Peer Assisted Learning in Mathematics (PALM)

Dr Joan Condell, Mr Yogarajah Pratheepan
School of Computing and Intelligent Systems, University of Ulster, Magee campus

Email: j.condell@ulster.ac.uk

PROJECT OVERVIEW
This poster discusses key practice issues in the teaching of Mathematics at the University of Ulster. Innovative practice is outlined in Peer Assisted Learning (PALM - Peer Assisted Learning in Mathematics).

AIM & OBJECTIVES OF PROJECT
The use of peer assisted learning in Mathematics at Ulster is a particular example of innovative practice. This type of Supplemental Instruction (SI) used senior students to support the learning of previous year students – in this case we used final year and first year PhD students to support the learning of second year students. SI began in 1973 at the University of Missouri at Kansas City in the subject of Mathematics. It has since spread worldwide, has become internationally renowned and has improved both student retention and academic performance and reduced drop-out rates. SI integrates effective learning strategies within the module content and enables a clear view of module expectations. It works in the language of the discipline, challenging the barrier between year groups. The SI concept works particularly well with ‘high risk’ modules. The Mathematics module which was used to pilot PALM (COM420, Mathematics II) presents many challenges in terms of delivery, teaching and assessment.

BENEFITS TO STUDENTS & TEACHING STAFF
PALM was facilitated through senior students (also known as leaders) acting as mentors by conducting weekly sessions with the cohort. Debates occurred weekly between the lecturer coordinator, PALM supervisor and the senior students (leaders) to obtain essential feedback. The week’s teaching finished with the weekly test to ensure the students had completely understood all of the material presented. Peer Assisted Learning innovatively assisted the delivery of the Mathematics module through giving the students additional support in the form of learner support through compulsory small group learning without creating dependency. In terms of students views PALM provided an additional mechanism for students additional support in the form of learner support through compulsory small group learning. The leaders (SI) concept works particularly well with ‘high risk’ modules.

FEEDBACK FROM STUDENTS & TEACHING STAFF
Various specific outcomes were achieved throughout this project. Particular feedback includes:
- Regular, ongoing student feedback to module coordinator
- Supportive environment for students (greater collaboration and learner support)
- Deeper conceptual understanding of fundamental Mathematics principles
- Increased individuals confidence to pass Mathematics exams
- Quality enhancement of learning experience, improvement of student study skills
- Small group teaching (see Figure 1)
- Improved Mathematics academic performance across all competencies
- Analysis of difficulties arising after teaching of first year modules and how this relates to overall curriculum of degree
- Positive impact on second year retention from diverse student range
- Possibility of extending the project to other analytical subjects across the University. This project aligns with the University’s new Teaching and Learning strategy in terms of small group teaching.

EVALUATION IMPACT AND RESULTS
In terms of evaluation:
- Qualitative results of the PALM pilot were assessed and evaluated after extensive consultations with leaders. Discussions and debates occurred weekly after each PALM session. Dialogue has been initiated with the student cohort at set times throughout the pilot to provide further direct feedback.
- Attendance of the student cohort has been monitored and analysed by the leaders. Student satisfaction ratings and surveys have been completed and assessed.
- On completion of the module examination (January 2010) extensive analysis will be carried out on actual student assessment and examination results to fully statistically evaluate the impact of PALM.

In general in previous years students have struggled to attain good marks in examinations (see Figure 2). In 2007/08 the average exam mark was 54.14% and in 2008/09 the average exam mark was 48.53% whereas in 2009/10 after the PALM pilot scheme the average exam mark had increased to 63.58%. In 2007/08 the average assessment mark was 74.69% and in 2008/09 the average assessment mark was 48.53% whereas in 2009/10 after the PALM pilot scheme the average exam mark had increased to 80.70%.

One obvious component to measure was the students’ exam results for PALM attendees vs. non-attendees. Table 1 suggests that mathematics exam marks increased as the number of PALM sessions attended increased. Therefore it is satisfactory to conclude that the pilot PALM program seems to have had an impact on students’ examination performance.

Table 1: Comparison of exam results between PALM participants for the 08/09 academic year

<table>
<thead>
<tr>
<th>Number of students</th>
<th>Mean attendance</th>
<th>Mean Exam result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occasional Participant (attended 1 - 5 sessions)</td>
<td>9</td>
<td>2.22</td>
</tr>
<tr>
<td>Regular participant (attended 6 - 11 sessions)</td>
<td>11</td>
<td>7.54</td>
</tr>
<tr>
<td>All students</td>
<td>20</td>
<td>5.12</td>
</tr>
</tbody>
</table>

There have been positive outcomes to this project in terms of the mentors or leaders of the PALM sessions themselves. The learning experience and Personal Development of the senior students (leaders) was enhanced through the project as they became effective ‘facilitators’ – a skill which can be carried on through to employment. It encouraged leaders to engage in the university department which may convince them to take on further study (e.g. PhD). It gave opportunities to reflect, review and re-evaluate their own studies and career path. In this way PALM promoted employability by developing key personal and employment skills and generally improved their academic performance.

TRANSFERABILITY – RECOMMENDATIONS TO OTHERS
There are currently extensive plans and targets within the Faculty of Computing and Engineering and school (SCS) for improvement of retention. At school level our current aim for second year students is to ensure that at least 85% pass their second year Mathematics II module on their first attempt. This pilot study has assisted this process by providing extra support to the students in their studies.

This project should inform faculty and school retention policies when it is possible to prove that the study has shown improvements and to decide if enhancements have been made in terms of retention, general academic performance and overall student experience. There is a possibility that the project could be extended to other analytical subjects across the school.

ACKNOWLEDGEMENTS
The authors wish to acknowledge the help of the PALM leaders in this project (Karl McCreadie, Francois Laverty, Timothy Wilson and Rory McGarrigle). They also wish to acknowledge the support of the SCS Head of School Professor Liam Maguire and the funding support given by the Centre for Higher Education and Practice.