

# The Role of Student Feedback in Evaluating Mathematics Support Centres

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## Abstract

Accurate evaluation of mathematics support centres is a complex task, given that such centres should ideally be integrated into the overall learning experience of the student, complementing structures such as lectures and tutorials. As such, a multi-faceted approach should be undertaken in order to best measure the effectiveness of such support, combining quantitative data such as attendance records and analysis of exam results with qualitative data such as anonymous student feedback.

Over the five years of its operation to date, the Maths Learning Centre in Dublin City University has maintained detailed records regarding the use of its drop-in support service. These records serve the dual purpose of allowing more efficient planning of resources by providing an overview of student attendance patterns and common problem areas, while also enabling an analysis of subsequent student performance to be conducted. However, such data provides little information as to the quality of the student experience within the Centre. Therefore, at the end of each academic year, an anonymous questionnaire is given to first-year service mathematics students to ascertain their opinions and experiences of the Centre. Over the past couple of years, more than four hundred students per year have completed this survey, over half of whom had used the Centre. Here, following a brief overview of our quantitative data, we focus on the survey results and discuss what can be learnt from these. We also consider the responses in the context of records kept and anecdotal evidence to determine the usefulness and reliability of such feedback.

## 1. Introduction

The poor core mathematical skills of a large number of students entering third-level education has been a growing cause for concern for mathematics educators for many years now. This concern has been expressed in numerous journal articles and conference proceedings, and inquiries have been undertaken to ascertain the mathematical accomplishment of these students. In Ireland, studies were being undertaken as early as 1985, when Cork Regional Technical College concluded that their incoming undergraduates were deficient in basic mathematics [1]. Numerous other universities and institutes were soon reporting similar findings ([2], [3], [4]). By 1995, in the United Kingdom, the London Mathematical Society (LMS), in collaboration with the Institute of Mathematics and its Applications (IMA) and the Royal Statistical Society (RSS), had produced a report entitled "Tackling the Mathematics Problem" [5], which investigated concerns amongst mathematicians, scientists and engineers in third-level education about the mathematical preparedness of new undergraduates. This was followed up by a report by the UK Engineering Council which showed strong evidence of a "steady decline" in basic mathematical skills and "increasing inhomogeneity in mathematical attainment and knowledge" [6].

As a result of these concerns, many third-level institutions across the UK and Ireland opted to set up Mathematics Support Centres ([7], [8]), although these vary from one university to the next, depending on the specific needs of students and the funding and resources available to staff.

Accurate evaluation of the operation of such centres is an important, but complex, task, given that centres should ideally be integrated into the overall learning experience of the student, complementing structures such as lectures and tutorials. Various approaches are undertaken, including recording attendance at the centre, surveying students who use it, giving questionnaires to the general student population, and analysing pass rates of regular attendees versus non-attendees. However, it can be “very difficult to establish that the Mathematics Support Centre has been the key reason behind the retention of any particular student” [7], and therefore the aim of such evaluation should be to ensure that the centre is operating as efficiently as possible, and having a positive effect on student learning, in particular for those students who are struggling with mathematics.

## 2. DCU Maths Learning Centre

The Maths Learning Centre (MLC) in Dublin City University (DCU) was established in February 2004, with the aim of providing additional mathematical support in a relaxed environment to any undergraduate student taking a mathematics module as part of their degree programme. The MLC has been a permanent fixture since September 2007, funded by the School of Mathematical Sciences and the Faculty of Science in which the school resides. The MLC consists of a drop-in centre, open twenty-two hours a week, along with e-learning support through the means of Moodle, a website and **math**tutor software [9]. There is a full-time director and the drop-in centre is staffed by the director, who is employed as a lecturer in the School of Mathematical Sciences, and postgraduate tutors from the same school.

### 2.1 Records kept

Over the five years of its operation to date, the MLC has maintained detailed records regarding the use of its drop-in support service. When students first attend a drop-in session in the MLC, they complete a registration form, which records data such as their name, student number, mathematics module and course, as well as how they found out about the service. For each visit, an attendance form is completed: the student simply fills in their name and student number, while the tutor records their own name, the date, the time the student arrived and left, and what topics were covered. This data is subsequently inputted into a database by the director of the centre. As it can be time-consuming to collate the data in this manner, an automatic student-card reader was trialled last year as a means of monitoring attendance, but this did not prove viable as a significant number of students did not bring their cards with them on a daily basis, as they are only necessary in order to enter the library. In any case, the form-filling approach has unforeseen advantages, in that it provides the newly-arrived student with something to do when they first arrive in the centre, allowing the tutor to engage briefly with the student, while continuing to work with those already present.

### 2.2 Reasons for Records

These records provide a more accurate picture of the day-to-day operation of the MLC, allowing the director to assess the busiest times of the week, how long students stay on average, and the topics most frequently covered. This contributes to more efficient planning of resources by providing an overview of student attendance patterns and common problem areas. In addition, the records enable an analysis of subsequent student performance to be conducted. For example, in 2007/2008, the pass rate in first-year service mathematics modules for students who attended the MLC was 81%, compared with a pass rate of 74% for those who did not attend. Clearly, there are many factors to be considered in conducting a detailed analysis of these figures, such as personal motivation

of students, mathematical level upon entry to third-level and so on, but maintaining records such as these allows for such analyses to take place.

### 3. Student Questionnaire

Although the records provide valuable data regarding the use of the Centre, they provide little information as to the quality of the student experience within the Centre. Therefore, towards the end of each academic year, first-year service-mathematics students complete an anonymous questionnaire regarding their attitudes to and opinions of the MLC. Generally, this results in approximately 450 responses, just over half of whom have used the MLC's services during the year. The questionnaire consists of twenty questions, which are a mixture of Likert items and open-ended questions.

#### 3.1 Results of Questionnaire

All respondents were aware of the MLC's existence, even if they had not used the centre's services. Students were then asked specifically about each component of the MLC's services (drop-in sessions during semester, specialised drop-in before exams, refresher sessions, revision classes, online resources), and each of these were rated very highly, with 70-80% of responses categorising them as "very good" or "good". Having rated these, respondents were then asked to mention specific aspects of the centre that they found satisfactory. The results, summarised in Table 1 below, show that the one-to-one support is prized above all else by students.

	Number of Responses		Number of Responses
One-to-one Support	79	Friendliness/Helpfulness	12
Tutors	38	Facilities	11
Online Resources	26	Notes	9
Timetable	22	No appointment needed	6
Revision Classes	21	Everything	5

Table 1: Satisfactory aspects of the MLC: Summary of students' responses to the open-ended question, "What aspects of the MLC's service did you find satisfactory?", based on 162 student comments.

Students commented:

*"I found the one-to-one teaching very helpful, and I wasn't afraid to ask questions as I would be in the lecture."*

*"You can discuss the different questions you have problems with."*

In addition, the importance of the staff working in the centre is highlighted, with numerous students mentioning specific tutors who were particularly helpful, or the friendliness and patience of all the tutors:

*"I enjoyed the fact that the people were very friendly and that they went out of their way to help me."*

*"The tutors didn't make you feel like any question was stupid or silly."*

Many students were full of praise for the existence of the service:

*"It was nice to know that if you were struggling with maths, there was someone there to help."*

*"Wouldn't have passed only for Maths Centre."*

A significant portion of respondents did not use any of the MLC's services. Of particular interest are the reasons given by these students for their non-attendance. The most common responses are summarised in Table 2 below.

	Number of Responses		Number of Responses
No need/no problems	124	Tutorials were enough	8
No time/too busy	34	Unsure of timetable	6
Timetable clash	15	Heard it was unhelpful	4
Too lazy	15	Unsure of location	3

Table 2: Reasons for not attending MLC: Summary of students' responses to the open-ended question, "Why did you choose not to use any of the MLC's services?", based on 223 student comments.

The most cited reason by far was that they had no need for the service, which would ideally be the only reason given for non-attendance! However, quite a number of students claimed that they were too busy or simply had no time to attend:

*"Didn't have time in first semester as I lived too far away from college."*

*"Other commitments outside of college eg work."*

More cited a clash between their lecture timetable and the drop-in sessions:

*"Assignment groups and lecture times clashed with MLC times."*

Some replied quite honestly that they were simply too lazy:

*"Laziness mainly, I was too busy having fun and didn't commit to any work outside my regular schedule"*

while another student *"didn't want to go by myself."*

In several cases, students realised too late that they had problems:

*"Didn't realise extent of problems until very close to exam, hadn't enough time to attend."*

*"I thought I'd be able to sit down and learn it myself...but I was WRONG!"*

Some students felt too negative themselves about their mathematics course to even try going to the MLC for help:

*"Didn't feel like I knew enough to ask for help, I was so, so lost."*

*"I hate maths. And I didn't think it would help."*

A small number of students did not attend based on hearing about a negative experience from a fellow student:

*"I heard from people who attended that it wasn't worthwhile going – waste of time."*

Responses such as this emphasise how important it is that students who attend the MLC have a positive experience – not only for their own sakes, but also because many students attend based on word-of-mouth, so a negative experience for one student often results in a number of other students not attending.

### 3.2 Observations

It is clear from the above section that a large amount of qualitative information is provided by students' responses to the anonymous questionnaire. However, it is necessary to combine this with the recorded data in order to obtain the most accurate picture of the operation of the MLC. For example, a total of sixty-four students said that they had attended the refresher sessions at the start of the academic year, and rated them accordingly, but records show that, in fact, only fifty-six students attended the sessions. The most likely explanation for this is that some students read the survey very quickly, and rated all the services in a similar fashion, regardless of whether or not they had used each individual service.

Another example would be that several students mentioned that they had tried to attend but the room was completely full, whereas records show that this was never the case – there was always space for at least one or two more students. This indicates that students may be put off if the MLC seems busy to them, even if there is still some space available within.

#### 4. Conclusions

Evaluating mathematics support is challenging and a multi-faceted approach is undoubtedly the most accurate means of doing so. A combination of quantitative data, based on detailed records maintained by the MLC, with qualitative data from an anonymous student questionnaire provides valuable insight into the daily operation of the centre and possible improvements that are needed. In addition to this, anecdotal evidence is also important, such as that gathered by regular communication with tutors working in the MLC, and discussion with students who use the service, as well as observations of the director, who works regularly in the centre. The MLC will continue to collate such data in order to improve the service provided to students in need of additional support.

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