

## **Why do students not avail of mathematics support? A case study of first year students at the National University of Ireland Maynooth.**

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Previous work concerning the evaluation of mathematics support services at NUI Maynooth showed that students who made use of the help available were more likely to succeed in their examinations than those who did not. It was also noticed that a significant number of at-risk students did not attend the Mathematics Support Centre. In an attempt to ascertain the reasons for this, students who were repeating mathematics modules were interviewed about their use of mathematics support. The results show that fear plays a major role in non-engagement.

**Keywords: Mathematics support, non-engagement.**

### **Introduction**

The Mathematics Department at NUI Maynooth has many supports in place to help students if they experience difficulties. Each student is assigned to a weekly small-group tutorial, and students have homework graded every week. In addition, online courses have been designed to help students with weak mathematical backgrounds, and the department runs a very successful Mathematics Support Centre (MSC). Research has shown that students who avail of these services have a greater chance of succeeding on examinations than those who do not, (Mac an Bhaird, Morgan and O'Shea 2009). However a small minority of at-risk students do not take advantage of the support available. The aim of our study is to investigate the reasons why some students who are experiencing difficulties do not seek help. In October 2009, all students who were repeating a first year mathematics module in NUI Maynooth were contacted and invited to participate in the study. Twelve students agreed and they were asked to complete a short questionnaire concerning their first year mathematical experiences. Seven of these students also agreed to be interviewed.

The interview and questionnaire data showed that students were often not aware that they had a problem, or were unwilling to admit to it (to themselves or others) until it was too late. Students were also reluctant to ask for help and feared embarrassment. Other authors have found that the fear of showing a lack of knowledge or ability negatively impacts on students' willingness to ask questions (for example: Ryan, Pintrich and Midgley 2001; Hannula 2006). Other factors identified as important in students' non-engagement with support in our study included the demoralising effect of failing first semester examinations, the anonymity of large classes, and to a lesser extent the lack of awareness of support services. Many of these factors were also identified in a study of students at Loughborough University (Symonds, Lawson, Robinson 2008).

In this paper we will focus on the fears that students expressed and how these fears prevented them from engaging with mathematics during their first year at university.

## Methodology

Thirty nine students were identified as repeating first year mathematics modules in September 2009. These students were contacted and asked to take part in this study. Twelve students agreed to fill out a short questionnaire and seven of these agreed to be interviewed. Coincidentally, the seven students who agreed to do interviews were all students who had not actively engaged with mathematics support. They generally had poor attendance at lectures and tutorials, poor submission rates with respect to assignments and had rarely attended the MSC. The group of seven interviewees comprised of four male Science students, two female Finance students and one (mature) female Arts student. Mathematics is a compulsory subject in first year for Science and Finance students.

The interviews were conducted by the first author. Each interview lasted for approximately 40 minutes. The questions were open-ended and concerned student's mathematical education prior to enrolling in NUI Maynooth, their impression of mathematics at university, and their views on mathematics support available to them and their reasons for availing or not availing of it. The questions on mathematics support related to lectures, tutorials, assignments, and the MSC. All students were offered a mentoring service as part of the study.

The interviews were transcribed by the first author. The transcriptions were coded using grounded theory (Strauss and Corbin, 1998) by all three authors and the codes were compared. Pseudonyms were used to protect the students' identities.

## Results

A preliminary analysis of the data has shown that the main factors in students' non-engagement with mathematics support were fear, lack of awareness of services, personal difficulties, and lack of personal motivation. In this report, we will concentrate on the first factor. We found that fear was the dominant factor for all but one student. This student was a mature student who had chosen to study mathematics. For the other students, fear was often the main reason why they did not engage with the subject. We found that this fear manifested itself in four different ways: fear of failure; fear of showing a lack of knowledge or ability; fear of being singled out; and fear of the unknown. These fears are clearly related to each other and this is obvious from the students' quotes in the sections below.

### *Fear of failure*

This manifests itself mainly as a fear of facing one's own shortcomings and a fear of one's own emotional reactions to failure. For example, some students said that they did not want to submit homework because they did not want to receive a bad mark.

Cause if it's handed back and I see an F beside it and I didn't wanna see that F.  
And that's kind of gearing towards an exam you don't wanna see F's coming at you. (Amy)

They often coped by trying to forget their problems and hoped that somehow things would improve.

Well it was a fear of like being told, "Oh my god, you're so far gone", cause I knew in my head how bad it was or how bad things were but I just kinda kept

thinking some miracle is just....I'm just gonna become a maths brain and that's it.  
(Amy)

Sometimes they coped by concentrating on something that they were good at.

I think I was kind of hoping for some miracle, I dunno, em, I just kind of pushed it to the side, and I kinda enjoyed the other subjects. I just did them. (Emily)

Students also reported having strong negative emotional reactions to working at mathematics. They found the experience frustrating and depressing. Some students found that the difficulties they had with problem sets discouraged them.

Found them difficult and they'd just kind of run you down about the subject as well cause you were feeling, you were getting marks from them, you were just doing poorly. Em, and coming up to exams and stuff like that it didn't feel great.  
(Ben on assignments)

Sometimes the memory of past experiences was enough to stop them from attempting a new problem set.

Emmmm, it was probably frustration, you know? If you tried, you know tried to do a few homeworks for could be 3 hours and I'd just get really, really frustrated and that kind of memory of frustration I suppose would reoccur. Next time I'd even think about going (inaudible) you know I just don't want to annoy myself like that again. (Colm)

### ***Fear of showing a lack of knowledge or ability***

The fear of showing a lack of knowledge or ability shows up as embarrassment and a reluctance to ask questions or fear of being wrong. This fear showed up in every section of the interviews. Students seem to feel that by asking a question they expose their lack of knowledge. The interviewer asked one student if they would ask a question in a lecture, they replied:

Never! I did in one, in accounting, but that's because I was comfortable with it and I knew what I was talking about and I corrected the lecturer and I asked a question. So, I was comfortable with that. (Amy)

Some students decided not to attend small-group tutorials because they feared that they might expose their lack of knowledge.

Cause I wasn't going to lectures, when I was doing my homework I didn't have a clue so I was just like "I cant go to a tutorial cause I wont know how to do....", you know that sort of way? (Emily)

While some students felt that if their homework was not correct, then their tutor would know that they had not understood the concept and might focus on them in the tutorial.

If you hand in a bad homework the lecture can focus a lot more on you and you know it will make you feel, not stupid but if you hand in a bad homework, this is me personally, I'd be less inclined to go to the tutorial. (Colm)

They also feared the reaction of their lecturers and tutors, if they showed a lack of knowledge or asked for help.

I was actually really embarrassed and intimidated about going and saying listen guys I struggle horribly with maths. (Joe on MSC)

I probably, coming back from being a 1<sup>st</sup> year just coming from secondary school I would have thought as well that if I went up to lecturers and said things, like "I haven't been coming to many of your classes, I haven't a clue what's going on". I would have thought I just be given out to or I dunno, I didn't know what way it worked you know? (Colm)

This reaction seems to stem from old fears about getting the right answer and was mentioned by many students. For these students, it seems that these fears originate in school.

Em, some were good, some were very much a hindrance because they would get more angry than helpful. If you didn't get something right, if you didn't do it right, if you didn't understand be you know kinda punished for it. Rather than help. (Ben on teachers)

In primary school with fractions, I was very nervous as a kid, so I was always afraid to ask questions. And you know, you're, I was always afraid to be called up in front of class if I had a problem, I just literally shied away and the problems got worse and worse. (Joe)

### ***Fear of being singled out***

Students also seem to fear standing out from the crowd. They do not want to show their inadequacies in front of their peers.

I mean in such large groups it's hard to ask questions cause there's just so many people around. ... It's just, it can be, I mean you don't want to say something stupid in front of 200, 250 people. (Ben)

While most people would not want to speak in a large group, this feeling seems to carry over to small groups also.

You know that they ask you questions and you're like "I haven't a clue" and everyone is looking at you and like "Why don't you know?". (Amy on tutorials)

For this student, the fear of the reactions of classmates seems to have roots in earlier experiences at school.

You'd learn them off, I'd have no problem learning them off but applying them to other things, I was like "oh my god", so she used to ask me the whole time. And everyone in the class used to laugh because I wasn't able to do it. And then, cause it's the, I could do better than them in everything else kind of thing. (Amy on theorems at school)

### ***Fear of the unknown***

The transition from second to third level is difficult for most students, and often they are not sure how the system works. The students in this group seemed to be wary of anything that they did not understand and were unwilling to try anything new. This was particularly true of the reaction to the Mathematics Support Centre. Some students expressed reservations about attending when they were not sure what happened there.

You know, kinda nervous to go off somewhere you didn't understand, you know you didn't, stuff that you want to (inaudible) strangers of stuff that you did not understand. And you just kind of felt embarrassed about not knowing how everything was working. (Ben on MSC)

Some got as far as the door.

Then second semester I went to the door, looked in and it was really, really busy and I just thought "hmmm, no!". And I turned around. (Amy on MSC)

However one student recognised that the first step is the most difficult one.

I think it's the initial, once you go the first time its gra(nd) ...it's going the first time I'd say. (Emily on MSC)

## Conclusions

We found that fear was a major theme in the reasons given by these students for their lack of engagement. The fear seems to break naturally into four related categories: fear of failure, fear of showing a lack of knowledge or ability, fear of being singled out, fear of the unknown. The first three of these categories seem to involve the fear of exposing one's own inadequacies to oneself, to lecturers or tutors, and to one's peers.

We are currently using our results to design an intervention strategy for first year students at risk of failing. We are also interviewing students who had similar mathematical backgrounds to the students in this study, but who did engage with mathematics support. Initial investigations show that the students who did engage had many of the same mathematical problems as those who did not engage but were willing to seek help either on their own or with a group of friends.

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