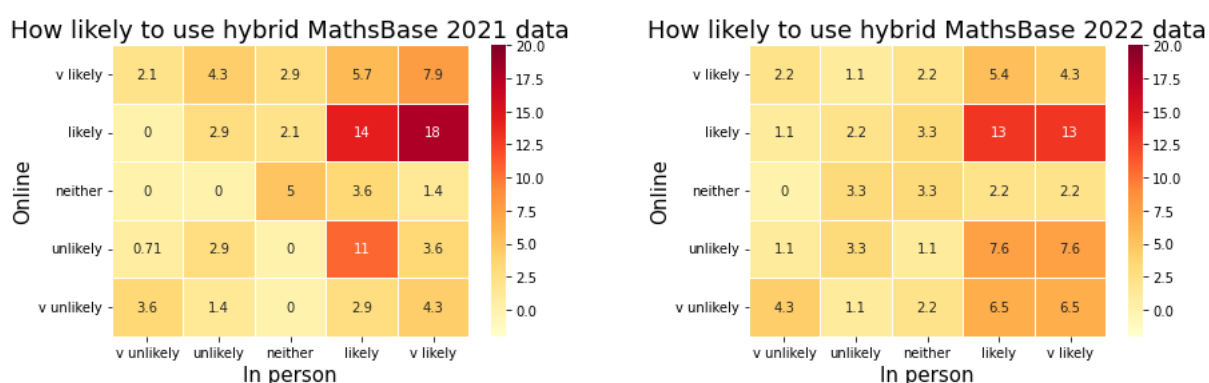


Figure 5: Heat map of likelihood of using MathsBase in different modes

From this we can see a consistent general preference for in-person support but there are two noteworthy implications. First, we can see a slight shift away from online. If we count only those students who said they were likely to use the service in one of both of the modes presented then in 2021 69.4% were positive about online with 83.5% were positive about in person but in 2022 59.5% were positive about online, a 10 point drop, and 85.1% were positive about in person which is a very minor increase. The second result is that in 2022, the most recent survey, 15% of those who said they were likely to use one or both modes of the service said they were likely to use



online and not likely to use in-person. This suggest that about 1 in 7 of our students who would seek support would be enabled to do so by offering synchronous support online and potentially excluded without online.

Respondents were asked to explain their reasoning for their to responses. Among those who had a preference for in-person we identified themes on the quality of teaching, ease of explanation and opportunity to work with peers. Among those with a preference for online we identified a clear theme that online is easy to access as it does not require travel to a specific venue.

One of the main challenges about the online support identified by respondents was the ability to share mathematical writing online. In 2022 only 42% of survey respondents had access to an iPad or writing tablet. A similar theme was identified in the tutor survey. The technology required for effective online support will vary by discipline but for students who need to access support online it is important to consider how they can access the technology to make that support as effective as possible.

How did you disseminate your findings?

Talks/ Presentations:

Developing digital and hybrid mathematics support for long-term improvements in quality and accessibility, CETL-MSOR, Coventry, September 2021

Developing digital and hybrid mathematics support for long-term improvements in quality and accessibility, TEMSE Seminar, University of Edinburgh, March 2022

Digital academic support for prehonours students with a view towards hybrid, University of Edinburgh Learning and Teaching Conference, June 2022

Digital mathematics support for prehonours students with a view towards hybrid, CETL-MSOR, Dundee, September 2022

Papers

Digital mathematics support for prehonours students with a view towards hybrid, (in preparation)

What have been the benefits to student learning?

The data from Teams has been used to inform how we schedule the support in light of reduced resources and around revision support. Furthermore both Teams data and responses from the surveys have fed into the training of tutors to try to ensure the student experience is positive from the first visit. In particular tutors are better aware of students' expectations and difficulties accessing the service.

We have quantified the benefits of continuing to offer synchronous drop-in mathematics support alongside the in-person support, enabling access for about 1 in 7 students who would seek support and likely improving access for everyone. The challenges of working online identified within the survey have helped to improve how we describe the service so students can be better prepared and get more out of the support. There is more to be done to ensure all students, who need to, have access to the technology necessary.



How could these benefits be extended to other parts of the university?

Although the service examined in the project is specific to Mathematics, many of the themes will be common to other disciplines. Time of access are useful for scheduling and attitudes to online, which are influenced by the required technology, are likely common across many step subject.



Financial statement (please delete as appropriate):

Either

This project has utilised the funding awarded to it by the PTAS adjudication committee and the Principal Investigator or School Administrator appropriate can provide financial statements showing the funding usage as and when required by the UoE Development Trusts who may require it for auditing purposes.

Please send an electronic PDF copy of this report to:

Email: iad.teach@ed.ac.uk