

Assisting Adult Learners within a Maths Learning Centre

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DIT Students' Maths Learning Centre is a relatively new initiative, having been in existence for just over two years. The centre aims to provide mathematical support in a relaxed, non-judgemental atmosphere to any DIT student whose programme contains a mathematical element.

For the past two years, about a fifth of the students who attended the centre were adult learners, falling into three specific categories: full-time mature students, part-time students and apprentices. While these students display many characteristics in common with traditional learners, each group faces additional challenges. Because many mature students have not studied maths in some time, they often need specific help revising basic topics at the start of the year in order to cope. For part-time students, time is of the essence, and so they often find it difficult to attend drop-in sessions, tending instead to avail of our e-learning resources. Apprentices spend ten weeks in DIT, twice, during the duration of their four-year apprenticeship, meaning their infrequent encounters with formal maths are sometimes baffling to them.

In this paper, we look in detail at the challenges facing each category of adult learner within DIT and how the Maths Learning Centre is striving to assist them to overcome these challenges.

1. Introduction

The Students' Maths Learning Centre (SMLC) in Dublin Institute of Technology (DIT) is a relatively new initiative, which has been in existence for just over two years. The primary aim of the centre is to provide additional mathematical support in a relaxed, non-judgemental environment to any DIT student whose programme contains a mathematical element. The centre offers support in two main formats: one-to-one tuition through the form of drop-in sessions, and online support through the use of e-learning resources in WebCT and a general website (Ní Fhloinn, 2007). All of the services offered by the centre are free-of-charge.

A significant proportion of the students who use the SMLC could be classified as adult learners, from a variety of different backgrounds. While these students have much in common with the rest of the student body as regards potential difficulties with mathematics, they often face several additional challenges. For the purposes of this paper, we have divided adult learners into three distinct categories: full-time mature students, part-time students and apprentices. In Ireland, a mature student is generally considered to be anyone who is 23 years of age or older on 1st January of the year that

they begin their course (CAO, 2007). We consider part-time students and apprentices of any age to be adult learners.

In this paper, we will look in detail at the specific mathematical issues that may arise for each type of adult learner, and mention some of the ways in which the SMLC is attempting to help these students, along with a number of initiatives that it is hoped to implement in the coming years. We begin by considering the number of students in question.

1.1 Number of Adult Learners Attending the SMLC

During the academic year 2005-2006, approximately one fifth of the students attending the SMLC drop-in sessions were adult learners. This amounted to a total of about one hundred students. The figures for 2006-2007 are as of yet incomplete, as three weeks of drop-in sessions remain at time of writing, but it would appear that the final number will be of the same order of magnitude as the previous year. The exact breakdown of the figures to date can be seen in Table 1.

Table 1: Number of adult learners who attended the SMLC drop-in sessions between September and May, during the last two academic years. (Note: 2006-2007 figures are incomplete, as they only include up to 11th May 2007)

Student Category	Number Registered with SMLC 2005-2006	Number Registered with SMLC 2006-2007
Mature (Full-time)	48	57
Part-time	20	19
Apprentice	24	17
Total	92	93

It is clear that the largest percentage of adult learners attending fall into the category of mature, full-time students. This is to be expected, due to the nature of part-time study and the difficulties for such students in attending any additional support services, as will be discussed in more detail below. In addition, apprentices do not belong to a faculty that directly supports the SMLC and as such, no specific efforts can be made to inform them of the service, which has a direct impact on the numbers attending the SMLC.

2. Mature students (full-time)

As the largest group of adult learners attending the SMLC are full-time mature students, the most observations can be made about students in this category. Most of the mature, full-time students attending the SMLC share a number of characteristics in common that distinguish them as a group from the rest of the student body. We will now look at each of these traits in detail, and where relevant, mention how the SMLC is working with mature students to overcome any issues encountered.

2.1. Highly Motivated

Firstly, many mature students are highly motivated and eager to learn, with a definite idea of what it is that they wish to achieve from their university programme. Because they view the acquisition of knowledge as more than simply a requirement to pass an examination, they prefer to know the origins of what they are learning, rather than simply be given a general method to follow.

This manifests itself most clearly in their reaction to the revision handouts available in the SMLC, which are open access resources produced by the online Mathcentre collaboration (<http://www.mathcentre.ac.uk/>) between the Universities of Loughborough, Leeds and Coventry, the Educational Broadcast Services Trust and UK Learning and Teaching Support Networks. They consist of two main types of notes: the “Engineering Maths First Aid Kit”, which is a series of two-page summaries on various important topics from first-year maths, including examples, exercises and solutions; and the “Teach Yourself Workbooks”, which are generally ten-twelve pages in length and cover similar topics in far greater detail. For the most part, students entering directly from second-level gravitate almost exclusively towards the “First Aid Kit” notes; however, almost all mature students prefer the “Teach Yourself Workbooks” (while also taking a copy of the summaries, in case they contain additional information). Their enthusiasm and motivation are often inspiring to observe and it is an easy job for the SMLC advisors to provide such students with additional information to supplement their learning in this way.

2.2. Poor Self-Belief

A second characteristic that numerous mature students share is low self-confidence in their own abilities, mathematical in this instance. Interestingly, this has been observed even in mature students who have previously achieved good results in mathematics, and so, does not appear to solely relate to poor performance in the past.

In general, mature students tend to gravely underestimate their own capabilities in regard to mathematics. This is partly due to the fact that it may have been some time since they last sat an exam in mathematics and so, are less able to judge what the required standard will be. Thus, the SMLC encourages mature students to work through past exam papers, timing themselves per question, so that they become used to the format and working under time pressure. Having successfully completed several such papers, their confidence tends to increase slightly, although generally speaking, it seems to take a good result in an exam to convince them of their abilities to cope with mathematics at third level.

2.3. Seek Help Sooner

Mature students attend the drop-in sessions earlier than any other student group, with some attending the very first day of lectures. This is reflected in the figures for mid-way through the semester, which always show a far larger percentage of mature students attending than the final figures reflect. For this reason, the SMLC offers drop-in sessions from the first day of term, as this can be a critical period for mature students. One student, who attended after her first lecture in Statistics, said:

“You have changed my life today. I came here thinking I had made the biggest mistake of my life by returning to college, because I didn’t understand anything in that lecture, but now I feel like I can really do this!”

Because the drop-in sessions are quieter early in the year, SMLC advisors are able to spend more time with mature students, who often simply need some reassurance at this time.

2.4. Difficulty Prioritising Material

Another characteristic observed in many mature students attending drop-in sessions is that they have a tendency to spend too much time on insignificant details of lectures, fearing that if they do not understand everything, they cannot progress. While it is commendable that they wish to understand background material, when carried to an extreme this results in some mature students being swamped by seemingly insurmountable workloads. This leads to them feeling under enormous time pressure as a result, as there is insufficient time to learn at this level in all their courses. One mature full-time student said (in week three of the first semester):

“Other students in my class are off in the pub every evening, and sometimes even during the day! I’m at every one of my lectures and in the library studying every evening, and I still don’t know everything – I just don’t understand how they find the time.”

This comment clearly conveys the frustration and concern of mature students who are attempting to fully understand *everything* mentioned in class.

2.5 Rusty on Basic Principles

More so than other students, mature students often need specific refresher sessions on basic mathematical concepts, as it may have been some time since they last studied maths. Currently, due to lack of resources, the SMLC does not run actual revisions courses for mature students, although these are very successful in other maths learning centres around the country. We are hoping to introduce these in the near future as a more efficient way of revising the necessary mathematical concepts to cope with first-year maths courses. A further advantage of such courses would be that mature students would see that they are not alone and that many others have similar difficulties to themselves in these areas.

3. Part-time students

Of the three groups of adult learners identified in this paper, it is about the part-time students that we know the least. However, we have gathered below the information gleaned from those part-time students who do attend the SMLC drop-in sessions, and from email contact with other part-time students.

3.1 Shortage of Time

Many part-time students in DIT are in full-time employment, and trying to juggle work and study. In a recent study in DIT, only 4.9% of more than three hundred part-time

students interviewed identified themselves as “unemployed”, and the majority of the part-time students were working a forty-hour week (Long, 2005).

The SMLC drop-in sessions are arranged so that, three evenings a week, the sessions run until 7pm, meaning that part-time students could attend for up to an hour and a half after work, depending on their commute to DIT. However, it is relatively rare that they can attend drop-in sessions. It is difficult to see how this situation could be improved, given that, as well as many of these students working full-time, they also attend lectures three evenings a week, from 7-10, and when questioned, suggested that it was unlikely that they would attend a fourth evening for drop-in sessions. Many speak of the intense pressure they feel while trying to juggle work and study, and of the constant demands on their time.

3.2 Highly Organised

When they attend a drop-in session, part-time students tend to be highly organised, as they want to make the most possible use of their time there. They usually have specific questions highlighted for extra help, having already worked through their class notes and tutorial sheets. They often cover several topics in one session. As mentioned earlier, the SMLC has numerous extra revision notes and workbooks, which part-time students often take away with them to work on in their own time.

3.3 Use of Online Resources

It seems probable that far more part-time students are using WebCT notes than are using drop-in sessions, as these would seem to be more suited to their lifestyle, given that they can be accessed at any time, from outside the campus. Almost 1100 students made significant use (where ten or more hits is considered significant) of the SMLC WebCT notes last year. Unfortunately, we cannot isolate specific class groups within this system and so are unable to ascertain the exact usage by part-time students. However, a number of these students have contacted the SMLC by email to request clarification of a point in the revision notes or advice on the best notes to cover a given topic, and so it is clear that a certain portion are using the online resources. Ideally, in the future, the SMLC will further develop these online notes, along with additional self-tests, to allow students to assess their own progress, even if they cannot attend drop-in sessions.

3.4 Lack of Information

Informing part-time students about the existence of the service is also a particular challenge, as each part-time programme is dealt with by its own department, rather than having a centralised system. Although each student receives a new student email address while in DIT, part-time students are less inclined to use these addresses, as many continue to use their work or home email addressees instead. They spend less time around the campus and so are less exposed to posters on noticeboards (one of the SMLC’s most successful means of informing students about the service). As a result, many part-time students are unaware both of the existence of support services and of the fact that part-time students are equally entitled to make use of these services as full-

time students (Long, 2005). The SMLC has prepared a special information leaflet for part-time students and sent this to the lecturers on part-time students in an attempt to inform more students of our existence, but more remains to be done in this field.

4. Apprentices

In Ireland, there is a Statutory Apprenticeship system, organised by FÁS (the National Training and Employment Authority) in conjunction with the Department of Education and Science, employers and unions (FÁS, 2007). The apprentice system is standards-based, meaning that there is a structured training programme that must be undertaken by apprentices and that certain pre-defined standards must be reached in order for apprentices to qualify in their chosen trade. Each apprenticeship lasts for four years, and is divided into seven phases, of which phase two, four and six are spent “off-the-job”, in full-time skills training and related education. Dublin Institute of Technology deals with apprentices of all types during phases four and six, both of which are ten weeks long. The apprentices study a range of subjects relevant to their trade, including maths, before sitting an exam at the end of the ten weeks. This exam consists of ten questions, three of which are mathematical, and the apprentice must get seven questions correct to pass the exam.

The majority of the apprentices attending the SMLC are carpenters/joiners, fitters, or electricians. Because these students are in a faculty that is not involved with the SMLC, they are not specifically targeted through any of the advertising or information campaigns run by the SMLC to inform students of our existence. Instead, most apprentices attend having seen posters on noticeboards around the campus; they are in lectures until 5pm each evening, and so come along to the evening sessions. However, as there exists no specific funding for apprentices in the SMLC, it is not possible to develop particular support services directed at these students. Because each phase in DIT only lasts for ten weeks, three different cohorts are dealt with per academic year. As a result, apprentices face exams at entirely different times from other students, and so do not benefit from the extra sessions run by the SMLC prior to end-of-semester exams. It is hoped in the near future that greater funding will become available to allow us to develop certain services tailored for apprentices.

4.1 Irrelevance of Maths

Many apprentices feel that maths is highly irrelevant to them in their future careers, even though the mathematical problems they are expected to solve appear to be very well grounded in relevant areas, far more so than for other student groups. However, the fact that the apprentices have already spent some time working “on-the-job” means that they are able to assert with authority that none of these mathematical approaches are used in practice, with estimation based on prior experience seeming to prevail in most situations! It is particularly difficult to convince such students that the mathematical techniques they are learning could lead to more efficient work practices when they finish their apprenticeship.

4.2 Problems with Independent Learning

It has been observed that the apprentices attending the centre have particular difficulties with “independent learning”, which is strongly encouraged in the SMLC. This means that, rather than have an advisor sit with the student for the duration of their time in the centre, they are given ten-fifteen minutes’ tuition, and then encouraged to attempt some questions themselves, or read a relevant example from a textbook or worksheet. The aim of this approach is to increase the confidence of students in their own ability to study mathematics, through the use of carefully selected questions.

However, apprentices tend to be more resistant to this form of learning, needing more constant one-to-one attention; they rarely continue with work unless closely supervised. This is most likely due to the fact that they have far less experience of independent work than other students, and also that they tend to have major problems with some basic mathematical concepts, such as cancellation, brackets, transposition of formulae, and comprehension of trigonometric ratios, meaning that they are easily baffled during a routine question. As a result, SMLC advisors spend a considerable amount of time revising basic topics with apprentices in order to give them a better grounding from which to begin a new question.

4.3 Difficulty Laying out Work

One observation from the drop-in sessions is that many of the apprentices attending have little concept of how to lay out their mathematical work in a clear, logical manner. Calculations may be written all on one line, or not in the order in which they have been done. As well as making it more difficult for an examiner to correct their work, it is also harder for them to decipher what they have done by the end of the question.

In an SMLC drop-in session, it is possible for an advisor to spend time with the student explaining the importance of laying out work clearly, and using the rule that every time a new calculation is done, a new line must be used. By close observation of the student at work, much progress can be made in this area.

4.4 Mathematical Language

The use of mathematical language can be particularly off-putting to many of the apprentices, meaning that many traditional textbooks are unsuitable if they require additional support. For example, a large number have difficulty with transposition of formulae: however, the introduction of the simple rule of “opposite side, opposite thing” led to a breakthrough for many students, who now follow the fact that if they move a number or letter to the other side of the equals sign, they must do the “opposite” thing (or operation) to it. Therefore, by trying to avoid language that seems obscure to the apprentices, SMLC advisors attempt to make mathematical operations more understandable for the students.

5. Conclusion

Approximately one hundred adult learners use the SMLC drop-in sessions during the academic year, with many more making use of online support. These students have particular needs, in addition to those of “traditional entrants”, as identified in this paper.

With its current resources, the SMLC is striving to help these students to overcome their mathematical difficulties, but we hope to implement several further support systems in the coming years, if funding allows.

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