Mathematics Learning Centre

Annual Report 2006

STUDENT SERVICES

The University of Sydney
STAFF OF THE MATHEMATICS LEARNING CENTRE 2006

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Figure 1: Student hours of attendance 1997 to 2006
Executive Summary

In 1984, the University of Sydney established a Mathematics Learning Centre to provide academic support for undergraduate students who, because of their background in mathematics, are considered academically “at risk” when studying mathematics or mathematics-based courses.

The Mathematics Learning Centre is a unit of Student Services.

The operational goals of the Mathematics Learning Centre are:

*To provide a comprehensive range of academic support programs in mathematics and statistics to address the development of students' learning in mathematics and statistics;*

*To conduct research and development projects in the fields of mathematics and student learning of mathematics and statistics and disseminate outcomes through publications and conference presentations.*

By pursuing these operational goals the Mathematics Learning Centre contributes to the University of Sydney Strategic Plan.

A wide range of teaching programs have been developed to meet the needs of those undergraduate students who enter the University without the mathematical knowledge, skills and confidence that are needed for studying first level mathematics or statistics units of study at university. Students attend the Centre’s programs voluntarily.

Programs and resources available to students in 2006 included:

- Bridging courses in mathematics and statistics (fee paying)
- A Drop-in Centre where students can receive individual assistance
- Supplementary tutorials and lectures
- Web-based resources for self-paced study

The Mathematics Learning Centre provides academic support for and oversees the University Preparation Courses in mathematics and acts as faculty liaison in mathematics for the University of Sydney Foundation Program.

The primary purpose of the Mathematics Learning Centre is the support of eligible undergraduate students. During 2004, it was determined that postgraduate student groups would be eligible for assistance only with funding from the appropriate Faculty.

Staff profile 2006

The number of Mathematics Learning Centre staff in 2006 in continuing positions was unchanged with 2.5 full-time equivalent academic staff (2.5 Senior Lecturers), and one 0.57 administrative staff member. A 0.4 Associate Lecturer was employed for Semester 1 to
partially replace a staff member on Special Study Leave. Ten casual teaching staff were employed during 2006.

The Mathematics Learning Centre Week

A description of a busy week during Semester will give the reader a snapshot of the teaching activities of the Mathematics Learning Centre.

Week 4 was the fourth busiest week in Semester 1 with the Drop-in Centre attendance being 288 student hours (student hours = no. of students x no. of hours in attendance). The mean attendance for the Drop-in Centre for Semester 1 was 226 student hours. During Week 4, the Drop-in Centre was open for 35 hours during which time 152 students visited with 55 students making multiple visits. There were a total of 245 visits with each visit lasting approximately 1 hour 10 minutes. There were nine supplementary tutorials run in this week covering seven units of study in mathematics and statistics. The supplementary tutorials were attended by 75 students in total. Two lunchtime lectures in calculus were given, which were attended by, on average, 16.5 students. In addition, in a typical week, students frequently seek advice from the academic staff. There are many telephone calls requesting advice of a varying nature from within the University or externally. These frequently require the attention of an academic staff member.

Student attendance

Since 2004, we have had access to the HSC data of commencing students. These data include information on the level of mathematics studied for the HSC and the mark attained by the student. We used these data in 2006 to further refine our targeting strategies for the Centre’s programs.

There was a 18% increase in the number of students enrolled in bridging courses in 2006 compared to 2005. There was a 2.5% increase in the number of students registering for the Drop-in Centre compared to 2005. Table 1 below summaries the student enrolments for the years 2003 to 2006.

<table>
<thead>
<tr>
<th>Source</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridging courses</td>
<td>227</td>
<td>185</td>
<td>211</td>
<td>250</td>
</tr>
<tr>
<td>University Preparation Course</td>
<td>126</td>
<td>100</td>
<td>90</td>
<td>89</td>
</tr>
<tr>
<td>Drop-in Centre</td>
<td>690</td>
<td>628*</td>
<td>608*</td>
<td>623*</td>
</tr>
</tbody>
</table>

*Eligibility criteria tightened by using HSC data to identify and target students

In 2006 there was an 18.5% increase in the total student hours of attendance from all sources compared to 2005. Drop-in Centre attendance increase by 27% in 2006 compared to 2005 while supplementary tutorial and lecture attendance decreased by about 3% compared to
2005. Table 2 gives a comparison of student use of the Centre’s programs for the years 2003 to 2006.

Table 2: Student hours of attendance for the years 2003 to 2006

<table>
<thead>
<tr>
<th>Student hours attendance all sources</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drop-in Centre</td>
<td>5381</td>
<td>4793</td>
<td>4783</td>
<td>6081</td>
</tr>
<tr>
<td>Tutorial classes</td>
<td>1426</td>
<td>1577</td>
<td>1887</td>
<td>1826</td>
</tr>
<tr>
<td>Total</td>
<td>6807</td>
<td>6370</td>
<td>6670</td>
<td>7907</td>
</tr>
</tbody>
</table>

Student Profile 2006

Undergraduate students made up 90.6% of our total enrolments (an increase from 87.5% in 2005). There were more female students than male students in our enrolments – 59% compared to 41%, a similar ratio to 2005. The percentage of students enrolled in the Faculty of Science was 41.5% compared to 42.7% in 2005. The percentage of students enrolled in the Faculty of Arts was 17% compared to 12.2% in 2005. The percentage of students enrolled in the Faculty of Economics and Business stayed the same at 13%. There was a decrease in the percentage of students in the 17 to 20 year age group from 56.3% in 2005 to 54.3% in 2006. In 2006, 29.9% of the Centre’s students spoke a language other than English as their first language compared to 25% in 2005. International fee paying students made up about 11% of the Centre’s enrolments compared to 13% in 2005. International postgraduate students for the Faculty of Economics and Business were catered for in mathematics workshops on specific topics relevant to their disciplines. Seven workshops were organised in 2006 to meet the needs of these students.

New teaching projects in 2006

- A supplementary tutorial for MATH1015 was developed to support students in this statistics unit of study. This initiative was in response to a need identified from our student surveys.
- Supplementary tutorials for the new units of study MATH1111, MATH1014 were developed and delivered in 2006.
- A short tutorial program was developed for students in the advanced statistics unit of study PSYC3010. This tutorial program ran for 8 weeks during Semester 2 and was available to those students who had previously attended the Centre’s program for PSYC2012.

Highlights of research and scholarship in 2006

- Dr Sue Gordon was reappointed in the position of Honorary Adjunct in the Faculty of Education and Social Work. The title was conferred March 2006 to March 2007. Dr Gordon has had continuous honorary appointments in the Faculty since March 2003.
• Dr Sue Gordon was appointed principal supervisor of a PhD candidate, Ms Jen Tindale, in the Faculty of Education and Social Work. The Faculty provides funding for her supervision. Ms Tindale commenced her candidature March 2006 and was awarded an APA, one of 4 students in the Faculty to achieve this award.

• Dr Phillips, in conjunction with Dr D.J. Ivers from the School of Mathematics and Statistics, designed a scheme for investigating progressively more detailed models of thermal convection in a conducting fluid sphere with anisotropic thermal diffusion. The scheme was critical to verify progressively more detailed models with limited known related results of past studies.

• Dr Phillips conducted a study of solutions of the basic state momentum and heat equation. A set of exact analytic solutions was derived to solve the basic state momentum and heat equation in a conducting sphere with stationary basic state velocity. These exact solutions are critical for providing the starting point for linear stability analysis of thermal convection and magneto-convection.

• Dr Sue Gordon continued her collaborative research project (with Petocz and Reid) into international educators’ ideas on teaching and learning statistics as a service course at university. An invited paper on the project was published in the proceedings of the 7th International Conference on Teaching Statistics (ICOTS7) Salvador, Bahia, Brazil, July 2006. A journal paper is in press in the International Journal for the Scholarship of Teaching & Learning. A further paper on the findings was presented at the Australian Association for Research in Education (AARE) Annual International Education Research Conference, Adelaide, November 2006.

• Dr Sue Gordon and Ms Jackie Nicholas continued their analysis of case studies on university teachers’ perceptions about memorising in teaching and learning mathematics and statistics.

• Dr Sue Gordon commenced a collaborative research project (with Schuck and Buchanan) into teaching quality. A conference paper was presented at the 14th Improving Student Learning Symposium, Bath, September 2006. A journal paper is in preparation.

• Dr Phillips, in conjunction with Dr D.J. Ivers from the School of Mathematics and Statistics, significantly extended the knowledge of the effects of anisotropic thermal diffusion on thermal convection models where the anisotropy is enhanced and diminished in the direction of the rotation axis (modified by the Coriolis force). The influence and effects of anisotropic thermal and viscous diffusion are an important and current topic in the field of magnetohydrodynamics.

• Staff contributed to the reviewing work of research journals and conferences.
1 Overview

1.1 Introduction

In 1984, the University of Sydney established a Mathematics Learning Centre to provide academic support for undergraduate students who, because of their background in mathematics, are considered academically “at risk” when studying mathematics or mathematics-based courses. The Mathematics Learning Centre assists students to develop the mathematical knowledge, skills and confidence that are needed for studying first level mathematics or statistics units of study at university.

In 2003, the Mathematics Learning Centre User Advisory Committee confirmed that the primary function of the Centre was to provide academic support to eligible undergraduate students. During 2004, it was determined that postgraduate student groups would be eligible for assistance only with funding from the appropriate Faculty. A grandfather provision was included in this policy to cover a small group of postgraduate students in the School of Public Health as these students had been supported by the Centre for many years.

1.2 Target groups

Students are eligible to attend the Centre’s programs if they do not have the assumed knowledge in mathematics they need for their first level mathematics or statistics units of study.

The Centre targets students from the following groups:

- People who have not studied the appropriate level of mathematics at school which is assumed for their university studies;
- Mature age students who have not studied mathematics for several years;
- Students from overseas who may find gaps in their mathematical knowledge, or who are not familiar with mathematical terms in English;
- Students whose studies have been interrupted by either illness or accident or some other cause;
- Students from equity groups;
- Anyone who lacks confidence in their ability to learn the mathematics or statistics needed for their first level units of study.

1.3 Initial visit

When a student first visits the Centre, his or her mathematical background is assessed against the assumed knowledge for their units of study. The student is then advised about Mathematics Learning Centre programs that are suitable for his/her needs. Students, who are not considered eligible at this first visit, are referred back to the appropriate teaching staff in their unit of study.
2 Attendance

In 2006, students attending the Centre were enrolled in degree courses in the Faculties of Agriculture, Food and Natural Resources, Arts, Economics and Business, Education and Social Work, Engineering and Information Technologies, Health (Medicine and Pharmacy), and Science.

Information about the Centre’s services is provided to students via posters at enrolment sites, through announcements at orientation programs and at lectures during the first or second week of Semester. In 2006, HSC data of students enrolled in the major mathematics or statistics units of study was used to target eligible students. The students identified as those who did not have the assumed knowledge for their units of study or for whom HSC data was not known, were emailed directly.

Students are asked to fill out a registration form when they first come to the Centre. The students also sign a sheet each time they use the Centre recording the hours spent working at the Centre. However, some students who attended the Centre do not formally register with us, and others forget to record their attendance every time they attend. Therefore, attendance statistics may underestimate the Centre’s use. All attendance in the Centre’s programs is voluntary.

2.1 Summary statistics for 2006

2.1.1 Enrolment and attendance statistics for 2006

Table 3: Number of students all sources for 2006

<table>
<thead>
<tr>
<th>Source</th>
<th>No. of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Preparation Courses</td>
<td>89</td>
</tr>
<tr>
<td>Bridging courses</td>
<td>250</td>
</tr>
<tr>
<td>Drop-in Centre and tutorial and lecture programs</td>
<td>623*</td>
</tr>
</tbody>
</table>

*448 registered students, 175 unregistered students

Table 1: Number of students all sources for the years 2003 to 2006

<table>
<thead>
<tr>
<th>Source</th>
<th>2003</th>
<th>2004</th>
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*Eligibility criteria tightened by using HSC data to identify and target students
Table 2: Student hours of attendance for the years 2003 to 2006

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<td>4783</td>
<td>6081</td>
</tr>
<tr>
<td>Tutorial classes</td>
<td>1426</td>
<td>1577</td>
<td>1887</td>
<td>1826</td>
</tr>
<tr>
<td>Total</td>
<td>6807</td>
<td>6370</td>
<td>6670</td>
<td>7907</td>
</tr>
</tbody>
</table>

Table 4: Attendance data all sources for 2006

<table>
<thead>
<tr>
<th>Daytime Attendance</th>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student hours in classes</td>
<td>1074</td>
<td>752</td>
<td>1826</td>
</tr>
<tr>
<td>Student hours in Drop-in Centre</td>
<td>3569</td>
<td>2361</td>
<td>5930</td>
</tr>
<tr>
<td>Other attendance</td>
<td>139</td>
<td>12</td>
<td>151</td>
</tr>
<tr>
<td>Total student hours attendance</td>
<td>4782</td>
<td>3125</td>
<td>7907</td>
</tr>
</tbody>
</table>

The total student hours of attendance in 2006 was 7907 compared to 6670 in 2005 and 6307 in 2004. This was an increase of 18.5% from 2005, and an increase of 25.4% from 2004. Figure 1 shows the total number of hours of student attendance for ten years from 1997 to 2006. It is difficult to identify the reasons for the yearly variations in attendance. For example, the large increase in demand in 2006 was unpredicted and is not readily explained.

Figure 1: Student hours of attendance 1997 to 2006
Table 5: Percentage of undergraduate and postgraduate registrations of Mathematics Learning Centre for the years 2004 to 2006

<table>
<thead>
<tr>
<th>Degree</th>
<th>Percentage of MLC registered students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2004</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>89.7</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>5.6</td>
</tr>
<tr>
<td>Other</td>
<td>3.6</td>
</tr>
<tr>
<td>Not known</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Table 6: Student enrolment in the Mathematics Learning Centre by faculty

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Percentage of total MLC enrolments</th>
<th>% of university enrolment (2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2004</td>
<td>2005</td>
</tr>
<tr>
<td>Science</td>
<td>48.9</td>
<td>42.7</td>
</tr>
<tr>
<td>Arts</td>
<td>13.5</td>
<td>12.2</td>
</tr>
<tr>
<td>Engineering</td>
<td>8.5</td>
<td>11.5</td>
</tr>
<tr>
<td>Economics and Business</td>
<td>9.0</td>
<td>13.4</td>
</tr>
<tr>
<td>Medicine</td>
<td>2.9</td>
<td>5.8</td>
</tr>
<tr>
<td>Education</td>
<td>4.4</td>
<td>1.5</td>
</tr>
<tr>
<td>Agriculture</td>
<td>4.5</td>
<td>3.8</td>
</tr>
<tr>
<td>Other</td>
<td>8.4</td>
<td>9.5</td>
</tr>
</tbody>
</table>

2.1.2 Gender and age profile

Gender

In 2006, 59.4% of the students attending the Centre were female. Table 7 gives comparative data for the years 2004 to 2006.

Table 7: Percentage of the Mathematics Learning Centre registrations from 2004 to 2006 by gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Percentage of total MLC registered students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2004</td>
</tr>
<tr>
<td>Female</td>
<td>63.3</td>
</tr>
<tr>
<td>Male</td>
<td>36.7</td>
</tr>
</tbody>
</table>
**Age**

The Centre has a sizable population of mature aged students. In 2006, about 45.7% of the Centre’s students were over 21 years in age. This percentage was a slight increase from 43.7% in 2005. A breakdown in age is given in Table 8 together with the total enrolment for the University in those categories. However, it should be noted that as the Centre caters mainly for first year undergraduate students, a direct comparison is inadvisable.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>% of total MLC enrolments</th>
<th>% of total university enrolments (2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-20</td>
<td>56.5</td>
<td>56.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>54.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>35.6</td>
</tr>
<tr>
<td>21-24</td>
<td>19.2</td>
<td>21.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>31.1</td>
</tr>
<tr>
<td>25-29</td>
<td>9.4</td>
<td>10.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14.5</td>
</tr>
<tr>
<td>30+</td>
<td>13.8</td>
<td>11.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18.9</td>
</tr>
<tr>
<td>Not stated</td>
<td>1.1</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.4</td>
</tr>
</tbody>
</table>

2.1.3 Cultural diversity

The Centre has a culturally diverse student population. In 2006, 29.9% of the Centre’s students reported speaking a language other than English as their first language. This percentage increased from 25% in 2005. A three year comparison is given in Table 9.

<table>
<thead>
<tr>
<th>Student characteristic</th>
<th>% of MLC total enrolment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language other than English as first language</td>
<td>2004</td>
</tr>
<tr>
<td></td>
<td>27.0</td>
</tr>
</tbody>
</table>

**International fee paying students**

In 2006, about 11% of the Centre’s students were international fee paying students compared to 13% in 2005. A three year comparison is given in Table 10.
Table 10: Percentage of Centre students who are international fee paying students for years 2004 to 2006

<table>
<thead>
<tr>
<th>Student characteristic</th>
<th>% of MLC total enrolment</th>
</tr>
</thead>
<tbody>
<tr>
<td>International fee paying student</td>
<td>2004</td>
</tr>
<tr>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

The decrease in international fee paying students in 2006 compared to that of 2005 and 2004 corresponds to the decrease in postgraduate students assisted by the Centre. The needs of postgraduate students could not be appropriately accommodated in the Centre’s existing programs. Consultations with the Faculty of Economics and Business were instigated and have resulted in the development of a mathematics workshop program to meet the needs of their postgraduate students. This program was implemented in 2005, and funded by the Faculty. In 2006, seven two hour workshops were held and attended by, on average, 15 students in each. Eighty six percent of the students who attended were postgraduate students and 54.4% were international students.
3  Teaching Activities of the Centre

The Centre provides support for students in the form of lectures, workshops, small group teaching, self paced study and individual assistance in the Drop-in Centre. Students attend the Centre on a voluntary basis and as frequently as they wish.

3.1  Drop-in Centre

Students can attend the Drop-in Centre at any time during opening hours. We have one lecturer available to help students at all times.

The Centre was open this year from 10 am to 5 pm on Monday, Wednesday and Thursday, from 10 am to 3 pm on Friday and from 10 am to 7 pm on Tuesday (7pm close only during teaching weeks), during teaching weeks, stuvac and the examination period. The Centre was closed for two weeks in each of January, July and December. The Centre was open during other university vacation periods on a restricted basis.

In 2006, attendance at the Drop-in Centre accounted for about 78% of total attendance.

The Drop-in Centre is an informal environment where individual assistance is tailored as far as possible to each student’s needs. We aim to develop a learning culture – one where students are expected to understand the mathematics they are studying and learn to think for themselves.

The informality of the Drop-in Centre allows students to meet others with similar difficulties. Students are encouraged to work together, and to explain concepts to each other. Frequently, students who meet in the Centre form groups to study mathematics as well as other subjects. In the past, these study groups have continued into higher years.

Students value the ease of access, the individual assistance and being in an environment with students with similar needs. Some typical responses to the question: The best thing about the individual assistance at the MLC was:-

“My questions can be answered. I’m not just listening to the questions of a larger class.”

“The tutors all gave an in depth and understandable explanation of the topics being studied. This has been extremely helpful, as it has allowed me to fully comprehend the mathematical principles involved in my study.”

“Helping me to identify what it is that holds me back from achieving my best in mathematics.”

“I was able to be shown things until I understood them completely. Also, as there were different teachers each time I came into the MLC, I was able to get a different perspective, which really helped me to learn!”

(Student surveys, 2005)
3.2 Small group tutorials

During 2006, supplementary tutorials were held for students in the following units of study: ECMT1010, ECMT1020, MATH1001/2, MATH1003, MATH1013, MATH1014, MATH1015, MATH1111, PSYC2012, PSYC3010, and PUBH5018.

Students are encouraged to join one of our supplementary tutorials whenever possible, both for reasons of efficiency and because we believe group discussion and co-operative work lead to more effective learning.

The students value the supplementary tutorials as an important opportunity to learn mathematics or statistics and also as a forum for meeting other students with similar difficulties. These points are raised again and again in the student surveys.

In 2006, some of the supplementary tutorials were quite large. Some supplementary tutorials were scheduled at 8 am reflecting the difficulty of finding a tutorial time to suit all interested students.

Snapshot of two supplementary tutorials

Two supplementary tutorials for the unit of study PSYC2012, Statistics and Research Methods for Psychology, ran on Mondays and Wednesdays for 13 weeks during Semester 1. Fourteen students attended at least 7 out of 13 classes. The final mark for eleven of the fourteen students was obtained. Nine students out of the eleven passed with an average mark of 64%.

Of the fourteen students who attended 7 or more classes, three students did not supply any information about the previous level of mathematics studied. Of the eleven students who did supply this information, seven students had studied mathematics up to year 10 or less. One of the seven failed the unit (but was successful on her second attempt in 2007), three students achieved a pass and three students achieved a credit. Two students had studied mathematics until the end of year 11 and both achieved a pass. Two students had studied mathematics previously to the end of year 12, one of these students failed and one achieved a distinction.

The students rated the supplementary tutorial very highly. In a survey administered in these classes attended by 18 students, 12 students returned a survey and 92% of students rated the supplementary tutorial as excellent, the highest category on a five point scale. A typical comment was: “I leave the class each week and feel as though I can do it. It keeps me working hard until the next class. As a mature age student it has been a steep learning curve.”
3. 3  Short lecture courses

Calculus from Scratch

An introductory calculus course, “Calculus from Scratch” was taught in Semester 1. The classes were organised as a response to the large number of students enrolled in the Mathematics for Life Sciences units of study who had not studied calculus before. Students who attended the Mathematics (2 Unit) bridging course were also encouraged to attend to consolidate their knowledge and skills. The class met for 23 hourly sessions at lunchtime with an average of 13 students attending each session. Students were provided with access to lecture notes at the beginning of each week via the internet. Some students who were not able to attend one of the lectures each week due to another class, nevertheless attended every other one and kept abreast of the lectures by using the notes provided on-line.

Calculus lectures for students from the Faculty of Agriculture

In 2006, a series of 20 calculus lectures were organized and taught in Semester 2 for students enrolled in the unit of study Biometry (BIOM1003) in the Faculty of Agriculture, Food and Natural Resources. This initiative was partially funded by the Faculty. The lectures were scheduled for 8 am on Mondays and Thursdays from Week 1 to Week 10. Students who had not studied HSC Mathematics (or a higher level mathematics course for the HSC or equivalent), or who had achieved a result in HSC Mathematics of less than Band 4 (70%) were timetabled and encouraged to attend. Forty two students attended the lectures at least once with, on average, 19 students attending each lecture. Nineteen students attended ten or more lectures.

3. 4  Mathematics workshops

In 2006, a series of workshops were organised and taught for undergraduate and postgraduate students in the Faculty of Economics and Business. These workshops were a joint initiative of the Faculty of Economics and Business and the Mathematics Learning Centre, and funded by the Faculty of Economics and Business. In Semester 1, four workshops were run and were attended by an average of 12 students. In Semester 2, three workshops were run and attended by an average of 20 students. The students rated the workshops highly with an average of 89% rating the workshops in the highest two categories on a five point scale.

3. 5  Self paced study

The staff of the Centre have spent considerable time developing and writing booklets on many topics in mathematics and statistics. Students are encouraged to use these booklets for self-paced study. The number of booklets available in this series is 21, currently selling for $5 + GST to students from the University of Sydney and $8.00 + GST to others. In 2006, a booklet titled ‘The Normal Distribution’ was published and a further five booklets were made
available on the Mathematics Learning Centre website, making a total of fourteen available on-line.

An extensive collection of Mathematics Learning Centre lecture and workshop notes are also available on-line.

Students have access to a range of computer based mathematical materials in the Drop-in Centre. These include commercial software for developing concepts in statistics and calculus and the Computer Algebra System, Mathematica™. Students can also use the Centre’s computers to access their unit of study materials on the internet.

3.6 Consultations

A limited number of individual consultations for a student referred to us from Disability Services was offered in 2006. This student could not be catered for in our regular programs. No students were referred to us from the Koori Centre.

In addition to the formal teaching activities of the Centre, we spend a considerable time advising students about matters concerning assumed knowledge in mathematics and bridging courses. Students who intend to apply or have applied for entry to the University approach us for advice about their preparation for the study of mathematics based courses at university. We provide advice to prospective students about suitable bridging courses by phone and in person via the Bridging Course booth at the University’s information days for prospective students in January and August.

3.7 Bridging courses

The Mathematics Learning Centre organises bridging courses in mathematics and statistics in February each year. Students pay a fee for these courses bringing in a modest income for the Centre.

3.7.1 Mathematics

During February, the Centre, jointly with the School of Mathematics and Statistics, offered Bridging Courses in Mathematics at the Mathematics (2 Unit) and Mathematics Extension 1 (3 Unit) level. The courses ran for 24 hours over 12 working days and a fee of $295 was charged. In 2006, 217 students attended these courses compared to 176 students in 2005. The students are taught in classes of between 15 and 20 students for 2 hours per day and are encouraged to come to the Drop-in Centre for a further two hours where assistance is available.

Responses to student surveys show that students appreciate the small class format which allows them to get to know their fellow students and tutor and believe that the bridging course will help them in their university studies. In 2006, additional mathematical materials were made available for the Mathematics (2 Unit) bridging course students on our website.
3.7.2 Statistics

The Centre again offered its Bridging Course for Statistics course in February 2006. This course ran for eighteen hours over a two-week period and a fee of $230 was charged. Thirty three students, who were enrolling in PSYC2012 Statistics and Research Methods for Psychology, STAT1020 General Statistical Methods or PUBH5018 Introductory Biostatistics for postgraduate students in Public Health, attended this course. The course aims to introduce students to some of the concepts they will study in statistics, to provide a mathematical base for the future study of statistics and to ameliorate the fears students may have about studying statistics.

Again in 2006, parallel courses were taught with students allocated to a stream according to their unit of study enrolment. This allowed for the courses to be more finely tuned to the needs of the students.

The courses were highly rated by the students. In a survey at the end of the courses, over 89% of students surveyed (25 of 28) rated the courses in the two highest of five categories. About 89% of students reported that their confidence in learning mathematics had increased.

“The teacher managed to make these concepts accessible even though its eons since I studied mathematics. The books are great, the exercises are excellent as they help me understand the concepts.”

(Introductory Biostatistics student, 2006 survey)

“The teachers were very approachable, explained things clearly and simply and encouraged questions. They also came to each person individually.”

(Psychology student, 2006 survey).

3.8 Continuing Education courses

The Centre, together with the Centre for Continuing Education, offers a University Preparation Course in mathematics to adults in the wider community. University Preparation Courses prepare students, who do not meet the usual entry standards and who satisfy other selection criteria, to enter a university course. This course is the recommended University Preparation Course for a wide range of degree programs. The assumed knowledge for this course is Year 10 advanced mathematics.

In 2006, 89 students enrolled in the course Preparatory Mathematics. Forty students completed the course (excluding one who deferred the final exam) of whom 29 passed the course with 17 students gaining a grade of credit or better.

3.9 New initiatives

The Mathematics Learning Centre developed and implemented the following new initiatives in 2006:
• A supplementary tutorial for MATH1015 was developed to support students in this statistics unit of study. This initiative was in response to a need identified from our student surveys.

• Supplementary tutorials for the new units of study MATH1111, MATH1014 were developed and delivered in 2006.

• The FlexSis data base was used to identify students eligible for the Centre’s programs. This was achieved with the invaluable assistance of the staff of the Student Centre.

• A short tutorial program was developed for students in the advanced statistics unit of study PSYC3010. This tutorial program ran for 8 weeks during Semester 2 and was available to those students who had previously attended the Centre’s program for PSYC2012 Statistics and Research Methods for Psychology.

3.10 Challenges faced in 2006

The biggest challenge faced by the Mathematics Learning Centre staff and students in 2006 was an increase in demand of 18.5% for the Centre’s services from 2005 levels, even though the number of students using the Centre increased by only 2%. This increase in demand was unexpected and disproportionately affected Semester 1. The demand for the Drop-in Centre services increased in Semester 1 by 47% from the same period in 2005, while the demand for Drop-in Centre services increased in Semester 2 by a more modest 7%. 
4 Research and Scholarship

4.1 Research projects

The Mathematics Learning Centre has a strong research culture and national and international reputation for high quality research. All current academic staff members are researchers in either mathematics (or statistics) education or mathematics.

This section gives details of the research projects of the Centre. Full publication details are given in section 4.2.

Project: Teaching and Learning Statistics at University

Researchers: Dr Sue Gordon, Associate Professors Peter Petocz and Anna Reid

This project was initiated and developed as Dr Sue Gordon’s SSP program in 2004 and is a collaborative project with Associate Professor Anna Reid, Institute of Higher Education & Research & Development, Macquarie University, and Associate Professor Peter Petocz, Dept of Statistics, Macquarie University. The project investigated statistics teachers’ ideas about teaching and learning statistics at university and ways of developing professionally as statistics educators.

The investigation consisted of a series of in depth, e-mail interviews with university statistics educators from around the world and focused on “service courses”, where statistics is taught to groups of students from various disciplines, such as psychology, public health, education and business. Email interviews were conducted with 37 members of the International Association for Statistics Education (IASE). Participating educators are from many countries including Argentina, Australia, Belgium, Brazil, Israel, Italy, Netherlands, New Zealand, Slovenia, Spain, Uganda and the USA.

A series of papers have been written pertaining to the project and a journal paper on the project methodology is in preparation. See 4.2 for details of the publications.

Project: Processes for Enhancing Teaching Quality in Higher Education

Researchers: Dr Sue Gordon, Associate Professor Sandy Schuck, Dr John Buchanan

This collaborative project was initiated in 2006 with Dr John Buchana and Assoc/Prof Sandy Schuck of the Faculty of Education, University of Technology, Sydney. The project investigates strategies for enhancing teaching and learning of higher educators and critiques the current processes and protocols in operation. It considers ways in which teaching is viewed and discusses the methods available for evaluating good teaching. Methods of supporting teaching at university are reviewed.
A conference paper was presented at the 14th Improving Student Learning Symposium, Bath, September 2006 (Schuck, Buchanan & Gordon, In Press). A journal paper is in preparation. See 4.2 for details of the publication.

**Project:** Case Studies on University Teachers’ Perceptions of Memorising in Teaching and Learning Mathematics

**Researchers:** Dr Sue Gordon, and Ms Jackie Nicholas

This project builds on and develops the interdisciplinary investigation into the role of memorising in learning science (Cooper, Frommer, Gordon, & Nicholas, 2002). Case studies on 5 mathematicians were analysed to flesh out and increase an understanding of academics’ perceptions about memorising related to their own learning of mathematics or statistics, to teaching and to students’ learning (Gordon & Nicholas, 2005).

**References**


**Project:** Anisotropic Thermal Diffusion Models For the Earth’s Core Under the Influence of Strong Rotation (Coriolis Force)

**Researchers:** Dr Collin Phillips and Dr David Ivers

This project is to investigate the influences of anisotropic thermal diffusion on magnetohydrodynamic models. Since this is the first investigation of the influence of anisotropic thermal convection in a conducting fluid sphere much emphasis is placed on confirming preliminary results. The choice of model to be considered for this project is critical. Much effort has been devoted to determining a problem that is analytically tractable, numerically practical and physically realistic for the Earth’s core.

The project includes extensive research into past work on the topic. Thus the project is to investigate anisotropic thermal diffusion with a preferred direction given by the direction of the rotation axis. Such an anisotropic thermal diffusion can be compared with the results of
anisotropic thermal free decay in oblate and prolate spheroids conducted by Niven C. (1880) and Ivers D.J. (2002)

The project involves developing a set of numerical routines in the programming language Fortran 90 to investigate anisotropic thermal diffusion. The isotropic diffusion thermal free decay problem in homeoidal oblate and prolate spheroids (considered by Ivers 2002) are compared with the anisotropic thermal diffusion problem in a sphere.

The project is to establish how the eccentricity of oblate and prolate spheroids influences their cooling. Thermal convection in a conducting fluid sphere is considered as it relates to the problem at hand. The results of both thermal convection and conduction in spheroids are benchmarked against the anisotropic convection results.

The project is then to extend the checked programming package to investigate the influence of an anisotropy in the direction of the rotation axis and establish how such an anisotropy will influence the magnetohydrodynamic instabilities in a conducting fluid sphere.

References
Ivers D.J. (2002). Thermal instabilities of an oblate spheroid, 8th symposium Study of the Earth’s deep interior, Grandlibakken, USA.


**Project:** Applicability of Antidynamo Theory to Mean Field Electrodynamics

**Researcher:** Dr Collin Phillips

This project is to investigate how antidynamo theory can be used to preclude dynamo action in mean field dynamos. The project has been made necessary in order to clarify some poorly understood principles in mean field electrodynamics theory.

The circumstances under which the planar flow antidynamo theorem and the two-dimensional antidynmo theorem apply are investigated. In particular the extension of these laminar flow antidynamo results to mean field and turbulent dynamos is considered. Antidynamo results are established for turbulent velocity fields where all members of the ensemble average are to satisfy either the planar flow or two dimensional flow conditions. Most importantly the circumstances under which these antidynamo results cannot be analytically applied will be established. Many errors in the literature in the past have resulted in the need for this investigation.
4. 2  Publications, presentations and scholarly work

4. 2. 1  Journal articles

In press

Submitted


4. 2. 2  Conference proceedings

Refereed


Edited

4. 2. 3  Presentations

Conference presentations

**Invited presentations**

Dr Collin Phillips gave a seminar titled: “The Effects of Anisotropic Thermal Diffusion on Free Decay and Thermal Convection Models of the Earth's Core” to the Mathematics and Physics Department at Comenius University, Bratislava, Slovak Republic.

Dr Phillips gave a seminar titled: “The Transition Mechanism Between Steady and Oscillatory Alpha-Squared Dynamos and the Influence of Anisotropy” at The Forschungszentrum Rossendorf Research Institute, Dresden, Germany.

**4. 2. 4 Work in progress**


Schuck, S., **Gordon, S.** & Buchanan, J. (In preparation). What Are We Missing Here? Problematising Wisdoms On Teaching Quality And Professionalism In Higher Education.

**4. 3 Research supervision**

Dr Sue Gordon was appointed Principal Supervisor of PhD candidate, Ms Jen Tindale, in the Faculty of Education and Social Work. The Faculty funds her supervision. Ms Tindale’s project is titled: Learning through participation: Spoken language as a resource in a Master of Accounting program. Ms Tindale was awarded the prestigious Australian Postgraduate Award, 2006.
5 Contributions to the University, the Profession, and the Community

5.1 Contributions to the University

The staff of the Mathematics Learning Centre participate in the following activities:

- Prospective Students Information days in August and January
- SWOT (Sydney Welcome Orientation and Transition)
- Broadway Orientation
- Faculty Orientation sessions
- International Student Support Unit information sessions

Individual staff contributions to the University were:

Dr Sue Gordon
Principal Supervisor to PhD candidate, Faculty of Education and Social Work

Ms Jackie Nicholas
Head of Exam Committee for the University Preparation Course in Mathematics
Faculty liaison (mathematics) with the University of Sydney Foundation Program

Dr Collin Phillips
Member of the Exam Committee for the University Preparation Course in Mathematics

5.2 Contributions to the profession and the community

Throughout the year, all Mathematics Learning Centre staff provided advice to current and prospective students and members of the general community about mathematical matters. This includes advice about the assumed mathematical knowledge required for various university courses, and details of the bridging and preparation programs available in Sydney and elsewhere.

Other contributions to the profession and the community were:

Dr Sue Gordon

Appointed to the International Advisory Board for the journal: Studying Teacher Education (journal of self-study research design and practice)

Reviewer of research papers and conference papers:

- Statistics Education Research Journal (successive reviews)
- Studying Teacher Education (successive reviews)
• Psychology of Mathematics Education (PME30) Conference, Prague
• Australian Association for Research in Education (AARE) 2006 Conference, Adelaide.
• Annual Conference of the Mathematics Education Research Group of Australasia (MERGA 29)
• Transformational Tools for the 21st Century National Conference 2006

5.3 Visitors to the Mathematics Learning Centre

Chinese scholars in the Teaching Science in English Program
The staff of the Mathematics Learning Centre hosted a lunchtime meeting for the Chinese mathematicians in the Teaching Science in English Program. A range of the Centre’s activities were explained to the visitors. The visitors toured the Mathematics Learning Centre, focusing particularly on our mathematical materials that are available on-line. One of the scholars, Min Chen from Donghua University, focussed on the Mathematics Learning Centre for her paper for the 2006 addition of the China Papers (http://science.uniserve.edu.au/pubs/china). In her paper, Min Chen analysed the operation of the Mathematics Learning Centre with a view to establishing a similar centre at Donghua University.

Other visitors to the Centre
Dr Sarah Carpenter visited the Centre in March to discuss issues and strategies for achieving good learning outcomes for students needing support in their learning of mathematics and statistics. Sarah is the Assistant Director of SIGMA—Centre for Excellence in Mathematics and Statistics Support at the universities of Loughborough and Coventry in the UK. SIGMA has a large website of resource materials which, following Sarah’s visit, University of Sydney students may access from the Mathematics Learning Centre website.

Professor Helen MacGillivray, Director of the Mathematics Access Centre, QUT, visited the Centre as a part of her Carrick project to investigate mathematics and statistics learning support centres in Australia.
6 Professional Development

As a part of the Centre’s professional development activities, the staff attend conferences and seminars in their discipline area. Administrative staff undertake appropriate internal training.

6.1 Special Studies Program

Anisotropic Thermal Diffusion in a Rapidly Rotating Fluid Sphere

Dr Collin Phillips — 17th January to 6th August 2006

Dynamo Theory or Magnetohydrodynamics includes the study of the molten core of the Earth and the electrically conducting plasma of the Sun.

The Special Studies Program simulates the effects of the finer scale, rapidly evolving field structure on the molten core of the Earth by a parameterised method. One result of this theory is that the thermal and viscous diffusion tensors have preferred directions given by the rotation of the Earth.

During SSP, a numerical package was written to incorporate such an anisotropic thermal diffusion. The thermal free decay problem was considered to benchmark the results of the project. The resulting numerical solutions to the anisotropic diffusion problem were compared with the equivalent free decay problem in oblate or prolate spheroids. Before considering the effects of anisotropic thermal diffusion on thermal convection, the code was further benchmarked against established isotropic diffusion thermal convection results.

Valid and appropriate analytic solutions to the basic state momentum and heat equations were established in order to expand the study to consider thermal convection.

The isotropic and anisotropic thermal diffusivities studied ranged from predominantly equatorial diffusion to predominantly polar diffusion. It was found that as the proportion of equatorial diffusivity increases from isotropy the stability of the dynamo mechanism increases marginally and then decreases. Alternatively as the proportion of polar diffusivity increases the critical stability of the dynamo mechanism decreases considerably.

The study was then extended to include investigation of the effect of varying relative magnitudes of the viscous diffusion and the rate of change of the fluid velocity (the Ekman number E) on the effectiveness of (diminished and enhanced) anisotropic thermal diffusion and the stability of the dynamo mechanism. The influence of varying the period of the fields in the longitudinal direction or azimuthal wave number was also investigated.

6.2 Appointment and accreditation

Dr Sue Gordon was appointed as Honorary Adjunct to the Faculty of Education and Social Work. This appointment, from March 2006 to March 2007, recognized her significant contribution to the teaching and research of the School.
Dr Sue Gordon completed the Institute of Teaching and Learning Development Program For Research Higher Degree Supervision. This is an accredited professional development course of the University of Sydney requiring the study of 6 modules and the writing of a reflective case study.

6. 3 Conferences, seminars, forums and workshops

Dr Sue Gordon


Dr Gordon participated in the following seminars/forums

- Higher Degree Research Supervision Forum, February, 2006, University of Sydney
- Honoraries and Visiting Scholars Meeting and Forum: Professor Derrick Armstrong May 2006, University of Sydney
- Workshop: Learn How To Use IRMA, December, 2006, University of Sydney

Dr Collin Phillips

Dr Phillips gave a presentation at the 10th Symposium of Science of the Earth and Deep Interior (SEDI 2006), Prague, Czech Republic, July.

Dr Phillips gave a seminar to the Mathematics and Physics departments at Comenius University Bratislava, Slovak Republic.

Dr Phillips gave a seminar at The Forschungszentrum Rossendorf Research Institute, Dresden, Germany.

Ms Jackie Nicholas

Ms Jackie Nicholas participated in the “Best Practice in Assessment and Student Feedback” Forum, June, University of Sydney.
7 Future Directions

This report has outlined the teaching programs and research activities of the Mathematics Learning Centre in 2006.

The teaching programs represent our on-going commitment to the needs of our diverse student community. The following teaching initiatives are being planned for 2007 and beyond.

- Establish additional web resources for the Mathematics Extension 1 Bridging Course students.
- Continued development of supplementary tutorial program for MATH1111, MATH1014 and MATH1015.

The following initiatives are being planned to further develop the Centre’s research activities.

- Continuing scholarship on project to explore the ideas of international statistics educators about the teaching and learning of statistics service courses at university. Preparation has commenced on a journal paper exploring the methodology of e-interviewing.
- Progress on collaborative project on evaluating and supporting teaching quality in higher education. A journal paper is in progress reviewing the methods of assessing good teaching and investigating issues related to enhancing higher education practice.
- Supervision of doctoral candidate, Ms Jennifer Tindale, Faculty of Education and Social Work. During 2007, Ms Tindale aims to submit her thesis proposal and apply for ethics clearance during 2007. Work has commenced on a journal paper and book chapter on the project.
- Continued work on a project analysing case studies on university teachers’ perceptions about memorising in teaching and learning mathematics.
- Conduct a feasibility study to determine which models are computationally practical for the problem where anisotropic thermal diffusion is influenced by rotation (Coriolis forces) and toroidal magnetic fields.
- Continue to revise research on anisotropic alpha-effect dynamos in order for it to be in published in the scientific literature.
- Continue to develop research on anisotropic thermal diffusion in a strongly rotationally dominant conducting fluid sphere.
8 APPENDIX 1 2006 Student Surveys

During 2006, nine surveys were conducted by the Centre. A report of six surveys is included in this section.

8.1 Bridging course for statistics surveys

This course was introduced in 1988, and is run annually in February. A survey is conducted at the end of the course each year and these surveys are used to further develop and modify the course. Thirty three enrolled in the Bridging Course in 2006. Again in 2006, the students were divided according to their unit of study and two similar parallel courses were taught. These groups will be referred to as the Psychology students and the Introductory Biostatistics students.

The students were asked to give an evaluation of the Bridging Course for Statistics in their last class. Twenty eight students returned the survey—Seventeen Psychology students and eleven Introductory Biostatistics students. The students were asked background information, open ended questions and asked to rate the Mathematics/Statistics course they received on a five point scale. A summary of their evaluations appear below.

Table 11: Overall evaluation of the Bridging Course for Statistics 2006: Psychology students

<table>
<thead>
<tr>
<th></th>
<th>Poor</th>
<th>Fair</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Count</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>0%</td>
<td>18%</td>
</tr>
<tr>
<td>N=17</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Open ended questions: Psychology students

The best things about the course at the Mathematics Learning Centre were:

Nine students commented on the high quality teaching and five students commented on the quality of the workbooks as the “best thing about the course”. The following quotes summarise the students’ responses.

- Excellent teachers and the textbooks were amazing.
- The teachers were very approachable, explained things clearly and simply and encouraged questions. The also come round to each person individually.
- Getting familiar will all the terminology and graphs etc.
What things didn’t work and how could we improve them?

When asked to comment on negative aspects of the course, three students reported on the pace or timing of the course. One student thought the pace was very fast and should be a two week course, one student thought “some parts [of the course] went too slow” and one student thought that the course should be more spread out.

- We went very fast—covered more than I could digest in this space of time. Improvement—a two week course?

Two students commented that the wording of the booklets was sometimes unclear, and one student wanted “a teacher per group of 4 just to relay over the info again”. Other comments include:

- Not having enough computers to work with so many students (not your problem!!).

Table 12: Overall evaluation of the Bridging Course for Statistics 2006: Introductory Biostatistics students

<table>
<thead>
<tr>
<th>Scale</th>
<th>Poor</th>
<th>1</th>
<th>Fair</th>
<th>2</th>
<th>Excellent</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
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<td>0%</td>
<td>0%</td>
<td>45%</td>
<td>55%</td>
<td></td>
</tr>
<tr>
<td>N=11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Open ended questions: Introductory Biostatistics students

The best things about the course at the Mathematics Learning Centre were:

Six student comment favourably about some aspect of the teaching and five students commented favourably about the booklets used in the course. The following quotes summarise the students’ responses.

- XXXX managed to make these concepts accessible even though it’s eons since I studied mathematics. The books are great. The exercises are excellent as they help me to understand the concepts.
- The time the teachers took to answer questions. The teaching and the teachers!
- Introducing the topics that we are going to be studying so some of the terminology will be familiar.

What things didn’t work and how could we improve them?

Two students commented that course was intense in its current format and two students comment that one teacher went a little too fast. The following quotes summarise the students’ responses.

- It’s fairly intense doing Tues, Wed, Thurs together after working. I could have done with the course spread out more but appreciate this may not be possible.
- XXXX’s sessions were a little too fast for me to keep up with.
- Some things felt like they were left unfinished before beginning the next topic.
8.2 Supplementary tutorial surveys

MATH1013 Calculus  Teacher: Dr Collin Phillips

This survey was conducted at the end of Semester 2 during a supplementary tutorial for MATH1013 students. Seven students (out of 7) returned a survey. The students were asked background information, open ended questions and asked to rate teaching/instruction in the supplementary tutorial and their confidence in learning mathematics as a result of attending the supplementary tutorial on a five point scale.

Table 13: Overall evaluation of the service of the supplementary tutorial for MATH1013 in 2006

As a result of attending the supplementary tutorials my confidence in learning maths has:

<table>
<thead>
<tr>
<th>Scale</th>
<th>Decreased</th>
<th>Stayed the same</th>
<th>Increased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>0%</td>
<td>57%</td>
</tr>
</tbody>
</table>

N = 7

I would rate the instruction/teaching in the supplementary tutorials:

<table>
<thead>
<tr>
<th>Scale</th>
<th>Poor</th>
<th>Fair</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>0</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>43%</td>
<td>57%</td>
</tr>
</tbody>
</table>

N=7

Responses to two open ended questions are summarised here.

The best thing about the supplementary tutorial is:

All the students responded to this question. The following responses represent their views.

- We do what’s necessary, and go over methods which we’ve been over in lectures but not everyone understands.
- Flexible — will go over the things we say we are having trouble with. Not just a set program. Also, flexible pace, ie [he] waits till everyone understands and then moves on. Free to stop and ask questions. It’s fabulous to focus on making sure we understand and not just speeding through the material.
- Really appreciate you having these tutes — I was floundering a few weeks ago — then joined this tute and started visiting the MLC and I understand the subject now. Plus very reassuring (from a psychological point of view) to have this hour to come to every week.

The worst thing about the supplementary tutorial is:

Three students left this blank or responded nothing. The following responses represent the comments made by the remaining students.

- There should be more classes running because they are excellent. If there were more classes available, it would be extremely useful in being able to go through all material.
- Going through 1 question and taking the whole tute to do it (sometimes inefficient).
This survey was conducted in the supplementary tutorials in Week 11 of Semester 1. Twelve students returned a survey. The students were asked background information, open ended questions and asked to rate teaching/instruction in the supplementary tutorial on a five point scale.

Table 14: Overall evaluation of the teaching in the supplementary tutorial for PSYC2021 in 2006

<table>
<thead>
<tr>
<th>Scale</th>
<th>Poor</th>
<th>Fair</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
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<td>0</td>
<td>1</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>0%</td>
<td>8%</td>
</tr>
</tbody>
</table>

N=12

The students were asked to evaluate the supplementary tutorials by commenting on the best things about them, the worst things about them and suggestions for improvement.

Seven students commented on the excellence of the teaching. The following statements taken from the survey encapsulate the range of their responses.

• The extra tutes taken by Sue for 2012 stats are amazing. The class is small and Sue goes through each problem step by step — its not overwhelming, anxious or rushed. It’s a confidence building tute, going through everything at a slow pace. The only suggestion is to have more classes per week or a 2 hour session. I hour is not enough compared to the volume of work to get through. Maybe smaller classes or split the groups into ‘finding it difficult’ or ‘finding it extremely difficult’.

• They have been great — they have helped me so much. The best thing is discussion about concepts which allow me to get my head around things. Another good thing is being able to see that there are other students with the same problems as me — I don’t feel like I’m the only one who finds these things difficult. Being able to ask questions and be treated as if they are valid — not just me being stupid.

• I don’t know if I would still be here without the class. Sue is fantastic. I am extremely grateful to her for her care and patience.

8.3 Mathematics Workshop surveys

Seven mathematics workshops were held in 2006. The workshops were constituted to cover some areas of basic mathematics that were needed in economics and business units of study. A survey was conducted at the end of each workshop. The survey results of the same workshop from each Semester are included here.

Working with Quadratic, Exponential and Logarithmic Graphs Workshop

Teacher: Ms Jackie Nicholas

This workshops was held in Week 3/4 of Semester, and was attended by 11 students in Semester 1 and 17 students in Semester 2.
Table 15: Overall evaluation of the Mathematics Workshop in Semester 1 2006

I would rate this Maths workshop as:

<table>
<thead>
<tr>
<th>Scale</th>
<th>Poor</th>
<th>Fair</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>0%</td>
<td>14%</td>
</tr>
</tbody>
</table>

N=7

Table 16: Overall evaluation of the Mathematics Workshop in Semester 2 2006

I would rate this Maths workshop as:

<table>
<thead>
<tr>
<th>Scale</th>
<th>Poor</th>
<th>Fair</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>0%</td>
<td>6%</td>
</tr>
</tbody>
</table>

N=17

The students were asked to respond to the following open-ended questions. The following quotes summarise the students’ responses.

The best things about this Maths workshop were:

Semester 1

- The clear explanation of mathematics processes. It renewed, refreshed and added to previous knowledge. The booklets were useful for following the course structure and will be a valuable resource in the future
- All topics were really interesting and well explained.

Semester 2

- There is a certain level (quite a high level!) of assumed knowledge with the microeconomic theory unit, even though it’s an introductory unit. This was a great workshop for stirring the synapses after so long and bringing us back up to speed (or at least crawling again). Also the web resource I’m sure will be helpful.
- Notes, thorough, assumed basic knowledge.
- Proof of everything but we only have to know the rules.

What things didn’t work and how could we improve them?

Semester 1

All students left this blank or made a positive comment.

Semester 2

Fifteen students left this blank. Other responses include:

- More classes and more time to select.
- Slowly.
Are there any other comments you would like to make?

Semester 1

Four students left this blank. Other responses include:

- I think workshops should be about 3 hours in order to give more practical exercises. The workshops should be given during W1 or W2.
- I was only able to attend 2 of 4 sessions. I thought it was fantastically explained by Jackie, very logical and at a comfortable pace.
- The workshop is quite short.

Semester 2

Twelve students left this blank. Other responses include:

- Good teacher, but MLC should provide more time to study.
- May add some real life examples to the handout.
- The time arrangement should suit for all students, have many more time choices.