



**UCD Mathematics Support Centre  
University College Dublin**

**Report on the Academic Year 2011 / 2012**

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## Executive Summary

The Mathematics Support Centre (MSC) offers support in mathematics to students from all programmes in UCD not just those studying mathematics. This includes students at all levels from Access to PhD students and includes mature students and those with disabilities.

This year the number of visits to the MSC was 4,401 a small increase of 3% on last year's total. The median number of visits by a single student was 2 visits. The attendance by any one student ranged from 1 to 101 visits and 19% of students visited 5 times or more. The average time of a visit was 82 minutes.

Students studying Actuarial and Financial Studies, Animal Science, Archaeology & Geology, Architecture, Arts, Agriculture, Business and Law, Commerce, Chemistry, Computer Science, Dairy Business, Economics, Economics and Finance, Engineering, Food Science, Forestry, Health and Performance Science, Horticulture, Landscape & Sportsturf Management, Mathematics, Mathematical Physics, Medicine, Physiotherapy, Psychology, Statistics, Sociology, Social Science and Sports and Exercise Management were some of those programmes tutored by the MSC this year.

Many of these students were international students. They represented the following countries: Albania, Algeria, Australia, Bangladesh, Brazil, Bulgaria, Burundi, Czech, China, England, Finland, France, Germany, Hungary, Iran, Iraq, Italy, Kazakhstan, Latvia, Libya, Lithuania, Malaysia, Moldova, Nigeria, Norway, Rwanda, Pakistan, Philippines, Poland, Romania, Russia, Slovakia, Somalia, South Africa, Spain, Ukraine, United Arab Emirates and the United States of America.

Students from Stage 1 formed the majority of attendees at 53% of the total number. This was 10% less than their percentage last year. 33% of visits were from Stage 2 students, 11% Stage 3 or higher and the balance were from pre university Access to Science and Engineering programmes.

The MSC opened 28 hours per week Monday to Friday in the first semester. Evaluations at the end of that semester indicated that a number of students found difficulty with our opening hours. In the second semester we extended our hours to open on Tuesday nights from 17:00 to 20:00. These extra hours were exclusively for Stage 1 and Access to Science and Engineering students.

The MSC assisted UCD Access and Lifelong Learning by developing and delivering pre-semester mathematics workshops for both incoming 2011/2012 HEAR and DARE students and a separate workshop for Mature students. The MSC data shows that students from the UCD Access Centre for Disability Support made 120 subsequent visits to the MSC in 2011/2012.

If lecturers or students identify particular areas in which students are having difficulty, the MSC with the agreement of the lecturer, design and deliver Hot Topics in these areas. This year Hot Topics were run in the following :  
exponentiation, discrete random variables, continuous random variables and differential calculus.

Our data collection system has seen further improvements this year, as for the first full year, lecturers in the School of Mathematical Science could log on to their module on the database on a daily basis. This allows them to view the current problems that their students are presenting with in the MSC. During a university-wide thematic review of student supports for undergraduate students in 2010/2011, one of the international reviewers and co-founder of the mathematics support "movement" in the UK visited the MSC and was interested in our data collection methods.

He has since proposed that one or two of his colleagues in **sigma** (Centre for Excellence in Mathematics and Statistics Support in the UK) visit our centre to see it in action and talk with us about the way the MSC operates.

The 6th Annual Irish Workshop on Mathematics Learning and Support Centres (IMLSN) was hosted by the MSC in University College Dublin on December 16th, 2011. The theme was 'Not Reinventing the Wheel - Research and Collaboration between Institutions'. There were two keynote speakers Professor Tony Croft, Loughborough University and director of **sigma** and Dr. Jane White, University of Bath and committee member of **sigma-south west**, a regional hub for sigma in the UK.

Once again this year the MSC Evaluation Form was put on line and students who had attended the MSC 2011/2012 were emailed in Dec 2011 and May 2012 to inform them of the site address and to encourage them to complete the evaluation. There were 378 responses. This is a significantly increased return as compared to the 212 returns last year. The results of the evaluation were very encouraging and were very positive in relation to the tutoring work of the MSC but negative in relation to the size of the venue, inadequate opening hours and the number of tutors.

Our new venue due to delays in construction, opened late this year on the 14<sup>th</sup> October 2011. As orientation is a very important aspect in introducing incoming students to the MSC we feel that the late opening may have been a significant contributing factor in the large drop in the attendance of Stage 1 students.

In conclusion the MSC is currently more than fulfilling its stated aims. Students show a very high level of satisfaction with the mathematical support provided. To continue coping with the increased demand a retention of this year's budget and the provision of a suitable venue completed early in August 2013 will be required.

We believe that the MSC represents a model of best practice for the provision of support within UCD.



# 1. Introduction

## 1.01 *Origins of the Maths Support Centre (MSC)*

In 2003 the Department of Mathematics secured Higher Education Authority (HEA) funding for the establishment of the UCD Maths Support Centre. A manager was appointed in February 2004 and the Maths Support Centre was opened on 16<sup>th</sup> February 2004. Further HEA funding was sought and awarded in 2004 and 2005. A full-time manager was appointed in September 2007. University College Dublin has funded the MSC since that date.

## 1.02 *Aims of the MSC*

The Maths Support Centre aims to:

- Provide mathematics support for undergraduate students of all mathematical abilities, on a one-on-one or small group basis, in a friendly, relaxed and informal atmosphere.
- Enable students who are experiencing particular difficulties in mathematics to overcome their fear of the subject, take control of their own learning and build confidence in their own mathematical ability.
- Ease the transition of first year students from secondary-level to tertiary-level mathematics.
- Provide targeted mathematics support for Access students, HEAR (Higher Education Access Route) and DARE (Disability Access Route) students, mature students, and students with disabilities.
- Increase the effectiveness of the MSC by evaluating the MSC's activities and communicating and co-operating with other mathematics support centres in Ireland and the UK.

## 1.03 *Services provided*

The MSC provides a range of services including:

- Dedicated drop-in centre staffed by friendly and supportive tutors.
- One-on-one tuition or group-tuition as required.
- Supervised study.
- *Hot Topic* tutorials.
- Relevant textbooks and useful handouts.
- Web-based learning materials including self-diagnostic tests.
- Directed link on Blackboard to the MSC.
- MSC- developed notes on topics that students experience particular difficulties with.
- MSC- developed laminated question and answer pages.

## 1.04 *Staffing*

The Director, Dr Maria Meehan is a member of staff from the UCD School of Mathematical Sciences. A full-time manager, Ms Nuala Curley currently staffs the MSC. The majority of tutors employed are postgraduate students

studying for PhDs in Mathematics, Finance, Mathematical Physics or Statistics. This year a number of the MSC tutors completed their PhD studies and were no longer available for work in the MSC. For this reason the MSC needed to employ new tutors. These positions were advertised internally. Interviews were held and a number of new tutors appointed. Combined training of MSC and School of Mathematics tutors took place in September.

### **1.05 *Improving facilities and coping with increased numbers***

The MSC was initially set up in 2004 in a small office in the John Henry Newman Building. In 2006/2007 the MSC was relocated to a room on the ground floor of the Physics building. However, due to development of that area, a room in the Science Lecture Building was allocated to the MSC in 2007/2008. Two years ago that room was extended to twice its size. This year due to development of the Science Hub the MSC was once again relocated to another venue - this time to a large bright room in the old wing of Science Centre South. An area in this room was sectioned off for the Manager. As in previous years lecture rooms are used in the evenings when required for larger group tutorials.

Office space for the Manager, with a computer and facilities such as a printing and photocopying, is situated in the School of Mathematical Sciences. This allows the Manager of the MSC to carry out her managerial function. However due to the move of the School of Mathematics to Business Office Park (BOP), the distance between the MSC and BOP made the use of the office in BOP impracticable except for periods outside semester time. This made it difficult for the Manager to find any respite from teaching in the MSC and required her to carry on her managerial duties in the evenings. This was not ideal.

The MSC has a separate computer used by students solely for the purpose of logging in and out each visit. Last year four new notebooks were purchased mainly intended for tutor use in updating our database. However they have also proved of great benefit to students logging in to Blackboard. A further unforeseen benefit has been that tutors have been able to demonstrate to their students the usefulness of various excellent internet sites. The Manager has decided to order further netbooks for student use.

The MSC has once again increased its library of suitable books on mathematical topics thanks to gifts from lecturers in the School of Mathematical Sciences. Staff members, tutors and students avail of these while in the MSC. UCD library have been very helpful in ordering certain textbooks that have been found to be especially beneficial for students attending the MSC.

This year we purchased a stand to hold our ever increasing collection of worksheets. These worksheets contained extra sample questions with answers. Some extra notes were also available in the MSC this year. These have been developed by the MSC tutors on topics that we have found cause particular difficulty for students. A number of leaflets on integration and differentiation, statistical formulae and other mathematical physics formulae have also proved very popular with students. These leaflets are produced by The Higher Education Academy in the UK and have been very generously provided to us free of charge.

### **1.06 *Record keeping***

Data relating to all students attending the MSC has been maintained confidentially for the last five years. In the second semester 2009/2010, a very successful student log-in log-out system, developed by the Manager and Dr Brendan Quigley from the UCD School of Mathematical Sciences, was introduced. This allowed student data which was previously recorded on an attendance sheet and manually uploaded to a database, to be registered

directly to the database. Tutors then recorded the student number and a description of the topic covered on a handwritten sheet and the database was manually updated. However this was very time-consuming.

This year saw further improvements and refinements of the programme. Tutors now log in to the database and update the topic covered as they finish the session with each student or students. In addition this year for the first full year, lecturers in the School of Mathematical Sciences could log on to their module on the database on a daily basis. They can view the current problems that their students are presenting with in the MSC. Confidentiality is maintained and identities of students are not available. There were a few teething problems initially but improvements in the system are on-going. I would like to thank Dr Brendan Quigley for his work on these enhancements.

An evaluation form originally filled in manually by the students has been online for the last four years. The information gained from this evaluation has been a crucial element in many improvements carried out in MSC.

In both of the above forms students are given the option by means of a tickbox to indicate whether they agree to this information other than their name or number being used for research purposes.

### **1.07 Accommodation and opening hours**

The MSC remains open throughout the year. It operates on a drop-in basis during semesters and it opens on an appointments only basis throughout the holidays. Students who, for example have not passed exams or perhaps may have exceptional circumstances, avail of this one-on-one appointment system. Some staff or postgraduate students also attend during the summer months. The majority of out of semester visits are Masters or PhD students needing help with statistics for their theses.

Once again as mentioned above, the MSC moved location this year. The room itself is of sufficient size and is bright and cheerful. But this constant change in the MSC venue has caused us considerable problems. This was further exacerbated by delays in gaining access to the new room. Normally orientation weeks from the last week in August to the end of the second week in September are the most suitable time to familiarize in-coming students with the location and services of the MSC. The late access made this impossible this year. However our location with windows facing on to the main pedestrian route between the Quinn building and the Sport's Centre should have made it ideal to advertise the MSC. We were refused permission to place the lettering "MSC" and our website address on the windows. We look forward to a resolution of this problem before September 2012. Some students finding our older venue inaccessible due to building works have assumed the MSC no longer exists.

The MSC opened officially on a drop-in basis for 2011/2012 year on 26<sup>th</sup> September 2011. This was later than normal and not in the new venue. We opened in Science Centre South on the 14<sup>th</sup> October 2011.

There were 12 weeks for drop-in services in both semesters. These included both the revision and assessment weeks. It was open by appointment outside these times. Opening times in the first semester were as follows:

- Mon/Tues/Thurs 10:00 to 13:00 and 14:00 to 17:00
- Wed 11:00 to 13:00 and 14:00 to 19:00
- Fri 11:00 to 13:00.

Evaluations at the end of the first semester indicated that a number of students found difficulty with our opening hours. In the second semester we extended our hours to open on Tuesday nights from 17:00 to 20:00. These hours were exclusively for Stage 1 and Access to Science & Engineering students.

This arrangement proved reasonably successful but needs further advertising.

Despite the extra tutoring hours, students have expressed dissatisfaction with the opening hours and the restricted area of the venue. Many students, while praising the high level of tutoring, were critical about the overcrowding and the length of time they had to wait for a tutor. (See Section 4.14: Size of room, opening hours, number of tutors and resulting concerns.) This was more evident approaching and during study weeks and first week of exams. (See Figure 4: Number of visits per week by students.)

In addition the MSC held *Hot Topic* and Revision tutorials in the evenings due to lack of availability of lecture halls during the day. (See Section 4.09: Hot Topics.)

### **1.08 Publicity**

Second level students are informed of the Mathematics Support Centre services in UCD through the Qualifax website which is the National Learners website organised by the Guidance Councillors of Ireland. Teachers and guidance councillors answering queries on the Leaving Certificate helpline were informed of the MSC. This enabled them to reassure students worried about third level mathematics that extra mathematics help would be available in UCD for any student who required it.

The MSC website [www.ucd.ie/msc](http://www.ucd.ie/msc) is updated on a regular basis. Location, opening hours and best times to visit for specific topics are among the items displayed. A number of self-assessment tests (with answers) are available on the site. Incoming students are recommended to try these if they are uncertain of the level of mathematics required for their programme or need to revise particular areas in mathematics. The website also contains links to many excellent teaching videos in specific mathematical topics. The MSC site is linked to Current Students/Student Support, the main A-Z UCD directory and the UCD School of Mathematical Science.

Students attending orientation, with the assistance of the student advisers and peer mentors, were specifically targeted. These included students from Post graduate Computer Science, Mature students, Medicine and Agriculture. Students were given information about the assistance provided by the MSC and its webpage and were informed that it was a free service for all students in UCD. It was emphasised that the MSC was not a grind centre and that students would be expected to carry out the work themselves but given as much help from the tutors as they needed. They were told that students of all levels of ability attended. However we were unable to bring the students to visit the new location as it was still under construction and was not available until the 14<sup>th</sup> October 2011.

In order to further publicise the MSC, and in particular for those taking mathematics as one of their modules, the Manager (with the agreement and support of the lecturers) visited first year mathematics lectures at the beginning of the semester. The students were told that the MSC did not replace lectures or tutorials but was an extra free facility provided not alone for those finding problems with their mathematical studies but for all students to enhance their performance in mathematics. The students were also reminded by the lecturers both in lectures and on Blackboard of the benefits of using the MSC. This once again proved to be a highly effective strategy and an important factor in the attendance of students at the MSC. Other forms of advertising used were posters, plasma screens and flyers. (See Section 3.2: Knowledge of existence and purpose of the MSC.)

## **1.09 Funding**

The MSC initially received HEA funding for three years. Since September 2007 the MSC had been funded by UCD with an annual budget. The majority of this funding pays for the staffing costs of a full-time manager and post-graduate tutors and a balance goes towards the purchase of necessary equipment and stationery. This year the increased funding (total funding €103,551) allowed the MSC to open in the second semester from 5pm to 8pm. A further significant benefit to our finances was the once off voluntary teaching hours given in the MSC amounting to a total of 137 hours. (See Section 3.6 MSC tutors.)

Students show an extremely high level of satisfaction with the services provided. However they still express dissatisfaction with overcrowding despite the increase in size of the venue. Annual attendance at the MSC has once again increased. (See Figure 1: Annual number of visits to the MSC.) UCD first funded the MSC in 2007/2008. That year there were 1,440 visits. This year the number of visits amounted to 4,401 an increase of 3% on last year. It is essential that budgets allocated to the MSC be realistic and that they continue at the same level for next year.

## **1.10 Conferences and papers**

During a university-wide thematic review of student supports for undergraduate students in 2010/2011 Professor Duncan Lawson, one of the international reviewers and co-founder of the mathematics support "movement" in the UK visited the MSC. He proposed that one or two of his colleagues in **sigma** (Centre for Excellence in Mathematics and Statistics Support in the UK) visit our centre to see it in action and talk with us about the way the MSC operates. He was particularly interested in our method of data collection.

The MSC took part in a joint research project organized by the Irish Mathematics Learning Support Network (IMLSN) in 2011. The aim was the evaluation of mathematics learning support throughout Ireland, for stage 1 students in service mathematics modules. Also in 2011 Dr Maria Meehan and Nuala Curley had a meeting with the IMLSN committee with a view to setting the network on a more sustainable basis. It was decided the best way forward would be to draft a simple constitution and have it adopted at the 6<sup>th</sup> Annual workshop.

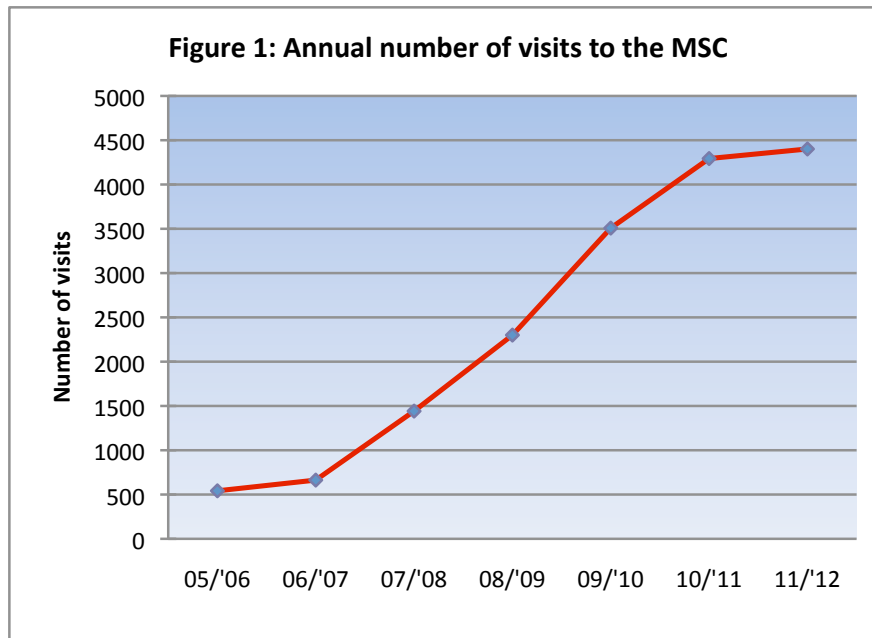
The 6th Annual Irish Workshop on Mathematics Learning and Support Centres (IMLSN) was hosted by the Mathematics Support Centre in University College Dublin on December 16th, 2011. The theme was 'Not Reinventing the Wheel - Research and Collaboration between Institutions'. The aim of the conference was to review the various mathematics support units available in Ireland, and decide on how best to move the community forward through collaboration, including the development and sharing of resources and the implementation of joint research initiatives. There were two keynote speakers Professor Tony Croft, Loughborough University and director of **sigma** and Dr. Jane White, University of Bath and committee member of **sigma-south west**, a regional hub for sigma in the UK. At the conclusion of the workshop a general meeting of the Irish Mathematics Learning Support Network (IMLSN) was held. The IMLSN constitution (drafted by Nuala Curley) was proposed and ratified and a new committee was elected.

Meehan, M. and Curley, N. (2011). The Evolution of a Data Collection System in a Mathematics Support Centre in Ireland. In CETL-MSOR 2011 Conference In Coventry, Monday and Tuesday 5th and 6th September 2011.



## 2. Mathematics Support Centre usage

### 2.01 Annual visits to the MSC since 2004



The number of visits to the MSC grows steadily each year. (See Figure 1: Annual number of visits to the MSC.) In 2011/2012 the number of visits to the MSC was 4,401 a small increase of 3% on last year's total. Despite the improvement in the number of tutors employed this, together with the increase in time spent per student (82 minutes) put severe pressure on the staff of the MSC to cope with the numbers attending particularly at exam times. (See 2.3 Number of individual student visits and average time of visits.)

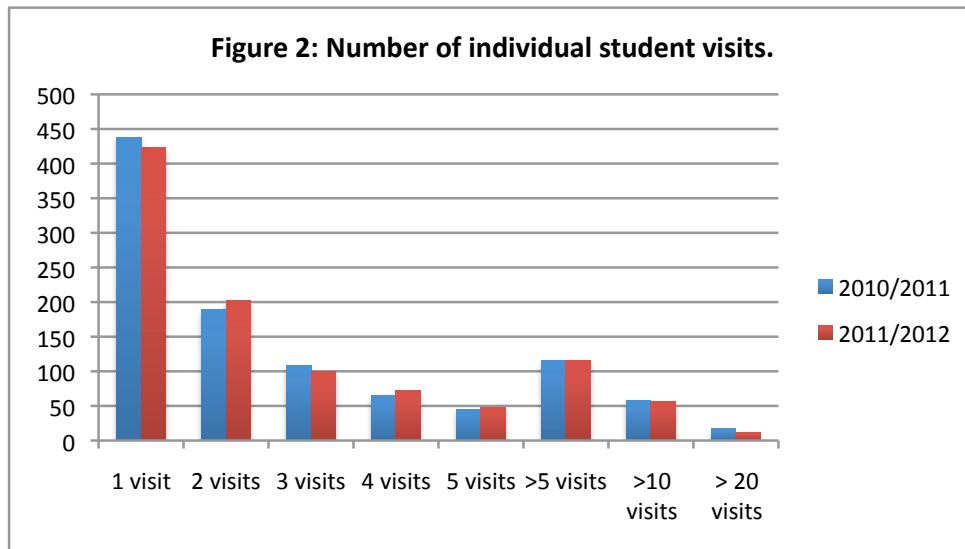
### 2.02 Programmes using the MSC

When the MSC was established in 2004, it was expected that the majority of visitors to the centre would be Stage One students enrolled on a mathematics course/module. While a significant number of visitors to the MSC in 2011/2012 still fit this profile, we have again observed that students from programmes such as Medicine and Sociology, where mathematics modules are not core, are attending the MSC with mathematical problems or issues they meet either in mathematical electives or in non-mathematics modules. We are delighted to see these students attending as they are testament to the success of the MSC in publicising its services, and illustrate the service we offer to all UCD students.

Students studying Actuarial and Financial Studies, Animal Science, Archaeology & Geology, Architecture, Arts, Agriculture, Business and Law, Commerce, Chemistry, Computer Science, Dairy Business, Economics, Economics and Finance, Engineering, Food Science, Forestry, Health and Performance Science, Horticulture, Landscape &

Sportsturf Management, Mathematics, Mathematical Physics, Medicine, Physiotherapy, Psychology, Statistics, Sociology, Social Science and Sports and Exercise Management were some of those programmes tutored by the MSC this year. (For students' comments see Section 4. 8: Usage of MSC by programmes throughout UCD.)

### 2.03 Number of individual student visits and average time of visits



The total average time spent by a student in the MSC in 2011/2012 was 82 minutes. This is 11 minutes longer than the average time last year. Students did comment on the patience of the staff. The tutors emphasize the importance of understanding mathematics and take as much time as they can with each student. The MSC strives to give their students a mathematical understanding of their topic. As one student said: *Very patient staff even if you don't understand after being told they will explain again in the simplest form they can. The staff don't just do the sums for you they help you do them yourself which is a huge confidence boost.* The increase in the average time that a student spends in the MSC may in part be due to the increased efforts of the tutors to give the student this understanding. But of course another possible explanation for this increase could be that it is also due to the longer waiting times for a student to be seen by a tutor.

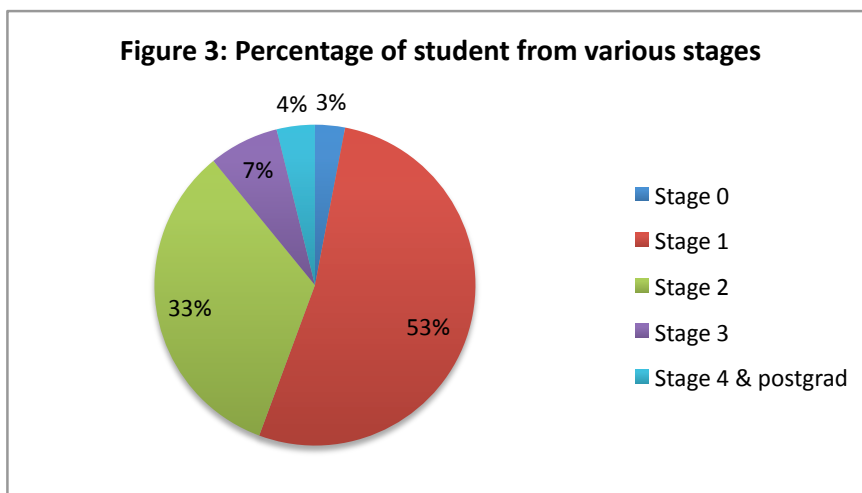
The median number of visits by a single student was 2 visits same value as last year.

The number of visits by any one student ranged from 1 to 101 visits. The highest number of individual visits in the previous year was 87. The percentage of individual students who visited 5 times or greater was 19% last year reduced to 18% this year.

(For students' comments see Section 4. 15: Size of room, opening hours, number of tutors and resulting concerns.)



## 2.04 Percentage numbers of students from various levels



Students from Stage 1 formed the majority of attendees at 53% of the total number. This was 10% less than their percentage last year. Even allowing for the increased number of visits this still resulted in a smaller number of first year students attending compared to previous years. A possible reason for this may have been the delay in confirming the venue and further delay in renovating the new premises. This resulted in the inability of the MSC to bring students to the new venue at orientation and a resulting delay in opening of the MSC. It also restricted our early advertising of the MSC venue. However we feel there were further factors effecting the attendance of Stage one students. For example there was a noticeable increase in the attendance of Stage 2 students. It increased from 24.7% last year to 33% this year. The latter increases are probably due to the fact that these students knew about the MSC from the previous year. This resulted in overcrowding and it may perhaps have discouraged the more nervous first years from attending. In an effort to overcome this difficulty we opened exclusively for Stage 1 and Stage 0 students on Tuesday evenings between 5pm and 8pm in the second semester. We plan to repeat this in the first semester September 2012. Percentage attendance of Stage 3 students decreased from 9.4% to 7% this year. Access students (Stage 0), with a increased percentage, made up 3%. Many Access students are working during the day and found the opening hours difficult. This is a further reason for retaining the evening opening on Tuesdays.

## 2.05 Equality of opportunity

The continued close co-operation between the Student Advisers and the MSC has proved to be very effective. The MSC and the Student Advisors were in frequent contact during the year.

This year the MSC developed and delivered six mathematics workshops for incoming HEAR and DARE students in August 2011. These were for those students who were entering academic programmes with some mathematical element. They were organised at a higher and lower level. The first, which was for those students coming in with Ordinary Level Leaving Certificate (LC) Mathematics, was a basic mathematics workshop. For those who had taken Higher Level LC Mathematics there was a statistics workshop. A further benefit that ensued from these courses was the familiarity of the students with the MSC tutors which meant they had no qualms attending the MSC when they needed its services. Indeed our data-base showed that 120 students from UCD Access Centre for Disability Support attended the MSC this year.

The Manager also spoke to the Mature students at Orientation informing them of the MSC facility and advising them of the self-assessment tests on the MSC website. These are designed to help incoming students revise their second level mathematics. Mature and Access students may either have forgotten a lot of the mathematics they once knew or else may not have reached the required standard. The MSC also developed and delivered a mathematics course in September to students entering UCD in 2011 as Mature students. These students are normally well motivated but need assistance which can most effectively be given on a one to one basis. This however can be difficult when the Centre is busy. In light of the current financial situation in the country the number of Mature and Access students may rise and the support given by the MSC could be a critical factor in allowing them to complete their programme to degree level.

### 2.06 Visits to the MSC by international students

The MSC set up an information desk at the orientation day run by the international office. The Manager of the MSC was also invited by Dr Carl Lusby to speak to the incoming medical students at their orientation.

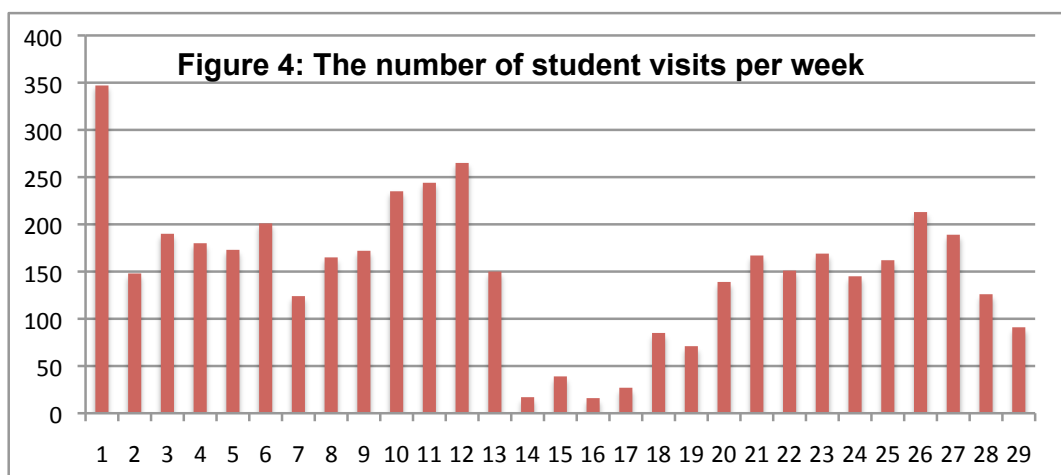
What was evident from our data this year was the surprising number of different nationalities who attended the MSC.

The countries represented were the following:

Albania, Algeria, Australia, Bangladesh, Brazil, Bulgaria, Burundi, Chechnya, China, France, Finland, Germany, Hungary, Iran, Italy, Kazakhstan, Latvia, Libya, Lithuania, Malaysia, Moldova, Nigeria, Pakistan, Persia, Philippines Poland, Romania, Russia, Rwanda, Slovakia, Somali, Saud African, Spain, UAE, UK, US and the Ukraine.

### 2.07 Weekly visits to the MSC in 2011/2012

The number of weekly visits as expected was lower at the beginning of each semester but increased over the course of the semester with the exception of week one when extra classes were organised for Access and Mature entry students. This was due no doubt to the fact that students were unaware of their difficulties early on but as the coverage of the module increased and mid-term examinations approached the students realised they needed the extra support. The percentage increase in numbers was maintained in the second semester. The number of visits per week for 2011/2012 is shown in Figure 4: The number of student visits per week to the MSC.



## **2.08 Identifying areas of greatest need: Hot Topics**

If lecturers or students identify particular areas in which students are having difficulty, the MSC design and deliver Hot Topics in these areas. Hot Topics are normally two hours in duration, held in evening times and lecture rooms are booked for these sessions. This year Hot Topics were run on following topics: exponentiation, discrete random variables, continuous random variables and differential calculus. The Hot Topic sessions in statistics were particularly well attended and the following is a comment from a student.

*It was brilliant, the teachers explained everything fully and until we understood it, they didn't put time limits on our understanding, and offered extra hours to explain in more detail if we were struggling, I would not have coped without it, I hope it will be available to me with other modules, especially with hot topic sessions that covered most of the things we needed to know.*

(See Section 4.09: Hot Topics.)

## **2.09 Retention figures**

Students who get help in time can be prevented from failing and possibly dropping out of college. However retention figures are difficult to quantify. The following question was asked on the MSC evaluation form. *Did you ever consider dropping out of your course/college because of mathematical difficulties?* 49 students answered "yes". If a student answered "yes" they were then asked: *What specifically influenced your decision not to drop out?* The following is how one student answered this question. *Self-motivation not to give up. The MSC helped with this motivation as it offered encouragement to work with my own abilities and offered support when things got difficult.*

First year students often need that extra help with basic mathematics which they may have either forgotten or never understood. Once they get this basis they can build on it to a higher level. (See Section 4.06: MSC assisted the retention of students.)

Often you will hear very able students remark that they could never do "maths". This lack of confidence in their mathematical ability and the related stress may also be a factor in causing them to drop out. Yet with the right help they can move on to at least be capable mathematically and hopefully to enjoy it. Sometimes it is just that they need the extra support to adjust to third level and are often shy about looking for help. One-on-one support is particularly important for these students. (See Section 4.10: Students benefited from one-on-one help.) It is essential that the MSC is seen as a place where you can always go no matter how low you feel your level of understanding of the module may be. Many students commented on the importance of the MSC in helping them gain this confidence. (See Section 4.11: MSC increased students' confidence.)



### 3. Evaluation of quality of service provided by the MSC

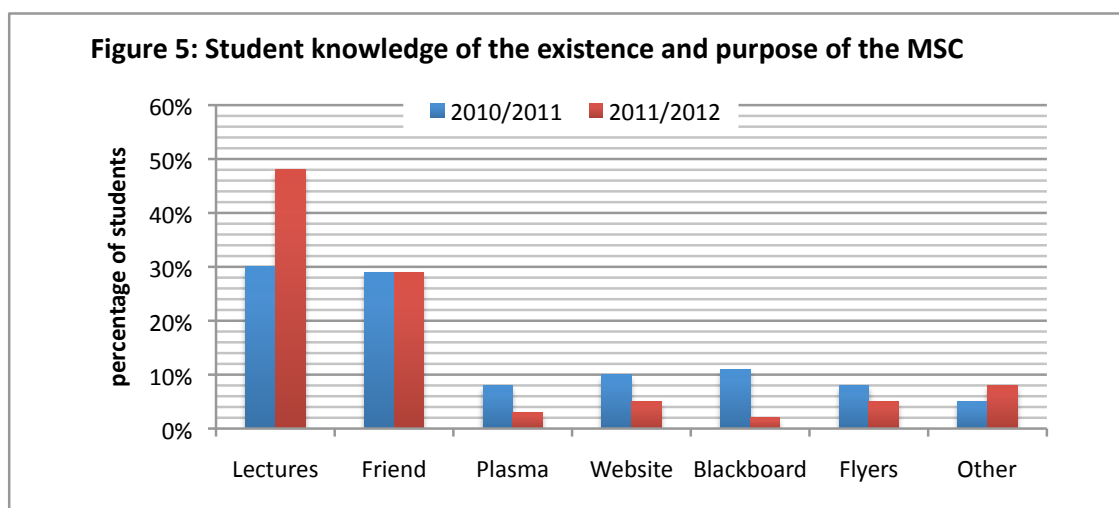
Once again this year the MSC Evaluation Form was put on line and students who had attended the MSC 2011/2012 were emailed in Dec 2011 and May 2012 to inform them of the address of the site on which the form could be found and were encouraged to complete the evaluation. There were 378 responses. This is a significantly increased return as compared to the 212 returns last year. A number of students completed evaluation forms both in December and in May as they take separate modules in each semester. This chapter summarises the results of this survey.

#### 3.01 Level of student attainment in mathematics prior to third level

Looking at the data from those who completed evaluation forms we found it surprising that 188 of these students had taken the Honours Irish Leaving Certificate Mathematics while a smaller number 149 had taken the Ordinary Level Leaving Certificate Mathematics. The balance of examinations were those other than the Irish Leaving Certificate.

Our attendance records show that those who did not sit the Irish Leaving Certificate (ILC) took their final second level examinations in various countries. The following are some examples: Malaysia (O level), America (Senior Year), Lithuania (equivalent Leaving Certificate), South Africa (Leaving Grade 12), Hungary (Erettsegi), Northern Ireland (GCSE), Ireland (Fetac level 4 and 6), Japan (Calculus AB) and Belgium (European Bacalaureat).

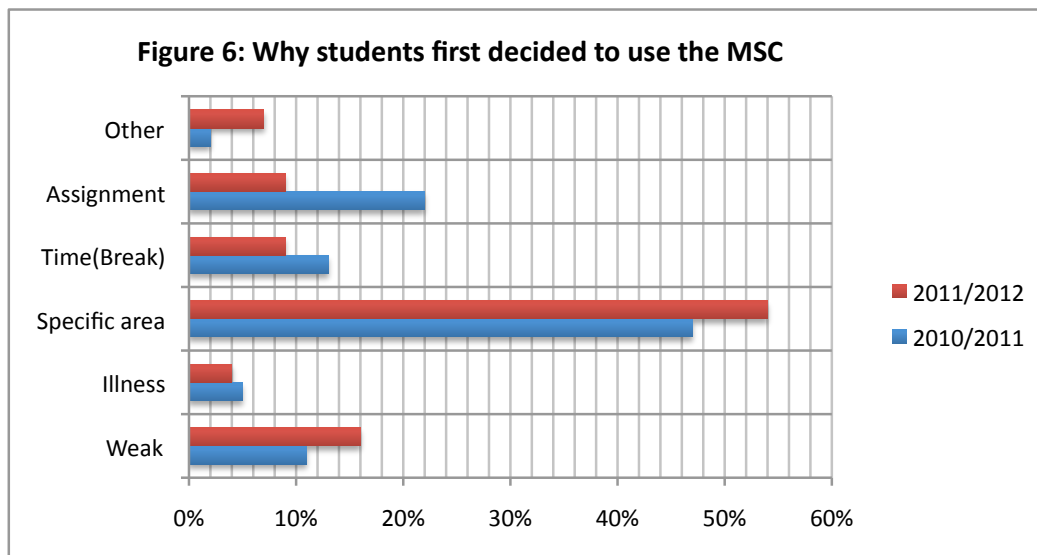
#### 3.02 Knowledge of existence and purpose of the MSC



The students were asked to tick one or more ways in which they had found out about the MSC. The recommendation and reminders by lecturers, as in previous years, were always an important factor in encouraging students to attend the MSC. However this year they are significantly higher than in previous years. 48% of students indicated in the Evaluation Form that they had heard of the MSC at lectures an increase of 18%

over last year. Word of mouth i.e. being informed by a “friend”; this method at 29% is significant and remains unchanged from last year. The importance of the latter in advertising the MSC has been further backed by the answers given to the question asking “Would you recommend the MSC to a friend?” This year 98% said “yes”. The benefit of Blackboard decreased this year from 11% last year to 2% this year, we cannot explain why this occurred but we do need to investigate it further. Plasma screen, Website and Flyers advertising also decreased this year and were probably due to building works in the lecture theatre area and the late confirmation of the location of the new venue for the MSC. The collaboration with Josh Clark in the Library and his agreement to the placing of flyers there was a major factor in doubling their effectiveness the previous year.

### 3.03 Why students first decided to use the MSC



Respondents were allowed to indicate multiple reasons if applicable. Approximately 54% per cent indicated their attendance was motivated by needing help in a specific area. This was a significant increase over last year’s value at 47%. Often a student might have a problem in a particular area that could be resolved in a single visit to the MSC but for other students the area could be a significant part of their module and require a number of visits. 9% stated that attendance was motivated by a tutorial/assignment/project to hand in, this was a noticeable decrease over the previous year of 22%. The percentage who felt their background in mathematics was weak was 16%, this was higher than last year at 11%. Other reasons had multiple responses and showed an increase 2% to 7%. Among these were the following: a need for more confidence, lack of understanding lectures, needing help with statistics and exam preparation.

### 3.04 Students’ opinions of the MSC

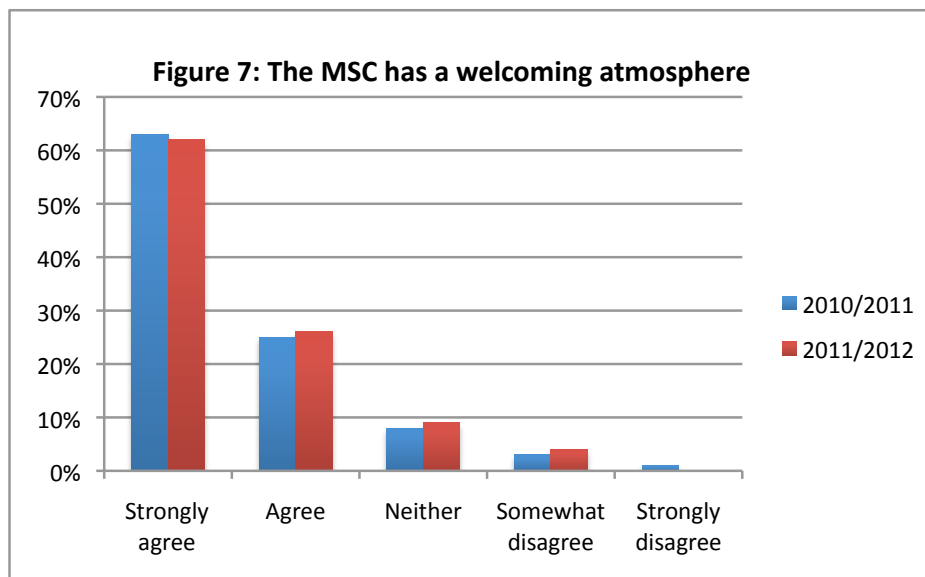
The respondents were asked for their opinions on various aspects of the MSC using a five-point Likert item.

The questions were as follows:

## Did the MSC

- Have a welcoming atmosphere?
- Have suitable opening hours?
- Encourage students to work with other students in their class?
- Provide a relaxed place to study?

The following charts describe their replies.



The welcoming atmosphere of the MSC is a critical factor in encouraging students to attend. Students may often be quite nervous coming in for the first time. As shown 88% of respondents agreed or strongly agreed that the MSC has a welcoming atmosphere. This equalled last year's values. No student strongly disagreed and the median value was "Strongly agree".

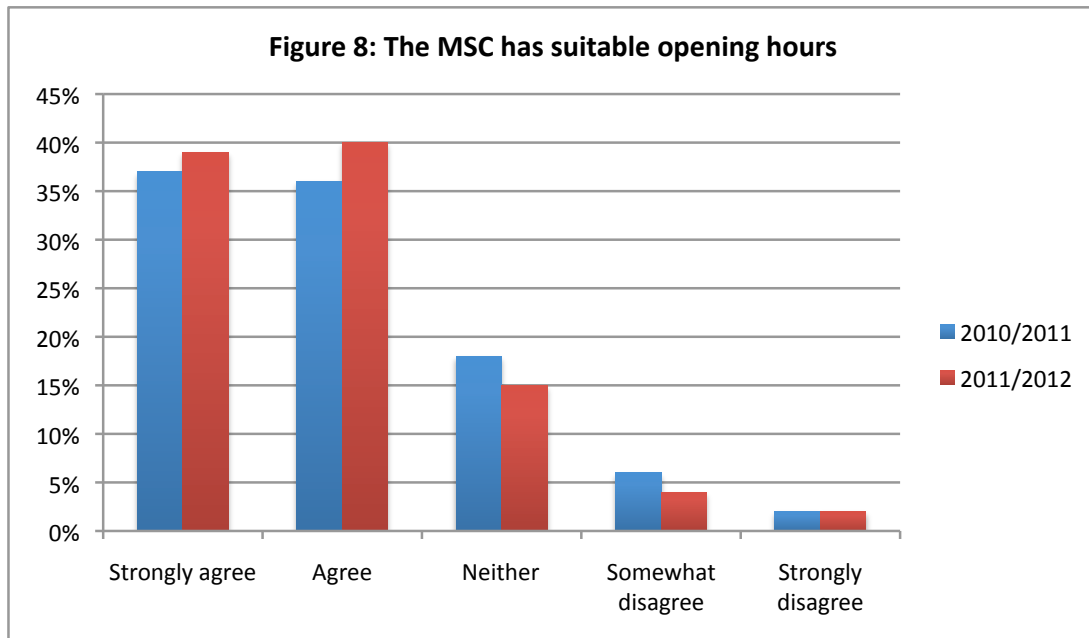
However this welcoming atmosphere does not just happen. It is the result of the careful recruitment and training of the MSC tutors. Tutors in the MSC must not alone be mathematicians but also have the social skills to relate well with students and their tutor colleagues. They need the gift of making mathematics appear easy and demonstrate a love for the subject. The following is a quote from one of this year's tutors now lecturing in Australia. (See Appendix 1: Tutors descriptions of teaching in the MSC.)

*However, the most enjoyable aspect to the MSC is the social side to it. It is a very relaxed and friendly atmosphere and often you get to know the students well.... Being a tutor at the MSC was extremely rewarding. I always looked forward to working there and always left feeling happy knowing that I had helped many students. It's a great feeling when a frustrated student smiles and says "oh that actually makes perfect sense now."*

The principle comments from students who *somewhat disagreed* at 4% were from those coming for the first time at mid term or end of semester examination times. They mentioned long waiting times, overcrowding not knowing the protocol when they arrived and not knowing the attendance times suitable for their module. These are our

peak visiting times and the centre is always at its busiest with up to 80 students attending per day. Inevitably at these times the centre will be full to capacity and students may have to wait some time to get attention.

The Manager has decided to have a FAQ sheet explaining the formalities displayed at the entry point to the MSC with copies available to the students.



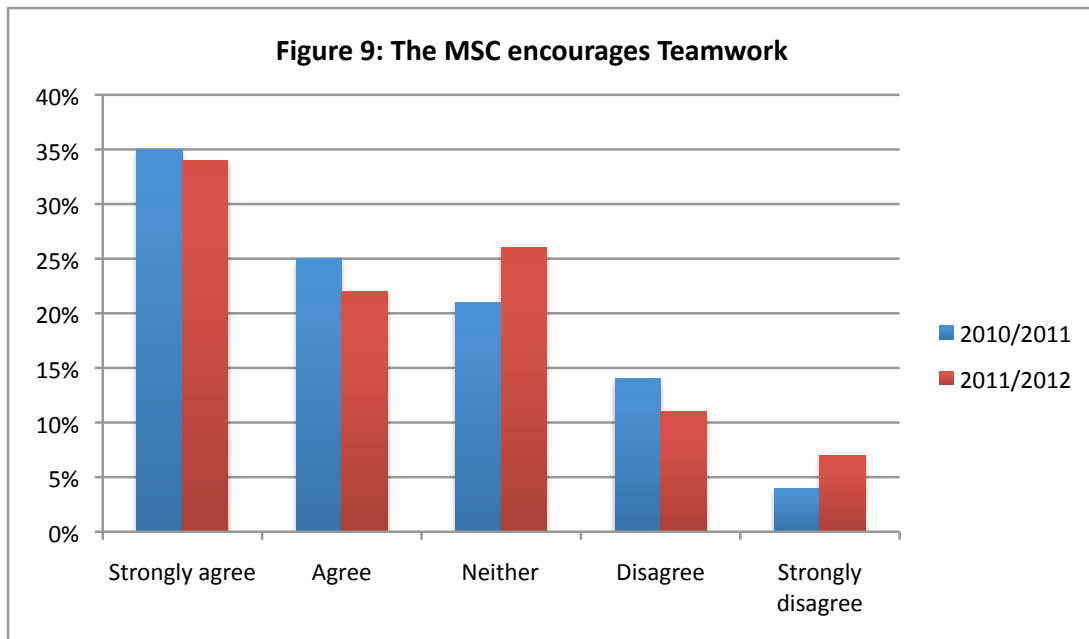
There was an overall increase in student satisfaction with the opening hours 79% this year over 73% last year. This was only possible as a result of the increased budget. Without this the MSC could not have catered for the numbers wishing to attend and many would have had to be turned away when the room was full. Indeed a number of students stated in the evaluation that the centre needed longer opening hours.

As it stands the capacity of the room does mean that the MSC finds difficulty at times satisfying the growing need of assistance with mathematics that students in UCD require. The majority of negative comments emphasized the confined space and unsuitable opening hours. The unsuitability of the opening hours particularly concerned Science, Engineering and Access students. Science and Engineering students have a very full timetable during the day and many Access students are working full time and therefore these students and many others in similar circumstances are only free to attend in the evening. A further problem is beginning to emerge. The Manager has become aware of an increasing difficulty in finding suitable tutors. She believes this is due in some part to the lack of research funding in Ireland for Pure Mathematics and Applied Mathematics .

Other problems were related indirectly to this. Certain topics beyond first year require an understanding not just of the mathematics involved but also the area of study, for example economics. The MSC recommends students to come at specific times for these subjects but with our restriction on tutors these times are limited and may not suit a student’s timetable. For students’ comments (See Section 4.13 : Size of room, opening hours, number of tutors and resulting concerns.)



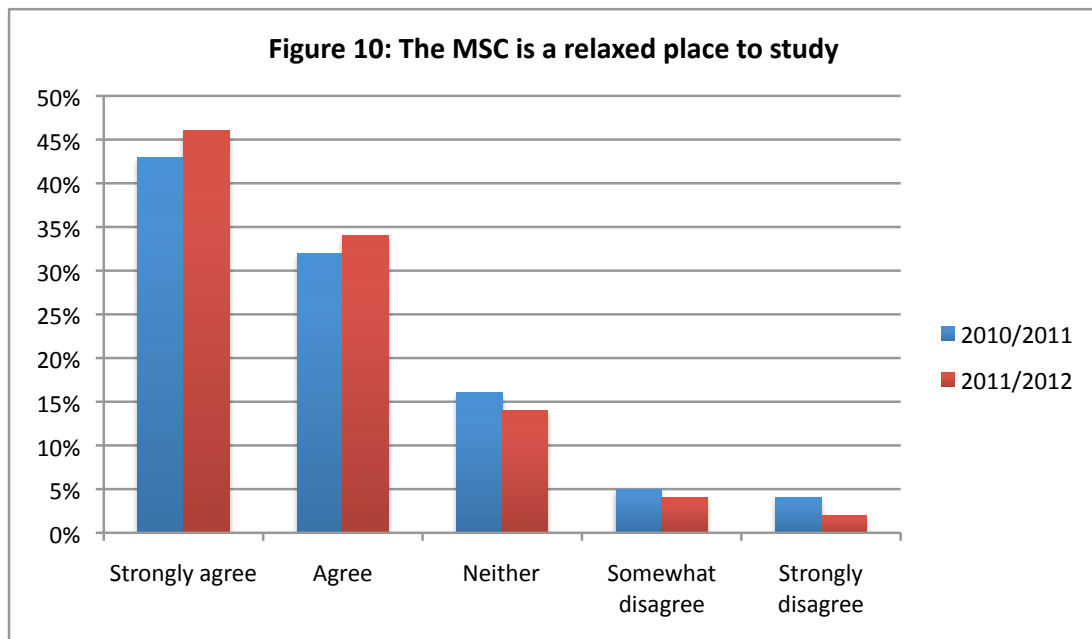
The Manager has taken on board the students' comments. We will be able to implement improvements if it is possible to employ additional tutors and thus be in a position to extend opening hours.



The tutors try to encourage small groups of students to work together. If students from the same module come in to the MSC they are, if possible, taken together and then encouraged to remain and work with each other in solving further problems. It was hoped that they would continue this group work outside the MSC. At 56% agreeing or strongly agreeing that the MSC encourages teamwork the number is a decrease on last year's value of 60%.

It became evident that our Hot Topic sessions were an effective method to increase group participation.

A larger venue would facilitate students working together. The Manager would recommend that this be given a high priority when choosing the new accommodation for the MSC.



Teaching in the MSC is difficult due to background noise from multiple simultaneous teaching sessions and this was exacerbated last year with the noise of the building construction directly outside. This year probably due to the decrease in building construction noise, there was a marked increase in students feeling of relaxation in the MSC. 80% agreed or strongly agreed that it was a relaxed place to study. The room size is a critical factor for both students and tutors alike. Some students in the evaluation mentioned the room was too small, at times it was difficult to get a seat and waiting times could be long. This was especially true coming up to study weeks and exam time. In these circumstances it can be very claustrophobic and difficult for students to study on their own while awaiting the assistance of a tutor. Furthermore this can cause students who might wish to come to be discouraged from attending, in particular the more anxious students.

In the opinion of the Manager opening the centre on an appointment only basis, as has been mentioned in the evaluation comments would strictly limit the number of students who could attend and as some student might require five minutes while another an hour or more it would be very difficult to run with effective use of resources.

Another aspect which is limited by the size of the room is that a number of students express the wish to remain in the MSC after a session to carry on with their study and have guidance as needed but due to the limited space available this is not always possible. It is critically important that the room size be increased or as minimum requirement be maintained in the forthcoming move to new premises.

### **3.05 Had the student passed the module for which they sought help**

The percentage pass rate of 94% as given in the evaluation forms was slightly down on last year's rate of 97%. Some students thanked the MSC for the help they received and remarked that thanks to the MSC they had passed their mathematics modules. Some indicating that without the assistance given to them they would not

have survived first year. One student stated *"I couldnt have passed without it. The experience gave me solid foundations in maths."* (See Section 4.06: MSC assisted the retention of students.)

It is very important that the MSC is also viewed as somewhere that students can attend to lift their standard to the highest level and where they can receive a first class grounding in their mathematics module. The MSC aims to increase the level of a student's understanding of mathematics and it was pleasing to note that some students commented on the fact that it was not just a question of passing their modules but increasing their mathematical understanding and developing their interest in mathematics. (See Section 4.11: MSC increased students' understanding and encouraged independent learning.)

### **3.06 MSC tutors**

The importance of the quality of tutors employed in the MSC cannot be overstated. The comments on the evaluation forms have clearly demonstrated not only the exceptional ability of these tutors to communicate their knowledge but also the encouragement and support given by them to the students attending the MSC.

This year we would like to look at some of the benefits the tutors gained by tutoring in the MSC. Naturally the most obvious benefit is that it helps support PhD students financially. The second benefit is that the tutors retain a grounding in their basic mathematics. Lastly and most significantly if these tutors are eventually to become lecturers they will have an excellent understanding of the problems experienced by undergraduate students.

The Manager would like to thank all the tutors for their dedicated work often under difficult circumstances. The MSC employed 17 tutors in 2011/2012. They were Alex Byrne, Anna Heffernan, Arthur White, Cathal Dempsey, Catherine Jefferes, Cormac Breen, Danny Lynch, David Conti, John Eves, John Sheekey, Laura O'Brien, Lisa Banahan, Luke Coburn, Niamh Russell, Richard Moloney, Sarah Donne and Catriona Ryan. This year however we had an exceptional situation in that Anthony James McElwee gave his time in the MSC free of charge. I would like to express my gratitude in particular to him. The overall time given to the MSC free of charge this year amounted to a total of 137 hours. This was a very significant contribution to the overall tutoring hours.

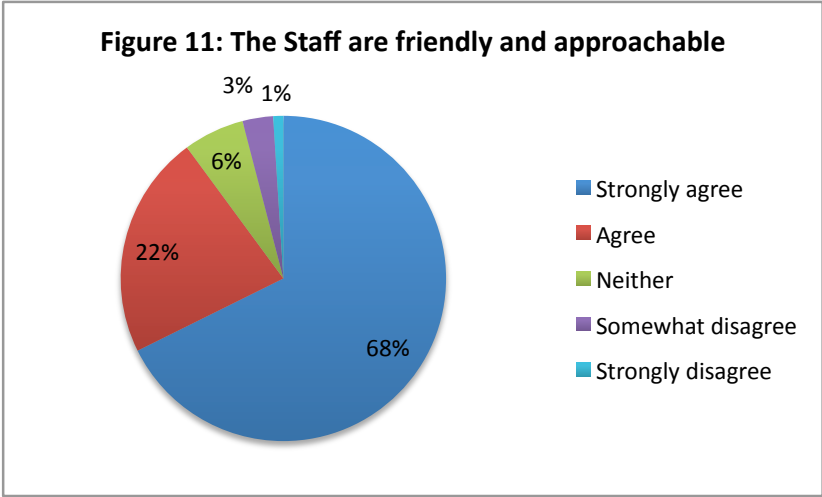
Two of our tutors who have worked in the centre for a number of years, completed their PhD studies this year. One is employed as a lecturer in Australia and the other is employed in an American firm that has a subsidiary in Ireland. The Manager asked them to write a resume of their experience working in the MSC and these are presented in Appendix 1: Tutors evaluation of their time tutoring in the MSC.

### **3.07 Students' opinions of the MSC staff**

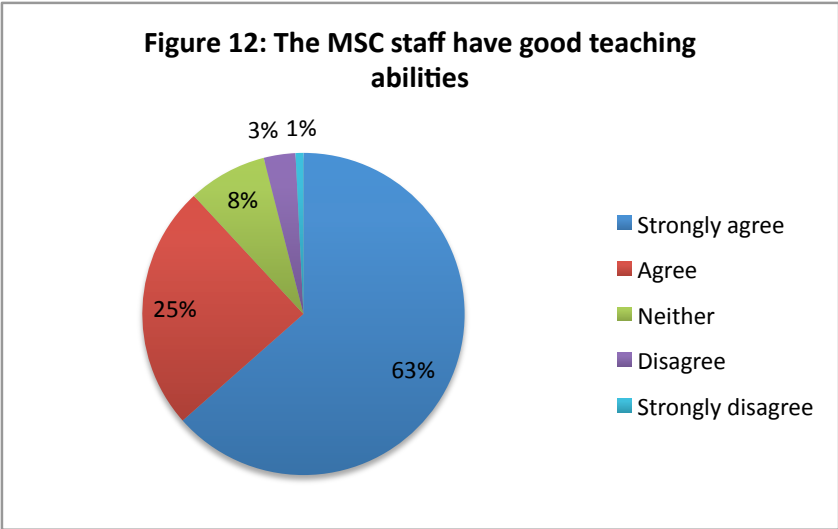
The respondents were asked for their opinions on various aspects of the MSC staff again using a five-point Likert item.

The questions asked about the MSC staff were as follows

- Are they friendly and approachable?
- Have they good teaching abilities?
- Have they a good knowledge of mathematics?
- Do they help you to cope better?
- Do they motivate you to study?

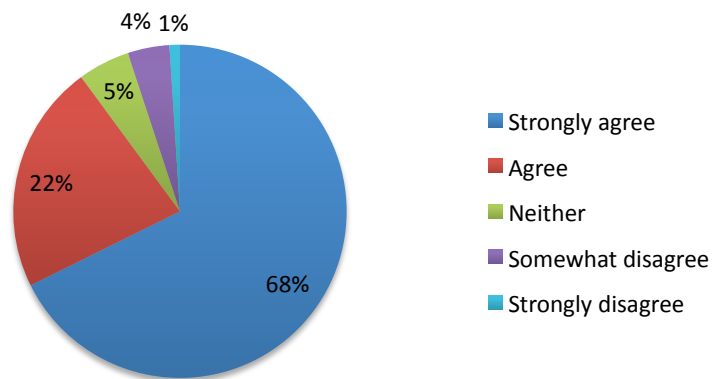


The attitude of the staff to students coming in to the MSC is very important as often those coming in for the first time are quite anxious. It is essential that they feel that they can approach the staff and not feel intimidated. The tutors are well aware of this and encourage the students to relax and explain where they are having problems. 90% of respondents agreed or strongly agreed that the tutors were both friendly and approachable. (See Section 4.02: Atmosphere in the MSC was friendly and supportive.)



The fact that 88% of the respondents agreed or strongly agreed that the MSC staff have good teaching abilities was very encouraging. The widely expressed satisfaction with the standard of tutoring is in no small measure due to the care that is taken when recruiting tutors. Not only their mathematical knowledge but their ability to communicate this knowledge is critically important. (See Section 4.03: General high standard of tutoring.)

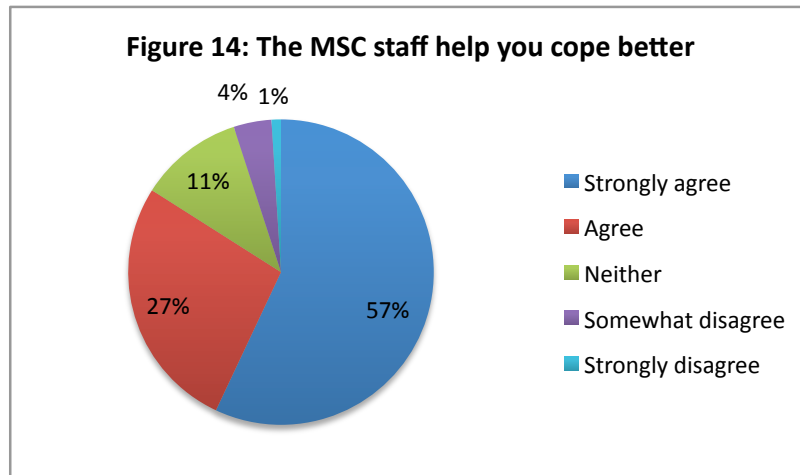
**Figure 13: The MSC staff have a good knowledge of mathematics**



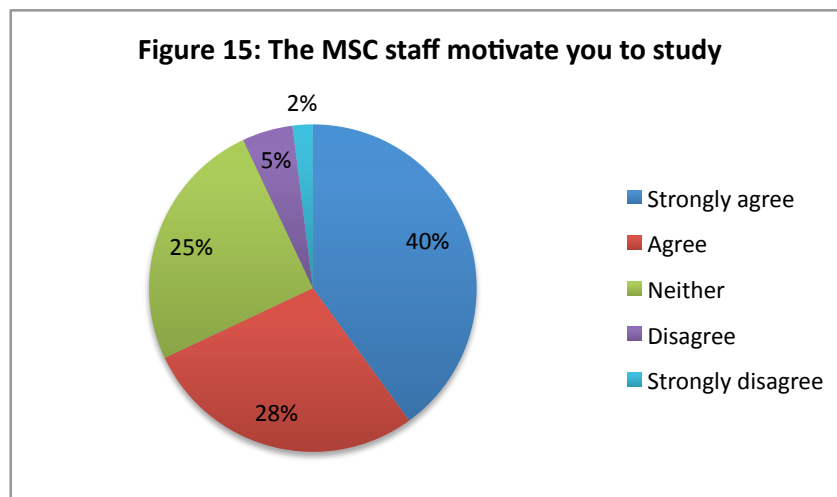
The tutors teaching in the MSC are mainly studying for their PhD or doing research in various mathematical areas. 90% of the respondents agreed or strongly agreed that the staff had a good knowledge of mathematics.

We cannot expect our tutors to be knowledgeable in all areas requiring mathematics beyond a certain level. Students come looking for advanced help in for example economics, maths physics or statistics. At the basic level any tutor can cope but at other levels we allocate times for specific subjects. We advertise these on our website and also on our notice board outside the MSC. However students do complain that they are not aware of these different times. Perhaps as tutor availability changes from semester to semester these times are also altered and this can lead to some confusion for students. Our proposed new FAQ sheet should be of assistance here.

These specialist times are also limited by budget and increasingly by the difficulty in finding specialist tutors.



It is essential that the students do not regard the MSC as a place where they can come to avoid doing the work themselves. From the above diagram it can be seen that 84% of respondents agreed or strongly agreed that the MSC helped them cope better. The students coming to the MSC should get a good basic understanding of the topic and must be encouraged to develop this understanding further by working on their own and when necessary coming back to the MSC with any problems. The MSC provides example sheets with answers and some students found these useful. (See Section 4.13: Students found extra resources in MSC useful.) Confidence in their ability is often a problem for students coming in to third level. Many students expressed the view that the MSC had given them confidence in coping with their module. For students' comments (See Section 4.12: MSC increased students' confidence.)



This year 66% of respondents agreed or strongly agreed that it motivated them to study. Sometimes a student may feel that either there is so much to learn that they don't know where to start or else get lost in a specific area. Coming to the MSC will often give them the wherewithal to move on with their study. However there is no doubt that the imminent approach of examinations is a greater motivation and this is evident in the increased numbers attending at these times.

## **4. Students' descriptions of their experience of using the MSC**

The Mathematics Support Centre (MSC) has a crucial role to play in enhancing students' knowledge of mathematics and in supporting those students who are having problems associated with mathematics. This is confirmed by the comments given by the students in the completed evaluation forms for 2011/2012. To give some indication of these we have categorised some of the comments under headings as given below. The comments were, on the whole, very positive. There was a marked increase in returns of our evaluation form this year 378 returns compared to 212 last year.

### **4.01 General Satisfaction.**

*Although a brief meeting, the friendliness and professionalism is something I will not forget, to the point that it stands out as an experience coming to University. I am seriously considering going back to study maths in the future.*

*It is clear that the MSC is working very hard to keep up the level of maths at third level and provides an invaluable resource to students without which we wouldn't be as well prepared for exams and class material. I really commend the staff for their great work and helpful resources- my experience of the centre was most encouraging!*

*A resource that is an absolute must. Should be in all Colleges. Brilliant.*

*I found it very well organised and the staff were very understanding and helpful.*

*Very happy with my experience couldn't do without it.*

*Overall a very positive experience the staff were very helpful no matter how busy they were they always made time for you. Very grateful for their help this year.*

*The MSC is a crucial service/help system for all students that have a difficulty with Mathematics.*

### **4.02 Atmosphere in the MSC was friendly and supportive.**

*I found the MSC a very warm and friendly place in which to seek help with maths. I like how the tutors in the centre don't judge or make you feel stupid for not understanding something. Any time I went to the centre I found them to be most friendly and helpful.*

*MSC did not judge my abilities, only sought to enhance them.*

*Very useful. Very encouraging. Very peaceful.*

*Helpful, friendly, useful, lifesaver.*

*Extremely helpful, friendly and essential to UCD and students.*

*I found the tutors to be most friendly and helpful. They were very approachable, and I felt free to tell them what I didn't understand. A really excellent service, well done!*

*I have used the MSC a lot and was always encouraged from day one to come back as often as I wanted. Nuala and her team of tutors are very professional in their approach. The friendly atmosphere is a highlight of the MSC and they take the time to support each student's needs.*

#### **4.03 General high standard of tutoring.**

*Maths is really hard. The maths support centre made it easier!*

*Studying maths I would get stuck often straight away and have to give up! In the centre I know if I decide to study maths there I will make progress and learn.*

*The MSC actually works. If I have problems understanding something in my maths classes I can go to the MSC and I know, before entering, that I will come out with clearer ideas.*

*Extremely helpful, all of the tutors are very patient and go through the problems thoroughly. Were a great help overall!*

*The centre was really helpful and good at explaining certain concepts that I could not understand from the lectures. The staff were all very welcoming and friendly and they really helped me to cope better with the maths module that I was taking.*

*I am a PhD student with a major stats element to my project. The MSC was invaluable. I was extremely confused about a model equation but with 2/3 visits to the MSC we figured out that the equation was WRONG! and I was subsequently able to develop my own model with this knowledge.*

*Great tutors, very helpful, extremely welcoming, very good knowledge. Thanks for everything.*

*I was always encouraged to come along early with a problem and I always came away with a great sense of achievement. The MSC is a wonderful resource and I would recommend it to all students.*

*I found the msc very helpful. My friends and I went there during study week and we all found it amazing. Really helped me understand stats. Thank you.*

#### **4.04 MSC helps to reduce student stress.**

*Excellent. really helpful and relaxed and removed the feeling of panic at not being able to do a particular thing.*

*Brilliant facility, knowing that the support is there on campus is great, feel quite secure in my course knowing that I can turn to the msc for help!*

*Very friendly and helpful...takes away stress.*

*The MSC staff are very helpful, friendly and approachable. They really have helped me cope with the pressures of my course.*



*It was a useful experience and put me at ease.*

*I had missed several lectures due to illness in semester one including the last exam for the module at Christmas. I had to re-sit the exam as an IX student and though I had time to prepare, I felt I needed help from someone to explain some of my course notes. ... The staff were very friendly and extremely accommodating and managed to calm my nerves right before my exam. I achieved a higher result than I would have achieved without their help. I know where to go if I need help again in the future. Many thanks.*

*Attending the MSC gave me the confidence to aim for a higher grade. The MSC also took away the stress I had about starting university maths and the difference in teaching. I would recommend this professional service to anyone. Thanks a lot for your help.*

#### **4.05 International students (non-EU students).**

*Leaving (the subject of) Mathematics for almost 3 years as I did not take any Mathematics subject for my A-level exam, I miss the happiness I gained after solving a Maths problem. That's why I choose Calculus as my elective when entering UCD. At first, I was afraid that I might be lacking since it had been a while since I last learned Maths. However, with the help and support from MSC, I managed to survive the module and get an excellent grade. Thanks a million to the MSC team and keep up the good work!!*

*It helped me with my math modules during the first semester and due to it I could get the highest mark for this modules.*

*I am grateful very much because I got valuable knowledge and experience.*

#### **4.06 MSC assisted the retention of students.**

*I couldn't have passed without it. The experience gave me solid foundations in maths.*

*If the maths support centre was to close due to financial difficulties most of the students I know would fail maths. It is an extremely important resource for us. The helpers help as much as they can and are very friendly.*

*It helped me enormously this year in maths tests throughout the semester and I feel without it I would (have) failed maths.*

*The MSC is an invaluable facility for any math student. Without it's help I believe a large percentage of math students would simply be unable to grasp the materials in math related courses. The MSC is quite simply the most important aid for any math related study in college.*

*The centre really helped me. Without it I would not have passed my exam. The staff are excellent. I really appreciated their help.*

*The centre was very useful and contributed greatly towards passing my exam. The level of maths in university is a big jump from ordinary Leaving Cert. maths so the MSC was good place to catch up. I would like to (see) the MSC expanded in the future with more staff.*

*I found the tutors at the MSC invaluable. I would not have passed without their help. They explained each problem slowly and clearly with examples and when I didn't get it they reworded it. I found this very helpful. Thanks so much.*

#### **4.07 Usage of MSC by programmes throughout UCD.**

*Really helpful and friendly environment to study which gave lots of help with difficult aspects of my maths modules.* (Economics)

*I found the centre very helpful and will definitely use it again in the future.* (Social Science)

*Can study maths confidently in MSC, clarify grey areas. get more study done (and) build a foundation that was never really there before, increased confidence/ ability.* (Agriculture)

*Very helpful and relaxing experience.* (Human Nutrition)

*Very helpful and an easy place to walk into.* (Arts)

*The staff were so helpful and approachable and gave me confidence in maths and data analysis. Will definitely be returning in the coming academic year and really appreciate all their help and patience.* (International Commerce)

*Very helpful welcoming atmosphere with very helpful people. The MSC was the direct reason for passing that particular module.* (Business and Law)

*Very useful if there's a topic in my studies that I had never seen in the past for whatever reason. The MSC ran me through it and I was then familiar with this topic and could happily continue on with my studies of this module.* (Actuarial and Financial Studies)

*The MSC actually works. If I have problems understanding something in my maths classes I can go to the MSC and I know, before entering, that I will come out with clearer ideas.* (Sociology)

#### **4.08 Mature Students and Access Students.**

*I did my Leaving Cert in 2009, and started in 1st year Science this year. Since it had been 2-3 years since I had done some of the Maths topics required on my course it was helpful to be able to get help in certain areas from the MSC that I needed to brush up on. After just a few visits I felt that I was back up to the same level as I was just after the Leaving Cert, which really helped in my maths modules and made the course a lot less daunting than it seemed before.*

*As a mature student who did the leaving cert. in 1981, I acquired confidence in using maths, especially calculus, where I got an A-, and Discrete maths, where I got an A in the exams, mainly thanks to MSC .*

*Having not studied maths in 10 years and returning to college the maths centre was very helpful in the first few weeks to help me understand the basics again and understand what the questions were asking me to do. The people in the centre were very helpful without molly codling and as a result of 4-5 sessions I was able to get up to speed and get good results in my exams*

*Before I arrived at UCD I was seriously concerned that I would not be able to keep up with my class with regards my maths abilities. Proof of the MSC's patience and ability lies in the fact I finished the year with an A in Maths, a B- in data analysis, and an A- in macroeconomics.*

#### **4.09 Hot Topics.**

*I took part in a mature student's maths session (differentiation) and also asked help for one of my courses later. On both times I was struck how the teachers in MSC were able to come to my level and explain to me in a way that I was able to understand. I cannot remember anything from previous maths studies that occurred over ten years ago and on top of that they were in different language. I have already encountered situations where asking for help leads to the acknowledgement that I don't really have the basics and thus no help is really available. This was not the case in MSC where I was patiently explained these things. I will be using the service in the future, as I highly appreciate their patience with me.*

*Very friendly staff, we could not make one of the hot topics sessions...a continuation, so a group of us agreed to attend the MSC at a specific time the next day. The attention we received was second to none and we all came out much clearer on the subject matter.*

*It was brilliant, the teachers explained everything fully and until we understood it, they didn't put time limits on our understanding, and offered extra hours to explain in more detail if we were struggling, I would not have coped without it, I hope it will be available to me with other modules, especially with hot topic sessions that covered most of the things we needed to know.*

#### **4.10 Students benefited from one-on-one help.**

*I liked the MSC because it was very relaxed and I got one on one help with specific problem areas. Also the member of staff that helped me explained the problem more simply than my lecturer and helped me make clearer notes.*

*The people were quick and eager to help. They gave you advice and explained the problem to you instead of just doing the whole problem for you. They took you through it step-by-step which I found really helpful.*

*The MSC has very helpful tutors, which will stick with the question until its finished. Very helpful with specific topics, with tutors for specific topics. Very positive experience, its how I passed my exam !!!*

*Helpful the way the staff would go through a whole question, really helped me to understand what was going on in the notes.*

*I found the MSC to be a really valuable resource, as sometimes you have specific questions that you might think too basic to ask the lecturers about, and also you get the time to really go through the concept that you are having difficulty with. Even during exam time, the staff tried to help everyone and I was never turned away.*

*I found the MSC to be very helpful in answering specific questions on how to solve problems, for example why we take one approach in favour of another.*

#### **4.11 MSC increased students' understanding and encouraged independent learning.**

*So helpful to get something explained in detail before going off to study it further.*

*The staff are nothing but helpful and try to let you solve the problem with enough hints and tips to get you by. I'm studying maths and applied maths in college and I can safely say at least 50% of my class would really struggle without your help. The only negative is you can sometimes be really busy and this means waiting a long time so you must leave a lot of time to go to the msc. But in general thanks for all the help!!*

*I found the msc to be more than helpful and were very patient when dealing with my difficulties. They were very clear and encouraged us to do the work rather than they do it for us. There was always a welcoming atmosphere and all the members of staff were very approachable. I found that my knowlegde of maths improved after every session and I strongly feel that they helped me pass my module.*

*Before visiting the MSC I was extremely worried about passing one of my modules (MATH10040), yet after a brief visit (less than an hour) I had the basic grasp on the areas of the module that I was finding most difficult and allowed me to study far more effectively.*

*The MSC was very helpful in going through questions slowly and explaining the questions I was having difficulty with. I left feeling I understood and could do the maths on my own.*

#### **4.12 MSC increased students' confidence.**

*Friendly, knowledgeable and encouraging. A great place to go to if your having trouble with understanding concepts, problems, lecture material or any aspect of your maths course. With help from the MSC I became very confident in my ability to tackle my Maths module and attain good grades .*

*I only used the MSC twice, but on both occasions I found the staff extremely helpful, studying maths I would get stuck often straight away and have to give up! In the centre I know if I decide to study maths there I will make progress and learn.*

*The MSC made me feel that no question was too big or too small to ask. They gave me reassurance that I could overcome the mathematics involved by encouraging me to understand and attempt the question myself rather than just telling me how the answer was gotten. I really appreciate their help and would recommend any student with a difficulty in any area of mathematics to attend.*

*I was struggling with my first maths module of my course. The change from Leaving Cert. teaching of maths to college teaching was difficult for me, just like most students I was spoon fed on how to do the maths needed for the Leaving Cert. maths exam. I dropped from Higher level to Ordinary maths a month before the Leaving Cert. because I felt slightly nervous about my ability. When I got help from the MSC they reassured me that I was more than capable once I get worked examples and taken through them. I find in lectures of 400+ students it's hard to follow the worked example and the lecturer of course wants to get his course thought so sometimes tends to go faster. The MSC gives a chance to those people who fall behind. The respect of the staff in the MSC is very comforting and there is a lovely atmosphere, I am aware that the college is making cuts but for the sake of students this is one area that needs to be left to the students.*

*It improved my understanding of topics which I did not understand in class. It made me more confident before doing my exams.*

#### **4.13 Students found extra resources in MSC useful.**

*Very helpful and explained really well. Also notes can be brought home to use for studying which is brilliant.*

*Upon entering I was greeted warmly and pointed towards the computer to log in. Shortly after that a tutor came to my desk and asked what I needed help with. After explaining the theory, he pointed me to some books in which I could find practice questions and came back later to go through some solutions with me. I found this very helpful.*

*It is clear that the MSC is working very hard to keep up the level of maths at third level and provides an invaluable resource to students without which we wouldn't be as well prepared for exams and class material. I really commend the staff for their great work and helpful resources- my experience of the centre was most encouraging!*

*I was able to go through sample exercises ... which was very helpful rather than reading a sample solution from notes. I was also able to work through problems with my classmates.*

*The MSC, is a great place to go to if you have difficulty in maths, and also have a great range of mathematics books to use. It is often quite busy which shows how useful it is to all students.*

#### **4.14 Size of room, opening hours, number of tutors and resulting concerns.**

*The MSC was a handy resource to help with things I didn't understand. Sometimes I had to wait quite a long time to be helped in the MSC and I would suggest taking on more staff at peak times.*

*Brilliant...The tutors were so helpful and patient but there was not enough of them on hand.*

*I have found the MSC to be very helpful, particularly with webwork difficulties that we may not have seen before in lectures. Although sometimes overcrowded with long waiting times, any help received has been great and much appreciated. I would like to thank everyone there who helped me complete and understand my module in linear algebra last semester and achieve an A in my final exam.*

*All the staff were very friendly and approachable, they were very good at communicating the maths terms which were difficult in a simple manner. The only problem with it I have is that my course lectures take up a lot of time and I think that there should be more opening hours. Also at times it can be quite crowded, which leaves less one on one time.*



## 5. Conclusions

- Attendance at the MSC (4401 visits) has increased by 3% in 2011/2012 compared to 2010/2011 and average time spent by a student increased from 70 minutes to 82 minutes.
- The quality of service provided by the MSC was formally evaluated in 2011/2012. Each student who attended was emailed and asked to complete the MSC evaluation form. The number of returns was high, 378 this year compared to 212 last year. The results were very positive. Recommendations from the 2010/2011 report have been implemented and the budget was increased.
- The late move to the new venue (14<sup>th</sup> October 2011) caused a number of problems. Among these was the difficulty of informing incoming students of the MSC and the confusion caused by the move from one venue to the next after the commencement of the semester. First year attendance is down 10%.
- Students show an extremely high level of satisfaction with the services provided. However as the number of visits and the substantial increase in the time of individual students' visits increased this year students have expressed dissatisfaction with the size of the venue and the number of tutors. It is hoped that the new premises will provide a solution for the former.
- A further problem was the availability of suitable opening hours. Some students for legitimate reasons are unable to attend the MSC during the day. The increase in the opening hours on Tuesday evenings in the second semester was a successful experiment.
- Provision of a suitable venue in a timely manner will be the main restriction to maintaining the professional operation of the MSC and will certainly curtail the further growth of the MSC.
- The MSC is currently fulfilling its stated aims.

## 6. Recommendations

- Continued analysis of the pattern of student attendance and the mathematical content of the sessions tutored should be employed. This should allow for more time and cost effective working arrangements to be implemented in future years. These arrangements would include the times of employment of tutors and the addition of extra *Hot Topics*.
- The ability of the MSC to cater not only for the increase in numbers but also the increase in length of individual student visits is now a concern for the Centre. But the major concern is the provision of a new venue preferably increased in size, located in an area readily accessible to the students and completed in adequate time for Orientation 2013. Staff should continue to promote and develop the MSC as a centre of excellence.
- Advertising the benefits of the MSC to all relevant bodies is critical for its survival. Frequent communication with students, lecturers and student advisors is essential. The on-going relationship with the Irish Maths Support Network and similar international associations is important for the further development of the MSC.
- Information is now automatically stored on databases and full use should be made of these to facilitate research and further improvement in the work of the MSC.
- Evaluation of the quality of service provided by the MSC should continue to occur on an annual basis.





## Appendix 1: Tutors descriptions of teaching in the MSC

### **My experiences working in the Mathematics Support Center UCD:**

*I started a PhD in UCD in 2008 following a degree in Mathematical Sciences and a Masters in Mathematical Modelling and Scientific Computing. I applied for a job as a tutor in the MSC and began working there in my second semester. I thoroughly enjoyed my time in the MSC and stayed working there throughout my PhD until time and funding constraints (in my final year) regrettably meant that I had to give it up. Without doubt my time at the MSC was a huge asset to the skills that I developed during my PhD. These were primarily communication skills but it also cemented my grounding in mathematics that could have easily been lost even while doing a PhD.*

*First and foremost I learned how to communicate mathematical ideas, often this meant simplifying concepts to make them easy to understand. This helped me on many levels, it gave me confidence in my own knowledge and abilities but it also developed my understanding in many subject areas. This confidence was very beneficial when I began tutoring to larger classes. Also there were benefits to my own research in the way it helped me understand how I learn while also giving me a break from my desk, which can help with overall productivity.*

*Moreover, the range of subject material jogged my memory on many courses I had previously taken and thought I had forgotten. This gave me a much better grounding in pure and applied Maths and Statistics. It also enhanced my skills in “how to learn”, for example knowing where to look for information when you don’t know the answer to a question and the different approaches to learning – through doing examples, drawing figures or by making a comparison to something the student does understand.*

*During busy periods we would often be jumping for one person the next. This really made me learn how to think on my feet. This was especially helpful when moving between students at different levels- one minute you might be helping a mature student re-learning basic Mathematics and the next could be helping a 4<sup>th</sup> year student understand their Quantum Mechanics notes.*

*However, the most enjoyable aspect to the MSC is the social side to it. It is a very relaxed and friendly atmosphere and often you get to know the students well. I would consider myself a people person anyway but working at the MSC definitely taught me how to connect with a student so they feel comfortable and not afraid to ask questions.*

*Being a tutor at the MSC was extremely rewarding. I always looked forward to working there and always left feeling happy knowing that I had helped many students. It’s a great feeling when a frustrated student smiles and says “oh that actually makes perfect sense now”. At times if I couldn’t answer a question it fuelled my curiosity to find the answer.*

*I recently started my first postdoc and during the interview process it was clear that my new employers were very impressed by my experience at the MSC. I hope to teach soon and I know that my experience in the MSC will stand to me when I do. Further, the communication and social skills and learning to think on my feet are proving to be very important in academia. I’m sure they will also be a great advantage to me in any job I have in the future.*

*Laura O’Brien.*

**My experiences working in the Mathematics Support Center UCD:**

*I've been a tutor at the Mathematics Support Centre since 2010. I'm very proud of the work I've done in the MSC, both because I think it is a wonderful service for students, and because it has been a hugely beneficial experience for me personally.*

*Because of the particular work environment offered by the MSC, I have been able to develop some very important skills. These include:*

*Communicating with students in an empathetic manner.*

*Explaining difficult technical concepts in a clear and accessible way.*

*Acquiring flexibility in tackling a variety of different problems in a short timeframe.*

*Working in a team with diverse strengths: Every tutor in the MSC has a slightly different background, and a tutor has to recognise when to ask others to step in and help with a particular question, or likewise when he can offer help to other tutors.*

*All of these were very valuable skills for me to develop as a PhD student, and will be equally applicable in either an academic career or an industrial one. I have no hesitation in saying that working at the MSC was a crucial part of my PhD education.*

Richard Moloney