RESEARCH ARTICLE

Access, Disability and Mature Student Opinion on Academic Mathematics Supports

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Abstract

In this paper we report on the main themes which emerged from analysis of a survey of students registered with the Access, Disability and Mature Student offices at Maynooth University. The survey focussed on the students' experiences of mathematics and the mathematics academic supports available to them. The majority of student feedback was positive, for example their engagement with the Mathematics Support Centre, improved understanding of mathematics and the influence of tutors and peers. However, some issues emerged in relation to impact on learning, such as inflexible departmental structures with fixed deadlines and a lack of student awareness of the supports available. In addition to discussing the main results, we outline how the findings will guide the future provision of such supports.

Keywords: Access, Mature, Disability, mathematics support.

1. Introduction

The Maynooth Access Programme (MAP) Office at Maynooth University (MU) provides supports for 'access students', 'disability students' and 'mature students' who register with them. Access describes students who have been placed at a disadvantage on their pathway to Higher Education (HE) due to social, economic or educational reasons. Disability broadly covers students with learning or physical disabilities, and mental health or other ongoing illnesses. Further details are available from http://accesscollege.ie/hear/. Mature refers to students who are at least 23 on the 1st of January in the year of entry to HE. MU traditionally has one of the highest levels of MAP students in HE in Ireland. For example, in 2020-21 MU had approximately 11,600 undergraduate students. Of these, 24.1% were registered with MAP. There were approximately 1,600 students in the Department of Mathematics and Statistics (the Department) and, though the exact number of these registered with MAP is not available, across Irish HE, the overall number of MAP students is rising and the subject area of mathematics and statistics has one of the highest proportions of MAP students (AHEAD, 2018). While the MAP Office provides a broad range of non-academic supports (see https://www.maynoothuniversity.ie/access-office/about-map), the focus of this paper is on the academic mathematics supports provided for MAP students. Key to the success of such services is that they are research-based (Lawson et al., 2019) and having previously investigated the trial of resources to assist students with dyslexia (Heraty et al., 2021), we decided that this first local examination of all academic mathematics supports available to MAP students was an appropriate next step.

MU has a popular Mathematics Support Centre (MSC) based in the Department of Mathematics and Statistics (the Department). The MSC provides a range of supports for undergraduate students, including drop-in, on-demand workshops and online resources, the effectiveness of which has been evaluated (Berry et al., 2015). Due to the COVID-19 pandemic, these supports were adapted to an exclusively online environment and included additional supports such as 1-1 appointments and study groups (Mac an Bhaird et al., 2021). In addition to the MSC, all students have access to Department small group tutorials and lecturer office hours. There are tutorials for every module and, for service mathematics, the tutors are usually final year undergraduate or postgraduate students. For the purposes of this paper, all these supports are labelled as mathematics learning supports (MLS). Students have weekly assignments, typically due at 4pm on a Friday, which contribute to their continuous assessment. There are no extensions, but students who miss an assignment for genuine reasons (illness, bereavement etc.) are not penalised.

The MAP Office are strong supporters of the MSC and encourage MAP students to avail of its services. Furthermore, every department has an academic staff member who acts as a point of contact for MAP students. This role is called the MAP Academic Advisor and the 1st author has held this position in the Department since 2012. MAP students who are struggling with mathematics often initially contact the MAP Office. A meeting, which includes the MAP Office staff member, the student and the MAP Academic Advisor, is then arranged. Often these students have not been engaging with existing supports, so the Academic Advisor provides study advice including how to use the academic supports available. As the MAP Academic Advisor also tutors in the MSC, they arrange to meet the student there in the first instance to give them initial support, show them how to use the MSC and get them working with their peers, if appropriate.

Occasionally it emerges that MAP student engagement with academic supports is impacted by personal circumstances, e.g. poor health or particular learning needs. In these situations, the MAP Office and the Academic Advisor can approve 1-1 tuition. The MAP Office covers the cost, and the Academic Advisor normally sources an appropriate Department tutor, liaising with them in relation to the student's progress. It is an agreed policy between the MAP Office and the Academic Advisor that students are not generally made aware of the availability of these 1-1 sessions. In the first instance, students are encouraged to use existing supports, so they have the opportunity to become independent learners of mathematics.

All students are made aware of the MSC through in-class announcements, and posts on Facebook, Twitter, and via all-class emails. Additionally, MAP students are reminded of these supports and informed about MAP Academic Advisors during the MAP Office orientation events. If a MAP student first contacts a lecturer or tutor in the Department then, subject to student approval, the Academic Advisor is informed, and they arrange to speak with the student.

2. Methodology

In January 2021 we developed an anonymous survey with a mix of yes/no, multiple choice and open response questions. There were two main sections: GDPR, consent and background questions; and questions relating to their experience of mathematics and the available supports. Ethical approval was received and the survey, available from www.onlinesurveys.ac.uk, was launched at the end of March via current Department and MU Alumni emailing lists. The survey closed on the 11th of June, and a total of 33 students responded. Responses were downloaded to Microsoft Excel and we applied *Thematic Analysis* (Braun and Clarke, 2006), with each author coding the open responses separately. We then met to discuss our coding, and the main themes that emerged are reported on in Section 3. Responses were also crosschecked with background questions, for example if the students were registered with the Disability Office, or the year of study of the respondent, and any patterns are also reported.

3. Results

3.1. Reacting to difficulties

When considering what students did when they first encountered difficulties with mathematics at MU, there were three main themes: Department, Self-study and MAP Academic Advisor.

The MSC was the most frequently reported departmental support '*I went to the maths support centre, this got me through my first two years*'. Respondents also mentioned seeking help from the Department Office or their Lecturers '*I first emailed my maths lecturer. He gave me all the sources of help I could avail of such as attending maths study groups*'. Students also referred to making use of their tutorial when they needed assistance '*Before* [COVID-19] *I would go to the MSC but currently I would talk to my tutor during my tutorial*'.

Self-study describes students who referred to either using online resources such as Google or YouTube, or those who appeared to work on their own, '*keep on trying to understand the material*'. Most comments in relation to the MAP Academic Advisor referred to the positive student experiences. They used words like '*helpful*', '*listened*', '*advice*', and '*admiration*'. For example, '*…wonderful experience, made me feel like it wasn't because I was unintelligent*'.

3.2. Academic supports

When students were asked their opinions on the academic supports they availed of, four main themes emerged: Understanding, Peers, Tutors and Structures. The theme of Understanding was evident across comments on all the supports. In almost all cases, students praised these supports, they felt that they encouraged them to engage with mathematics, clarify misunderstandings they may have had, and this gave them increased confidence in their abilities. For example, '*Tutorials were very good as it forced me to do the maths and expose misunderstandings when I got questions wrong*' and '*I found* [drop-in] *to be a huge help as I was able to go through lectures that I did not understand. It was also useful to get other examples of questions I was struggling with*'. There were, however, some comments which indicated that either study groups or tutorials did not increase student understanding. Students provided different reasons, such as being too shy to ask questions or blaming the tutor, for example '*I didn't benefit much from tutorials, felt embarrassed asking questions and tutors weren't very interactive*'.

Within the theme Peers, there were two subthemes, Collaboration and Social. The Collaboration subtheme related to the sharing of ideas with peers and the ease of asking questions '*I went* [to the MSC] *with friends so we could work out our assignments and help each other*'. The Social subtheme covers remarks about the benefits of having an environment where students can converse while studying. For example, '*…find* [study groups] *super helpful and a way for us to have social interaction while learning online*' and '*…it was a great emotional support to have a space* [MSC] *where friends could meet to discuss hardships associated with the course…*'. A small number of students, who availed of MLS during COVID-19, acknowledged the difficulties of working with peers in an online environment and signalled a desire to return to on-campus learning '*Discussing problem sets with students online helped a lot although it hasn't been the same as meeting them in person*'.

All but one comment in the Tutor theme was positive. Students mentioned words like '*helpful*', '*patient*', '*enthusiasm*', '*advice*', and '*great explanation*'. For example, '*My tutor is so enthusiastic about the work and I loved that because it made me want to engage more with the tutorial*'. All comments which fell under the Structure theme were related to tutorials. They either referred to the tutorial format or the timing of the tutorial content in relation to assignment submission '*Tutorials are way more helpful this year as it was the content we are working on rather than what we did the week before*'.

3.3. MAP student status

From a series of questions which aimed to gain an understanding of how the students' MAP status (access, disability, mature) affected their studies, three themes emerged: Time, Academic, and Age. Time issues mainly related to comments on difficulties keeping up. Comments from disability students indicated how their disability made it difficult to maintain pace with the course content '*I need extra time to get through lecture notes because I often lose focus or just need more time to process the information so I can understand the concepts*'. Whereas mature students referred to other factors which limited their time availability '*I have other responsibilities. I care for an elderly parent*'. Some students referred to poor attendance due to illness '*If I have a panic attack it could leave me useless for a day or two*' and others suggested poor time-keeping or organisational skills. Finally, there were a couple of students who struggled with the time allotted to complete their assignments and took issue with the rigidity of the Department homework submission deadline '*I much prefer when assignments are more spaced out in case I have a bad week*'.

The theme Academic refers to comments where students identified difficulties in staying focussed, recalling information, and misreading questions. There were some comments, all from disability students about general academic issues. For example, '*Anxiety and depression symptoms mean my concentration, memory and cognitive function are majorly affected*'. Other comments were much more specific about how their status impacted their studies in mathematics. For example, students referred to their weak mathematical backgrounds. Mature students associated this with the length of time since studying mathematics at school, and disability students with either missing class or underperforming due to their disability. Several disability students also commented that they sometimes mix up mathematical details, for example '*It can be really difficult to keep all the formulas in the right order in* [my] *mind…*'. Furthermore, there were comments related to difficulties with mathematical language and mental maths '*Have difficulty with symbols and shorthand*'.

All comments in the Age theme were from mature students. Some comments identified that '*money pressures are greater for mature students*', while other comments suggested that mature students felt less connected to their peers due to age differences. In contrast, there were mature students who viewed their life experiences as an asset to them '*As a mature student I found that I could organise my study time and group sessions adequately and with good confidence*'.

3.4. Additional support

Students were asked what the Department or MSC could do to improve their experience with mathematics, and four themes emerged: Tuition, Social, Differentiated Learning, and Academic Structures. Comments which fell under Tuition expressed a desire for more contact time with tutors, more 1-1 assistance and MAP-only tutors. '*More tutors in general and …*[tutors] *specifically for MAP students*'. Under Social, students also indicated a desire for increased opportunities to work with their peers. For example, '*I can say that I wish I had made friends in first year*' and '*Have a study group with just disability students so we can understand each other*'.

Under the theme Differentiated Learning, some comments centred around a desire for staff to be more cognisant of students' knowledge level '*… need to encourage me more, but remember I'm not a pure mathematics student*'. Others suggested that more written and visual examples would be beneficial '*…as I have difficulty understanding or remembering spoken descriptions*', and several students specifically referred to increasing staff awareness of their MAP status '*to let the tutor know because they can't help if they don't know*'. Finally, under Academic Structure**,** students made a variety of recommendations that they felt would improve their situation as a MAP student. They referenced items such as: being excused from mathematical computing labs, flexible deadlines, and more drop-in late in the week. Some students suggested that there was minimal learning in traditional lectures, while also discussing the advantages of asynchronous material: '*Online learning has helped me find video examples* [which are] *an excellent resource, can rewatch and pause which really helps understanding'*. Students also expressed different opinions on the timing of Department tutorials,

with some preferring tutorials on material before it was due, and others wanting tutorials with feedback on material after it had been submitted.

3.5. Further themes

Two additional themes, Anxiety and Communication, were evident across sections 3.1-3.4. Students referred to anxiety about speaking in front of classmates: '*I also struggled in the tutorials because I was too anxious to speak up in front of everyone*'. They were also anxious about their abilities in mathematics: '*I spoke to a lot of lecturers and was then told about the support centre, this changed my anxiety around learning the subject and aided me in understanding very difficult concepts in a broken down and digestible way*'. The theme of Communication captures student responses which exhibit a lack of awareness of available supports, for example '*I wasn't aware of the service* [MAP Academic Advisor] *at the time*'.

4. Discussion and Conclusion

Though the number of respondents was low, the themes which emerged from this first local look at MLS for MAP students provide useful feedback for reviewing Department services. Encouragingly, students were broadly positive about MLS and mathematics: '*I feel like I have a better understanding of maths since coming to Maynooth. I felt in school it was more about the exam but in college its more about understanding the concepts in maths*'. While positive feedback from students who are engaging is not unexpected (Lawson et al., 2003), it is reassuring for our local policy of encouraging MAP students who are struggling, in the first instance, to avail of standard MLS. The respondents were particularly positive about tutors which, again, is not unexpected. Student evaluations of MLS, almost without exception, identify the importance of tutors (O'Sullivan et al., 2014). Research also suggests potential benefits for students from engaging with peers while studying mathematics (Duah et al., 2013, Solomon et al., 2010), and this is also evident from our responses. Comments were generally positive about their experiences of working with peers and some students suggested that we facilitate increased opportunities for peer interaction. This reinforces the relevance of our study group initiative, which was launched for all undergraduates in September 2020. Initial student feedback praised, in particular, the social aspects of these communities of learning (Mac an Bhaird et al., 2021).

While there was little negative feedback, there were several issues that we can seek to work on and improve, or advise the staff responsible. Some students referred to a need for increased staff awareness of their MAP status and its impact. A survey of MSC co-ordinators and 1st year lecturers across Ireland and the UK (Cliffe et al., 2020) identified similar problems. At MU we have increased the visibility of MAP in our MSC tutor training, for example, we are involved with sigma (http://www.sigma-network.ac.uk/sigs/accessibility-sig/) in the development and trial of accessibility resources specifically for those who co-ordinate and tutor in MLS (Heraty et al., 2021). Cliffe et al. (2020) also found that staff were often unaware of how they should support MAP students academically and, furthermore, if there was collaboration between MLS and MAP services locally.

Some MAP students also felt that Department and University structures were not flexible enough for their needs, which suggests that a streamlining of policies for MAP students in required. For example '*The systems that allow me to get extensions or exam supports are spread throughout the university, and the process of getting them is so much more convoluted*'. Addressing this issue is an ongoing challenge for a Department with a large number of students who have at least one assignment due each week. The move to increased online assessment has allowed the Department increased flexibility on deadlines for MAP students through the ease of setting specific submission deadlines on Moodle for different student groups. However, it is important to recognise that online teaching and learning can introduce other barriers for students (Smith et al., 2020).

There were references in the student responses to both social and mathematics anxiety. Mathematics anxiety is a commonly reported issue (Marshall et al., 2017) and mathematics anxiety sigma resources will be trialled at MU in 2022-23 and hopefully this will allow us to further reduce barriers for these students. Interestingly, some respondents in our study commented on how availing of certain aspects of support allowed them to develop strategies that reduced their social anxiety. For example, '*Used drop-in specifically during times when* [MAP Academic] *Advisor was there as social anxiety prevented me from using it otherwise*'. However, others remarked that their social anxiety prevented them from availing of some supports altogether.

Across the survey, there were a wide variety of comments which identified an array of unique student needs. This highlights the importance of the MAP Academic Advisor who can act as a coordinator between the Department and the MAP Office to determine bespoke solutions to student learning needs. Students who did avail of the MAP Academic Advisor were extremely positive about the experience. Unfortunately, almost half the respondents reported being unaware of the MAP Academic Advisor role. Students reporting unawareness of advertised supports is not a new phenomenon (O'Sullivan et al., 2014) and we continue to work with the MAP Office staff to promote the position. In addition to continuing our development of existing services to support MAP students and following up on the issues reported in this paper, we are considering further research. MU has a large number of MAP students and only a small proportion of these responded to our survey, with a variety of responses across the different MAP cohorts. Cliffe et al. (2020, p. 196) suggested that '*the fragmented nature of the MLS work on accessibility has not impacted on general practice…*', so we would welcome further work from colleagues on the academic MLS available for MAP students in their institutions and corresponding student feedback. This would allow us to put our own work into broader context and identify how generalisable our study is, given the number of respondents. Locally, it would be interesting for us to investigate the access, disability and mature student groups individually in more detail.

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