

For dispelling the fear of mathematics through respect for the learning of individuals

Overview of contribution and relevance

Over the past decade I have taught a preparatory mathematics subject to students who do not have a background in mathematics. These students have a profound fear of mathematics and are required to complete this course as part of their degree. This fear of mathematics gives many students a feeling of inadequacy and severely hinders their ability to learn. The poor self esteem felt by these students not only affects their performance in their mathematics course but has profound effects on their overall university experience. I have developed approaches to teaching which have been extremely well received by my students, my peers and have been recognized as outstanding by the Faculty. As many students enter preparatory mathematics with strong reservations about mathematics, I feel that it is just as important to instil a feeling of confidence and self belief about mathematics as it is to improve basic mathematical abilities.

Regional universities serve the needs of a distinctive student demographic with diverse academic histories and backgrounds (rural, mature age, indigenous backgrounds and first time participants in the tertiary education sector). As universities accept students from such varied backgrounds we must be prepared to adapt our courses and teaching styles to match the constantly changing student intake. This is particularly relevant to preparatory mathematics whose cohort of students come from varied mathematical backgrounds. JCU identifies the importance of increasing tertiary participation rates and preparatory mathematics is important in this, as it is vital in supplying the basic mathematical skills needed for numerous degrees across the university. The problem with providing these basic skills also occurs at a national level, where the ability of students entering first year universities has decreased significantly over the past decade. This problem has generated significant discussion on strategies to handle the increasing "gap" between high school and university mathematics and will be vital over the next decade as we attempt to understand the type of student entering the tertiary sector.

Criterion 4: Respect and support for the development of students as individuals

Preparatory mathematics is dominated by students with very little mathematical preparation and there are many students who suffer from a severe lack of confidence. Hence building confidence and raising self esteem is the basis behind the majority of my teaching strategies and this is achieved through building trust in the lecturer and themselves. All decisions I make are driven by what I believe is best for the student. It is important to get to know the students and their needs and this can only be done through a genuine open door policy. I also believe that is important to handle all aspects of the course personally, including attending all tutorials, marking all assessment and responding to all emails. Minimising stress on the students is also paramount and this is achieved by having regular assessment which is tapered in difficulty in order to build student confidence.

D'Arcy was great, he was very helpful and understanding to me when I had some personal issues earlier in the semester. He made my uni life a lot less stressful. (2000)

D'Arcy was particularly helpful when I had trouble with this subject, there was genuine concern and care. (2005)

Developing Rapport:

In order to develop a good rapport with my students I must get to know them as individuals. Preparatory Mathematics typically has 200 students and, although this is a time consuming job, I believe that learning names is of utmost importance. As I attend all of the tutorials I find it easy to interact with the students in a one to one situation and actually get to know and understand them. Attending tutorials also allows me to mentor any tutors that I am using in my subject. The rapport that I have developed with my classes is evidenced by the student evaluations for this subject, conducted on 6 separate occasions where 57% of the students responded that my "*ability to develop good rapport*" was "outstanding", which is a record level of success. I feel that I develop a very good rapport with my students because they know that I genuinely care about them as people.

The lecturer was outstanding, he took the time to learn everyone's name. I appreciated it as did the rest of the class. (2001)

He is extremely knowledgeable, kind and actually tries to get to know you. Easily the best lecturer I have. (2007)

It is his enthusiasm for his teaching and a genuine interest in the success of his students that promotes the required environment and motivation for the students. (Peer review: Dr Ronald White, Senior lecturer, MPIT)

Creating a Safe learning Environment:

Many students entering Preparatory Mathematics have been told all their lives that they are no good at mathematics. They often have low self esteem as their problems with mathematics make them feel inadequate. In order to begin to learn, the students must feel that they are in a safe learning environment where they can ask questions without the fear of being ridiculed. This is particularly important in this subject as many students are embarrassed by their maths fears and will hide their work rather than allow the lecturer to see that they have made a mistake. Hence the priority must be to get the students to a point where they feel it is safe to try to attempt their maths, as it is often by making mistakes that they truly learn. I make it clear that almost all people are capable of becoming proficient at mathematics and I continually stress that there is no such thing as a “silly question”. It is this building of trust between the lecturer and the students that is vital in creating a good learning environment. Over all student evaluations conducted, 54 % of the students responded that my “interest in assisting students to learn” was outstanding. Furthermore, 70% of students responded that “the teacher’s attitude” was outstanding.

The first step in fostering independence is to give the students confidence, and D'Arcy's methods in giving feedback certainly foster this. (Peer review: Dr Shaun Belward, Senior Lecturer)

Always a pleasure to come to class. Always a happy, easy working learning environment. He made it fun to learn and easy to attend maths. (2007)

Excellent delivery of context in a manner that removed much of the anxiety associated with the study of mathematics. If only more mathematics teachers adopted the same approach. I hope to use many of D'Arcy's techniques when I end up teaching. (2006)

I had a terrible fear of mathematics when I enrolled, as an elective. I now do not have that fear any more. My lecturer understood my fear and was fantastic with me about it all. (2007)

Valuing Student Time:

I strongly believe that a student’s time must be valued and this is achieved by having a genuine open door policy. I make it very clear that my job is to assist them wherever possible and I strongly encourage students to come and ask questions. I also make it clear that I value their time and am aware that five minutes of my time may save three or four hours of unnecessary stress for the student involved. As current students are accustomed to receiving instant responses to text messaging, I respond to any emails and phone messages immediately. This has proven to be very successful as the students are aware that you genuinely value their time. I am actually pleased to see students at my door, as this means I have succeeded at getting the students actively involved in facing their problems. It is here that you learn what their individual needs are. Over all six student evaluations, 55% of students responded that my availability was “outstanding” but more importantly, 67% responded that my “willingness to assist students” was in the “outstanding” category.

I can honestly say that I am overwhelmed with D'Arcy Mullamphy's teaching abilities. He is a very approachable person that will explain things 101 times if required. (2000)

Student Evaluations:

My Student Feedback about Teaching results have been excellent over this time period and have always been a long way above the university average.

Table 5: Summary of my averages over all questions on student evaluations

Semester	Completely Unacceptable	Not really Acceptable	Acceptable	More than Acceptable	Outstanding
Sem1, 2004	0.0%	3.0%	23.6%	36.5%	36.8%
Sem2, 2004	0.0%	0.1%	10.2%	36.6%	53.0%
Sem1, 2005	0.0%	0.7%	14.5%	38.2%	46.6%
Sem2, 2005	0.0%	0.2%	7.6%	38.2%	53.2%
Sem1, 2006	0.2%	1.1%	14.9%	38.3%	45.9%
Sem 1, 2007	0.1%	0.5%	11.2%	35.2%	53.0%
My Average	0%	1.0%	13.7%	37.2%	48.1%
<i>Uni Average</i>	<i>1.0%</i>	<i>5.6%</i>	<i>31.4%</i>	<i>39.0%</i>	<i>23.1%</i>

There is also further excellent student survey evidence dating back to 1999 which is too large to incorporate in this document. There are an enormous number of very positive student comments over the last decade and of the 80 responses on the most recent student evaluation, over 93% of the comments are favourable. The comments included in this application are typical of the vast majority of student comments I have received.

The lecturer made it a joy to learn, coming from someone who has always hated maths. (2004)

I just want to say thanks heaps. I never thought I would look at a math book and understand what I'm looking at. Math isn't as bad as I thought it was. (2008)

Contribution to student learning (Criterion 4)

I have taught all or part of Preparatory Mathematics over the last decade, and over this period student numbers have risen from 35 students in 1996 to over 300 students in 2004. This statistic is very pleasing as mathematics is now being seen as a viable alternative to students who previously never consider mathematics as part of their degree. Although this rise in numbers cannot be fully attributed to quality teaching I do believe that the quality of my teaching played a significant part in improved student enrolments and retention.

The students who have progressed from preparatory mathematics into first year statistics in the following semester have performed well overall with 94% of my students in 2007 successfully completing the statistics course. This pass rate is far superior to that of the overall class which had a pass rate of 69%. The average mark obtained by my students was at the credit level which was 4% higher than the overall class average for the statistics course. This is very satisfying to see students who have a genuine fear of mathematics not only succeed in my course, but use this new found confidence to succeed in subsequent mathematics courses.

D'Arcy is an invaluable asset in the current climate where retention of students is a big issue. (Peer review: Dr Shaun Belward Senior Lecturer, MPIT)

Criterion 1: Approaches to learning and teaching support that influence, motivate and inspire students to learn

Building confidence:

Initially I make it very clear that no prior knowledge is assumed and that I approach all topics from the very basics. This is very good at building confidence, which is the first step in getting the students to attempt new problems on their own. Assessment is tapered in difficulty so that students may have some degree of success early in the course and this degree of difficulty is increased as the course progresses. I return marked assessment very quickly, which is an onerous task, but is vital in building confidence and reducing stress on the students. Immediate reinforcement is also obtained by providing theory to the class and then immediately requiring the class to attempt related tutorial problems during the lecture. This has proven to be a very successful technique and forms a strong link between lecture and tutorial material. Students learn in different ways and hence a varied approach to my teaching is needed. I lecture with a mixture of powerpoint and whiteboard and I am currently incorporating screencasts into my lectures. The flexibility of screencasting and the ongoing use of online quizzes will be very beneficial to students who prefer the flexibility of working at their own pace in their own time.

He is certainly outstanding in his ability to encourage students, especially those who are weak at mathematics or have a phobia about the subject. (Peer review: Associate Professor Lance Bode)

I feel much more confident about maths, not only in this class but across my other classes - and Darcy Mullamphy's enthusiasm and positive attitude contribute greatly towards that. (2006)

D'Arcy completely invigorates and encourages his students. His teaching style is second to none and has inspired me to investigate the option of further maths. (2002)

D'Arcy is a pleasure to have as my teacher. He is generous with his time and has made me as a person respect maths more than ever before. At the beginning I felt hopeless but now I feel confident with maths. (2007)

Generating student engagement

As students do not all learn in the same manner, I provide formal lecture notes electronically to students prior to lectures as well as a more "nuts and bolts" approach delivered during the lecture. This is particularly important to students who have poor mathematical backgrounds and who find a "nuts and bolts" approach far easier to understand. I strongly believe in "authentic learning approaches" and try to include as many "real world" examples as possible. With 41% of JCU students coming from rural backgrounds I have found

Citation for Outstanding Contribution to Student Learning 2008: Dr D'Arcy Mullamphy (JCU)

the inclusion of local topics to be very successful in relating to the students. I also find that the inclusion of examples involving finances is well received by the large cohort of mature age students in the class, as they see the direct relevance of mathematics to their own lives.

D'Arcy is an extraordinary lecturer who understands and reads the class capability very well. Exceptional in providing clear and concise material. His ability to simplify even the hardest areas of the course shows how valuable his contribution to teaching is. (2007)

With his down to earth language he makes maths easy to understand. His explanations during lectures were clear, concise, as well as entertaining. (2004)

I believe that student engagement is the primary reason for my success in teaching unmotivated students. I feel that the use of "theatre" in my lectures is very helpful in keeping a group of non-maths savvy students engaged and interested. This is very important to catch, and maintain, the attention of the students in order to keep them motivated. I genuinely love teaching mathematics and this is obvious to the students and seems to "rub off" on them. Over all student evaluations, 44% of the students responded that the teacher's ability to generate interest was "outstanding", which is a very good result in a class of students who predominantly hate mathematics.

His energy motivates the students and his teaching ability keeps students motivated. (2005)

The lecturer's infectious enthusiasm for this subject made for an enjoyable and productive learning experience. (2007)

Fantastic. The lecturer made a hard and quite boring subject into a challenging and exciting experience. (2001)

He is patient and able to explain complex issues. I cannot praise his teaching enough. (2007)

For you are the reason why people become such a success in their future careers. (2000)

The lecturer's enthusiasm and teaching style excited interest in a subject I had no interest in. I feel I understand the subject rather than just know it. (2007)

Contribution to student learning (Criterion 1)

I have a genuine interest and enthusiasm for teaching and education and I am currently moving my main area of research from atomic physics into the field of mathematics education. I recently published an education paper in the ANZIAM journal discussing the perceived drop in mathematical abilities of first year university students, as well as being part of a small group who received a \$30,000 internal grant to incorporate screencasting in their lectures. I have always received very high student evaluations, excellent student comments and have won the school teaching award on one of only three occasions it has been granted, as well as receiving four letters from the PVC of Science and Engineering for outstanding student survey responses. I am very actively involved with local high schools and have spoken at local high school maths conferences as well as organising JCU's contribution to these conferences. I initiated meetings between JCU mathematics, education staff and high school teachers in an effort to bridge the gap between secondary and tertiary mathematics. I am on the Queensland Association of Mathematics Teachers committee, the school teaching committee as well as working on teaching quality for the strategic plan for MPIT (Maths, Physics and IT). I am also the main JCU person behind the teaching of first year mathematics into high schools in North Queensland, a program which has run for four years and has been extremely well received at the high schools as well as school and faculty level at JCU.

He has a positive attitude and encourages the students to believe that they can succeed in the subject. The students respond well to D'Arcy's easy-going nature and this relationship removes the preconceived idea, held by many high school students, that Uni staff are remote and unapproachable. (L.Meehan, teacher, Ryan School)

In conclusion, over the last decade I have dealt with an enormous number of students with a profound fear of mathematics. I have worked, and succeeded, in creating a safe learning environment for these students through the building of their own self confidence. This is achieved through building trust with the students and getting to know them as individuals. I firmly believe that my job is not just to teach mathematics, but to allay the students' fear of mathematics and come to enjoy a subject they had previously hated. From a teaching perspective, to see withdrawn and tentative students come out of their shell, take a leap of faith and succeed in an area that they had previously despised is very satisfying.

I have had a psychological problem with mathematics for many years. D'Arcy ...helped dispel a lot of my fears. At last I am not afraid of maths any more. Now I would like to be good at it.