University College Dublin
Maths Support Centre

Annual Report 2019/20

Contents

1 Executive Summary

Summary statistics of 2019/20 at the UCD MSC include:

- The number of visits was 4,259 from 1,138 unique students, a decrease of 23% and 19% respectively (due to pandemic).

- Student visits from 184 distinct modules were recorded, a decrease of 5 modules on the previous year.

- 67% of all visits were from students registered to level 0 or level 1 modules, an increase of 1% from 2018/19.

- The average time spent with a tutor was 31.2 minutes (an increase of 3.1 minutes) and the median time spent with a tutor was 16.2 minutes.

- The median wait time to see a MSC tutor was 4.4 minutes, a decrease of 3.6 minutes on the previous year.

- 79.7% of all visits came from students registered to modules delivered by the School of Mathematics and Statistics (SMS), down 4.3% on the previous year.

- 10.8% of all visits were of a statistical nature, a decrease of 5.7% on last year - 7.7% of all visits came from STAT modules within SMS.

- There were 3,172 one-on-one MSC sessions (a decrease of 706 one-on-one visits), and 383 MSC sessions with two or more students, a decrease of 231 group visits.

- There were in excess of 50,000 website hits to the MSC Leaving Certificate mathematics suite of videos between March and June 2020.

Developments at the MSC during 2019/20 include:

- Updating both the online and in-house MSC maths and stats resources.

- Strengthening the governance and oversight of the MSC, including publishing the oversight committee's terms of reference, and MSC Director's job description on the MSC website

- Improvements to the feedback system for lecturers, MSC tutors and student users of the service.

- Opening on two extra weeks during Spring Trimester examination period (COVID-19).

- Providing five weekly dedicated 2-hour slots for HEAR, DARE, Mature, International, QQI/FET and Access students.

In the 2019/20 academic year the UCD Maths Support Centre (MSC) received 4,259 student visits corresponding to 1,138 unique students studying 184 distinct modules representing all six colleges of the university. The MSC maintained its opening hours of 43 hours per week in 2018/19 to to include late night openings from 6-8pm each night Monday to Thursday in Autumn Trimester. We opened for drop-in support for a total of 25 weeks of the academic year. The opening hours for semesters two were Monday to Thursday 10am-7.30pm and Friday 10am-1pm.

In August and September 2019 the MSC ran a series of maths support sessions for HEAR (Higher Education Access Route), DARE (Disability Access Route to Education), Access (Access to Science, Engineering and Agriculture), QQI/FET (Further Education and Training - formerly FETAC) and Mature student cohorts, supporting over 400 students in the process.

The MSC facilitated over 20 hours of dedicated one-to-one support, which took place outside of the MSC, with students registered to the Access and Lifelong Learning Disability Support Service.

2   Introduction

The Maths Support Centre (MSC) at UCD, offers free, non-judgmental academic support in mathematics and statistics for any UCD student registered to a level 0, 1 or 2 module. It is normally a drop-in service working out of the centrally and neutrally located James Joyce Library Library Link 1 space. Though from March 23 2020 it moved wholly online using Brightspace Virtual Classroom, Zoom and the YouCanBookMe appointment based booking system due to the pandemic-enforced move to online teaching and learning. In 2019/20 the MSC was staffed by 29 skilled tutors, the most ever hired in it 17 years of operation. The MSC is a well established university-wide academic support unit which in its first three years of the operation saw an average of 480 student visits per year, while the last six years have experienced an average of 5,311 annual visits.

3   Governance and Oversight of the MSC

For the 2019/20 academic year the UCD MSC Oversight Committee consisted of Kevin Hutchinson (Chair), Maria Meehan, Head of Teaching and Learning SMS, Brendan Murphy, Head of School SMS, Áine Galvin, Director of UCD Teaching and Learning, Ted Cox and Nial Friel from the Applied and Computational Mathematics, and Statistics subjects of SMS respectively. The committee met on September 26 2019 and again on February 25 2020.

Separate regular meetings with MSC tutors and management are held throughout both semesters. The MSC annual report is sent to the Registrar's office each year where it is further disseminated to the University's Management Team via the Student Experience Group (SEG) and a presentation is made at that same meeting by the MSC manager.

This year the SEG meeting was held via Zoom on March 24 2020. The chair and Registrar opened by saying he was very impressed with the MSC annual report as a document both in its scope and detail. He very much welcomed the metrics that are used and the measurements that are driving student behaviour. He added that he and the SEG are very appreciative of all the hard work going on at the MSC.

In view of the intensive use of the allotted MSC space the urgent need for better physical facilities for the MSC, in particular for adequate space, light and ventilation especially, a recurring item in the agenda of the MSC Oversight committee, was discussed. It was suggested by the SEG chair that this item be added to the agenda of the Library Strategy Group (LSG). The chair added that the building for the Centre for Future Learning is progressing and is in panning at the moment, and there is no intention to halt progress on it even given the current circumstances. Also, UCD Director of Estates - Campus Operations said he would look would look at the space to see what remedies could be applied to the current Library space to increase the fresh air and comfort levels in the MSC space, and that this could come under a larger project that is on-going in the JJ Library.

Subsequent to this meeting the Chair of the MSC Oversight Committee wrote to Prof. Barbara Dooley in her capacity as Chair of the LSG inviting further engagement from MSC management and Oversight Committee on this. The MSC Oversight Committee has not heard anything on this matter since.

The MSC Annual Report is also sent to the Dean of Students, the Dean of Undergraduate Studies, the Librarian, relevant Programme Deans, relevant Heads of School, the Director of Access and Lifelong Learning, the Head of the Student Advisers Group, relevant Academic Student Advisors, the Students Union Undergraduate Education Officer and the SMS Office Manager.

4 The Year in Numbers

The number of recorded visits to the MSC in 2019/20 was 4,259 from 1,138 unique students. Semester one visits totalled 3,127 (an decrease of 391 visits on the previous year), while our semester two visits were 1,132 down from 2,042 last year. This significant decrease was due to less engagement with MSC services over the 8-week period of the pandemic in Spring Trimester. Despite extensive advertising

and marketing methods being deployed to raise awareness among the eligible UCD student body that the MSC services were all available online we surmise that Stage 1 and 2 UCD students were simply overwhelmed with the adaption to online learning required in those weeks and thus mathematics supoprt slipped down their priority list.

The annual number of recorded visits (and unique visitors) to the MSC for the past fifteen years is given in Figure 1. In August and early September of 2019 the MSC supported 600+ visits from 400+ distinct students on the HEAR (Higher Education Access Route), DARE (Disability Access Route to Education), Access (Access to Science, Engineering & Agriculture), QQI/FET (Quality and Qualifications Ireland/Further Education & Training, formerly FETAC), International and Mature route entries to UCD. **These visits are not recorded** on the MSC database as these students do not yet have their UCD student numbers at this time and so cannot log in to our system. Thus Figure 1 relates only to the number of recorded visits/visitors to the MSC each year during the teaching, revision and examination periods of each semester.
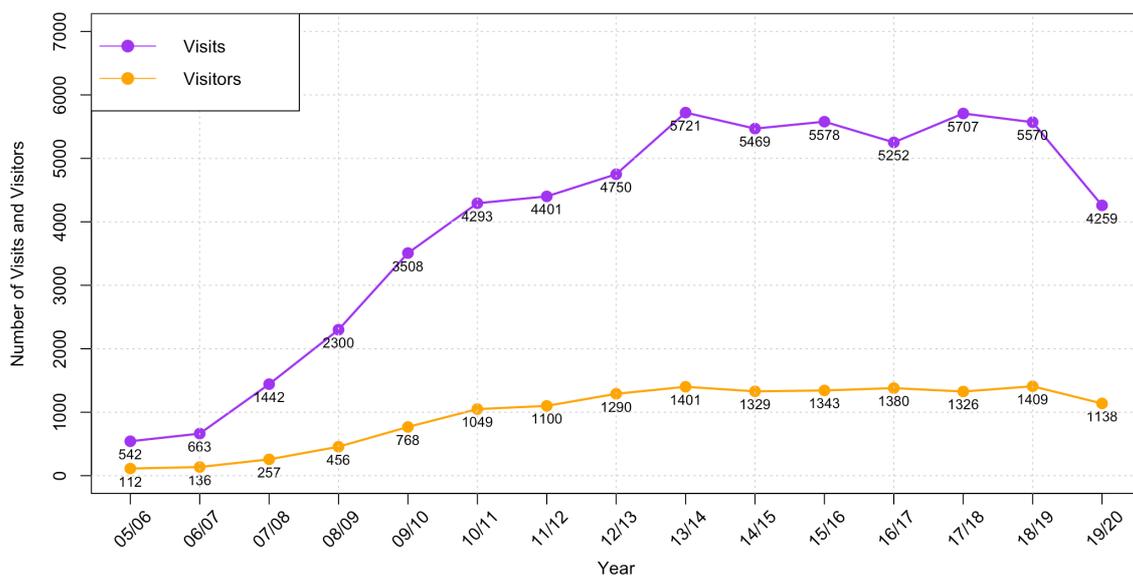

Figure 1: Annual number of visits/visitors to the MSC from 2005/06 to 2019/20

5 How MSC Data is Recorded

In 2019/20 the MSC further developed its data capture process. The MSC data management software system links directly to the UCD student records database

so that an accurate record of each student's registration and MSC session details can be captured. This means the data collected at the MSC is robust and accurate allowing for detailed analysis. The visiting student enters his/her student number at a terminal upon log in and then he/she is given a place in the queue (displayed on the centre's projector screen) by the automated process. The feedback from each student visit is then anonymously recorded (with the consent of the visiting student) by the attending tutor(s) and uploaded to the MSC database. Module Coordinators and lecturers have access to the MSC feedback for their respective module(s) and this feedback is also sent to them each Friday via an automated email. This process has proven an effective source of feedback for lecturing staff, MSC tutoring staff and management. MSC management is currently working with teh UCDNova team and their Technology Transfer Officer to adapt the UCD MSC software for other Higher Education Institutions needs. With the help of MSC tutors a short video has been produced explaining the MSC feedback system from the perspectives of the student visitor, the MSC tutor and the module lecturer, available at http://www.ucd.ie/msc/mscvideos/

6   Wait Times & one-to-one sessions

For the past five years the median wait time to see a MSC tutor has improved from 29.2 minutes in 2015/16 to **4.4 minutes** in 2019/20 all without an increase in tutor expenditure. This relatively short wait time is largely due to the implementation of a forecast model based on both historic data and real-time wait duration taken live from the MSC queue, which have allowed us to predict peak times so as to roster staff effectively. Figure 2 shows a boxplot of the median wait times to see a tutor by each day of the week for the Autumn Trimester.

While the majority of MSC sessions are one-on-one sessions (3,172 visits or 74% of all sessions), where we define a session to be an interaction between a tutor and a student or students, there were 383 sessions with two or more students. These support sessions with two or more students demonstrate the popularity of this small-group peer support approach to learning. There were 11 sessions with 8 or more students which represent "Hot Topics" (tutorial sessions dedicated to a particular topic of difficulty as identified by students and/or their lecturer) which are held outside regular MSC drop-in hours. These targeted sessions allow the MSC to run more efficiently and effectively.

Wait Times for 2019/20 Sem 1 by Day of the Week
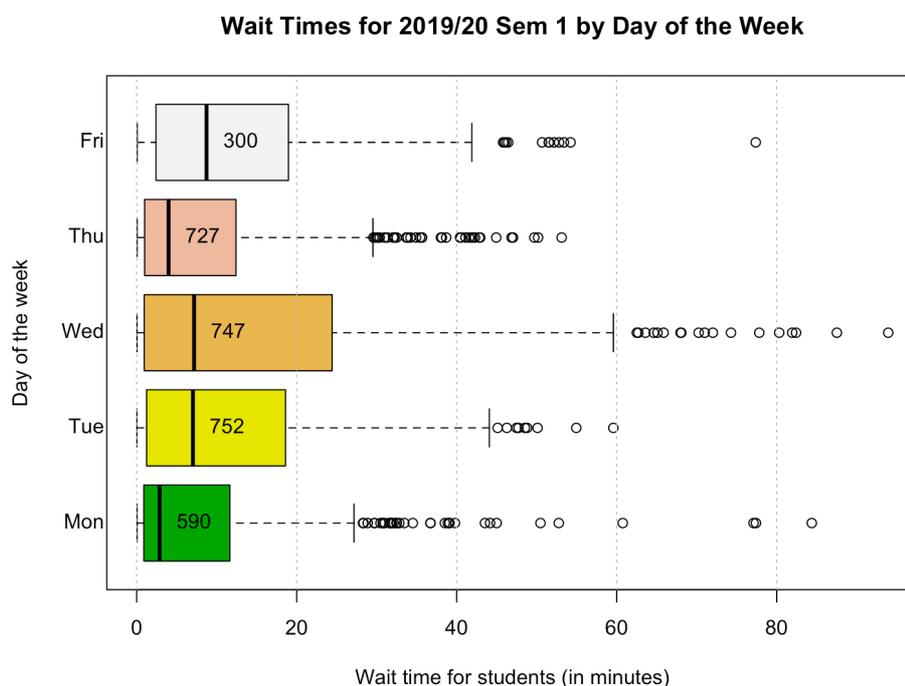
Figure 2: Wait time to see MSC tutor in semester 1 for 2019/20 by day

7 MSC Visits by the Week, Day & Hour

The number of MSC visits by week is given in Figures 3 and 4. As we can see there are no quiet weeks in the MSC (apart from week 1 of Autumn Trimester when the MSC opens for two days only). Clearly from week 8 of semester two the COVID-19 pandemic had a significant impact on students' engagement with the online MSC service. Those that did utilise the online support were highly likely to use the service again but getting the message out to all who had used the in-person service previously proved a great challenge.

The heat map of Figure 5 shows the busyness of the centre by the hour of the day for both semesters. Each box is colored based on the aggregated number of visits over the whole semester for a particular day of the week and particular hour. For example, the top left corner box represents the total number of visits on each Monday between 10 and 11 AM. The **Quiet** region represents when there have been less than 20 visits in an hour/day over the whole semester, **Average** denotes 20 to 50 visits, **Busy** between 50 and 80 visits and finally **Very Busy** represents the boxes when visits exceed 80 in number over the whole semester.

If we want to provide a daily representation (without aggregating over the whole

semester), we can represent the numbers by taking an average over 13 weeks. For example Quiet would be 1 - 2 visits per hour, Average implies 2 - 4 visits per hour, Busy implies 4 to 6 visits per hour and Very busy implies greater than 6 visits per hour.

Number of visits per week during Semester 1
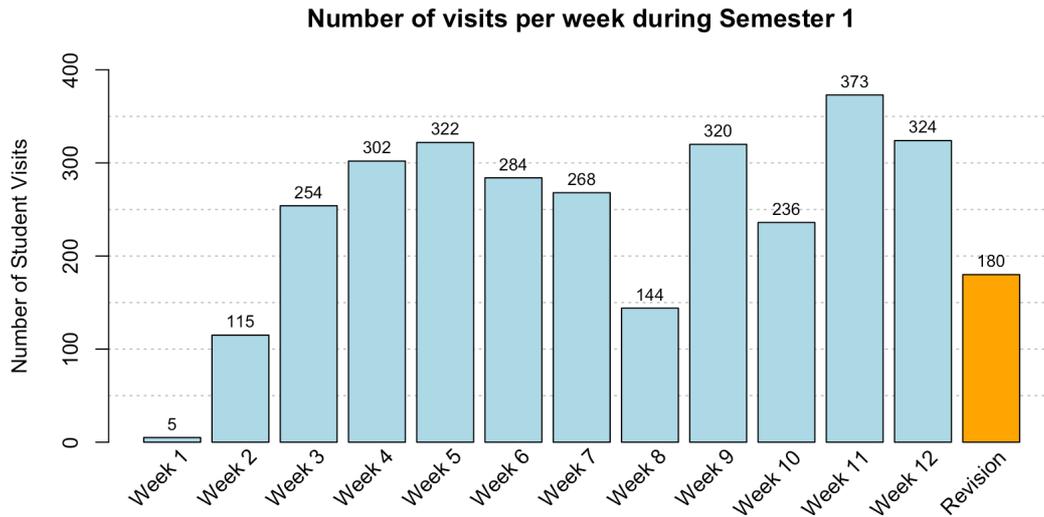
Figure 3: Number of visits per week to MSC for semester one of 2019/20

Number of visits per week during Semester 2
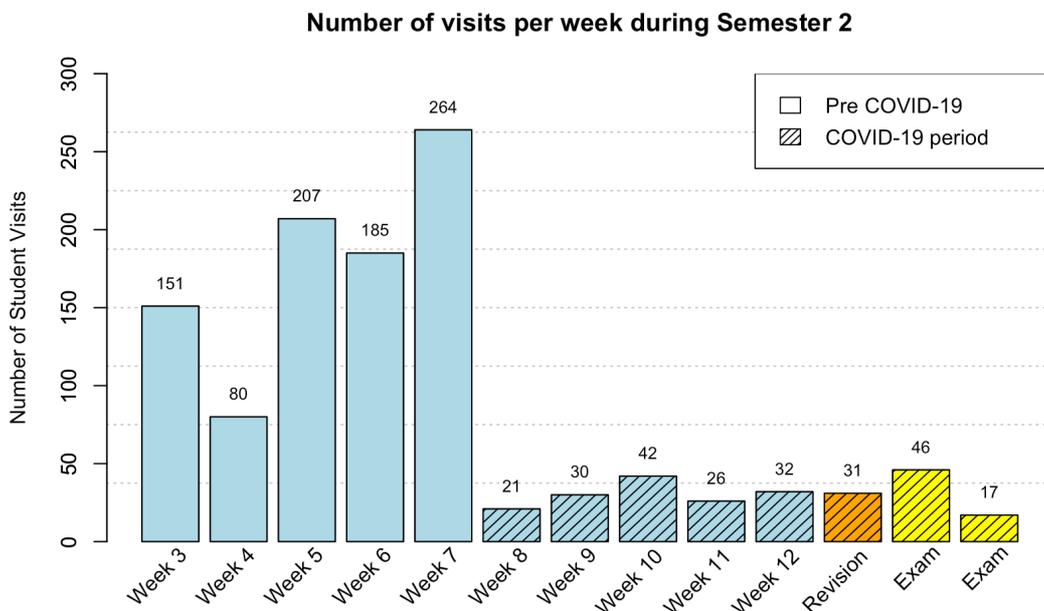

Figure 4: Number of visits per week to MSC for semester two of 2019/20
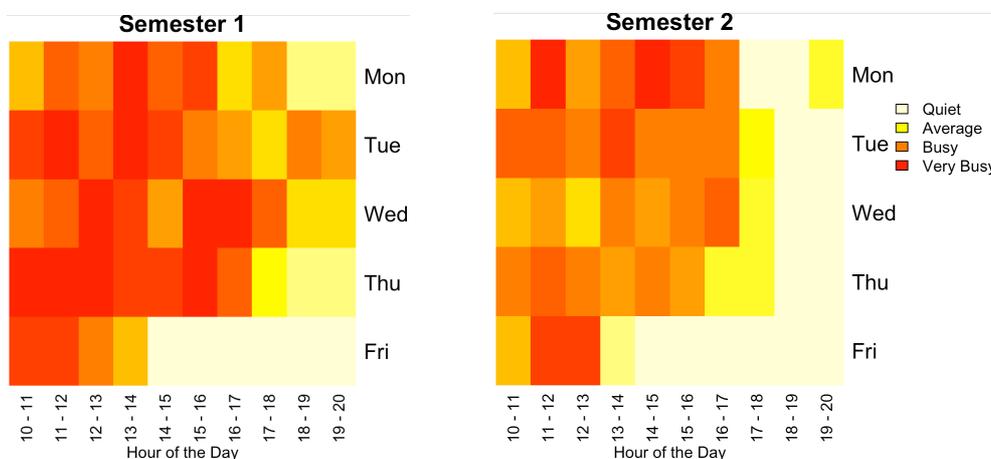
Figure 5: Visualisation of busy hours by day of the week

8   Module Levels in the MSC

The percentage of level 0, level 1 and level 2 visits was 13% (down 1%), 52.6% (up 0.8%), and 32% (down 1%) respectively. The 2% of visits from stage 3, stage 4 and postgraduate students refer to those students who logged in to the MSC system but were referred back to their lecturer. The proportion of level 2 students attending the MSC was 25% back in 2012/13, increased to 32% in 2015/16, and further increased to 40% in 2017/18. This year just under 1 in every 3 MSC visits are from stage two modules.

Percentage of Tutorials by Module Levels
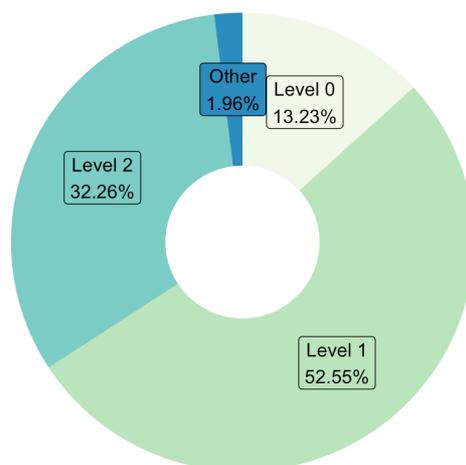
Figure 6: Percentage of MSC visits by module level for 2019/20

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9 MSC-Module Coordinator Partnerships

This year saw the further development of the MSC-Module Coordinator (MSC-MC) Partnership Agreement. Designed to ensure an alignment between the support offered at school level and at the MSC this agreement keeps all stakeholders (students, MSC tutors, teaching staff and management) informed of student learning. This year the growth of the MSC-MC Partnership Agreements to include over 50 lecturers/module coordinators relating to the modules most frequently represented at the MSC.

Module Coordinators have online access to the MSC (anonymous) feedback in real time that relates to their module(s). Module Coordinators and lecturers also receive an automated email each Friday afternoon detailing (i) the number of visits and unique visitors the MSC has received from their module(s), (ii) the duration of each visit, (iii) a running count of the total visits over that particular semester and (iv) the nature of the student query (as interpreted by the attending MSC tutor(s)) and how it was remedied. As part of the Module Coordinator-Maths Support Centre Partnership (see Appendix 1), this feedback is sent to over forty lecturers, both prior to the start of the new academic year and in advance of semester two teaching in January. Included in this report are the following summary statistics:

- Summary stats for MSC visits from last academic year e.g. no. of visits, no. of distinct visitors, no. registered to sit terminal examination and no. of students that subsequently failed this exam

- A time series graph for the number of visits and distinct student visits per week of semester

- A chart showing the most commonly occurring difficulties

- A summary of the issues raised by MSC visitors and finally

- A qualitative description of each visit as recorded by the MSC system (via the attending MSC tutors).

These discussions help both parties to provide the best mathematical educational experience for the university's undergraduate students and ensure that sufficient support is offered at school level before the MSC is utilised by a particular student.

10 MSC Tutors

As always the success of the MSC is due to its committed staff. This year we interviewed the highest number (14) of candidates for the MSC tutor role testament

to the word-of-mouth commendations such work has for the future employment prospects of our tutors in both industry and academia. This year the MSC hired 29 tutors (21 males and 8 females) over both semesters, nineteen of which were re-hired from 2018/19 and ten of which were trained on September 4 at a full days training session in the MSC. Three of this years' MSC tutor cohort have doctorates in Mathematics or Mathematical Physics. Fourteen tutors were completing their PhD studies in the School of Mathematics and Statistics, three were doing a research MSc in Mathematics/Statistics and another was completing an MA in Mathematics. Five of our tutors were undergraduate students in 2019/20 three of which has taken the Peer-Assisted Tutoring module MATH30340 at UCD in 2018. The remaining tutors were sourced from outside UCD. All MSC tutors undergo screening, interviews, extensive training and mentoring throughout their time at the MSC. Every year the tutor turnover is high at the MSC where tutors either move to industry (e.g. SIG, Optum Technology) or other high calibre educational institutions (e.g. Warwick University, Imperial College London) and so sourcing and retaining high quality mathematics tutors remains a significant challenge for the UCD MSC.

	2019/20	2018/19	2017/18	2016/17	2015/16	2014/15	2013/14	Totals
Tutors newly hired	10	13	11	9	12	13	15	83
Tutors re-hired	19	15	10	13	13	10	3	83
Totals	29	28	21	22	25	23	18	166

Table 2: Numbers of new and re-hired MSC tutors for the past seven years

10.1 Continuing Professional Development of MSC tutors

MSC management and/or MSC tutors took part in the following continuing professional development activities in 2019/20:

- Mar 2020 - All MSC tutors were trained (5-6 tutors at a time) to conduct support sessions online using Brightspace's Virtual Classroom. This was a monumental effort on behalf of all tutors involved given only one tutor had tutored in an online setting before. Interactive Wacom tablets and digital pens were purchased for tutors.

- Jul 23 2020 - Designing Online Assessment - G O' Neill UCD

- Jun 24 2020 - Irish Maths Learning Support Network Annual Workshop

- June 2-3 2020 - Teaching and learning mathematics online

- Apr 23 2020 - Effective Remote Collaboration

- Mar 12 2020 - Inclusive Teaching and Learning Workshop

- Mar 9-11 2020 - Teaching Across Cultures

- Feb 27 2020 - Writing a Data Management Plan - From Funding Proposal to Full DMP.

- Feb 13 2020 - Academic Developers on Theories of Change Workshop

- Feb 11 2020 - United Nations International Day of Women and Girls in Science 2020

- Jan 17 2020 - Tanya Evans, University of Auckland, Who is tasked with modernisation of mathematics education? Research mathematicians and mathematics education researchers bridging the disciplinary gap.

- Jan 16 2020 - Equity Diversity & Inclusion in T & L: Promoting Inclusive Practices

- Oct 7 2019 - MSC management and two senior MSC tutors attended a seminar by Dr Rhona Mahony on 'Re-framing the Conversation: Leading Culture Change.

- Semester 1 - MSC manager audited the UCD T & L module Problem-Based Learning in trimester one.

11   Research and Communications at the MSC

A number of research outputs were disseminated by MSC management in 2019/20 including:

- Dec 11 2019 - FYiM (First year in Mathematics) conference, Western Sydney University, Australia

- Nov 25 2019 - the Delta Conference in Fremantle, Australia

- September 5 2019 DCU. Anthony Cronin and Donald Shearman (Western Sydney University) presented highlights of their paper published in the International Journal of Mathematical Education in Science and Technology comparing two MSCs feedback data. Anthony Cronin, Donald Shearman, Alison Sneyd and Gizem Intepe titled. "Analysis using natural language processing of feedback data from two mathematics support centres".

- September 5 2019 DCU. A conference presentation at CETL-MSOR in 2019 by Dr Emma Howard (UCD School of Psychology) and Anthony Cronin titled "Effective Tutor Timetabling Based on Identifying Busy Periods in a Maths Support Centre"

12 Outreach Activities at the MSC

12.1 Maths Sparks

With thanks to Enya Murray and staff in the UCD Access and Lifelong Learning unit the next installment of *Maths Sparks* happened over five Monday nights in September and October of 2019 with the voluntary cooperation of several MSC tutors and undergraduates from SMS.

Also, the third installment of the SFI Discover-funded *Maths Sparks* booklet of workshops was posted to 15 DEIS schools in the Dublin, Wicklow and Kildare areas. This is an annual outreach and public engagement programme designed and delivered by staff and undergraduate students from the School of Mathematics and Statistics, including MSC staff, to over 80 DEIS students from 12 local secondary schools.

12.2 Computer Science Sparks

On November 8 and 15 2019 MSC manager attended Computer Science Sparks workshop in UCD to assist and interview coordinators on their experiences.

12.3 UCD Open Day

On November 9 MSC manager attended the UCD Open Day taking questions from parents and prospective students on mathematics related queries at UCD.

12.4 Maths Week

On Oct 17 2020, for Maths Week MSC management helped coordinate the visit of Kjartan Poskitt (author of the "Murderous Maths" and eight primary schools visit to UCD Science Moore Auditorium. Also assisted with the outreach event pf puzzle solving.

12.5 DEIS Outreach

On November 13 2019 MSC management presentation an overview of what the Maths Support Centre offers to our students to ten local Transition Year student attending DEIS schools. On Jan 14 2020 a similar talk was given to Leaving certificate DEIS students.

12.6   ESB Science Blast

On March 2-4 the MSC manager was a judge over three days of the ESB Science Blast competition for primary school pupils held at the RDS. This involved providing constructive feedback to pupils and their teachers on their work on six projects before completing feedback forms and presenting schools with their awards.

12.7   UCD Library-MSC Leaving Certificate Programme

Due to the pandemic the Library-MSC Leaving Certificate Programme did not happen within the James Joyce Library as usual. Instead schools were encouraged to engage with the 200+ videos created by MSC tutors covering all five strands of both the Ordinary and Higher Level mathematics course. This resulted in over 50,000 hits to the MSC website for these videos as measured by Google Analytics

12.8   Student mentorship

MSC management was a mentor to two Stage 1 mentees in Science. This involved meeting with both students separately in October 2019 to see how they were settling into UCD and again in February 2020 to see how their examinations went and how academic progress was going.

13   Summer Courses at the MSC

In July & August 2019 the MSC designed and delivered four online 3-hour workshops for the 48 students registered to the Access to Science, Engineering and Agriculture programme. This included a number of Open Learning students wishing to study part time. The MSC also attended and presented at many orientation events in the preceding weeks of term, including the International Orientation Programme for incoming students in August and January.

14   Future Developments and Recommendations

14.1   Developments for 2019/20

1. For 2020/21, the MSC aims to get all MSC tutors a tablet and digital stylus for interacting with students in support sessions.

2. As the number of student enrolments to mathematics related courses continues to grow the aim for the MSC is to continue to provide high quality academic

support to UCD students accessing the service within the existing budget parameters and with the support of highly skilled tutors.

14.2 Recommendations

1. While operating from the Library in Autumn and Spring Trimesters of 2019/20 the MSC management continued to receive numerous complaints from visiting students and tutors in relation to poor ventilation, temperature and lack of natural light within the centre. This stifles both students and working tutors and once again we recommend that a more suitable, and larger space to provide the service from be found. In March 2020, at the Student Experience Group meting of the University Management Team, MSC management was informed that plans for the new Centre for Future Learning building on campus were ongoing. MSC management and oversight committee would again like to highlight that this presents an opportunity for the MSC to put forward its case for re-location to more suitable accommodation within the time frame of the planning process and we'd appreciate some feedback on this process.