INTRODUCTION

The first year of third-level education has always presented challenges to both students and institutions. For students, it is one of life's critical transitions. In fact, the most critical period for first-time students is during their first two semesters in college. This is the time which is most likely to affect the student dropout. There are many academic and social differences between the second-level and third-level education. International research studies (Weinstein et al, 1988) have identified six categories of differences: academic environment; grading; knowledge acquisition; support; stress; responsibility. These studies found that third-level students have less support from family, friends and teachers; higher stress due to more difficult academic work; increased responsibility for learning and increased responsibility for making major life decisions. As a result, first-year third-level students often experience various problems that make them prone to withdrawal. These problems include disorientation, mismatch from expectations and problems adjusting to self-learning and motivated study. For engineering and technology courses, the technical difficulty of the subjects adds to the above problems. Some students also find it difficult to integrate into their academic community or even make new friends. This results in lack of group work, communication and interaction between classmates, which otherwise would have helped all the students. Effective models of retention stress the need for students to be integrated into the academic and social dimensions of the college community (Tinto, 1993). These connections need to be established during the first weeks of their first year of third-level education. Such an interpersonal support system is important to all first-year students regardless of their background and experience.

One of the main problems first year students face is the sudden change in the teaching style (as compared to second-level education) that is highlighted by the reduced contact time with course tutors, partly as a result of increasing numbers and partly due to modularisation. In some cases and due to various reasons, the students themselves contribute to the reduced contact time by not attempting to see their tutors outside scheduled teaching hours. The lack of contact adds to the difficulties already experienced by the students and quite often affects their motivation to complete assignments, attend lectures and practical sessions, or do additional background reading. This has an adverse effect on students' performance and progress, which often lead to high failure and dropout rates.
Third-level courses are the preparatory stage to a profession, and therefore encourage learning. This should be done in reflection to the way in which professionals continue to learn, that is, through means which are self-directed, self-paced and resource-based. Marshall and Rowland (1993) note that knowing how to learn makes it possible to continue learning after finishing formal education. Currently, there are demands internationally for the inclusion of professional and transferable skills training in undergraduate curricula. In Ireland, the Higher Education Authority's (HEA) newly introduced quality assessment bodies will soon require universities to demonstrate how outcomes regarding the acquisition and development of generic attributes as well as study, technical and professional skills are being achieved. For engineering and technology-based courses in particular, the Institution of Engineers of Ireland (IEI) and other national accreditation bodies will also require the same. These changes are in response to increasing demands by employers that graduates have not only technical work skills but also informed and sensitive awareness of the communities and cultures within which they may be employed (Reilly, 1999).

On the other hand, a new emphasis regarding the central focus of education is taking root in higher education throughout the world. Rather than the traditional teacher-centred model, the focus is continuously shifting to being learner-centred (Arendale, 1988). Instead of focusing on transmitting and pumping information, its emphasis is now on effectiveness of the transmission process. The traditional instructional/teaching model encourages an increase in the quantity of information that is presented to students and the use of new instructional technologies to transmit this information. After a long period of focusing energies and committing resources to improving teaching, many educators have turned their attention to improving the efficiency and effectiveness of the learning environment. The learning process must be expanded beyond the traditional classroom walls and additional partners must be added to the learning environment in addition to the classroom lecturer/tutor.

It was in this developing atmosphere of the need for improved learning outcomes, the acquisition of effective study and professional skills, and the provision of academic and interpersonal support system that the Peer-Supported Learning Groups (PSLG) programme was introduced in the University of Limerick (UL) about two years ago, based on the Supplemental Instruction (SI) model used at many North American universities (Martin and Arendale, 1993). The author visited the University of Missouri Kansas City (UMKC) in 2001 and saw that the SI scheme would be of great potential benefit for Irish universities.

**PEER SUPPORTED LEARNING**

*Peer Supported Learning in the USA: The SI Model*

It has been recognised that the most effective learning environment is one where learning is an active process fully involving the learner, preferably in groups in a supportive and non-threatening environment that can be strengthened by a truly
collaborative approach with student and tutor. Evidence shows that students increasingly feel that they are not supported in a mass higher education system and with the changing nature of the student intake there is a greater than ever need for a supportive learning environment (Wallace, 1996). Many students taking challenging courses would cherish the opportunity to study with their colleagues. They would like to learn by interacting and helping each other in a confidential manner and with no fear of tutors' judgement. However, productive collaborative study group sessions are often difficult to organise and plan by the students themselves.

Peer supported learning is a well-established feature of education at many North American universities. Often called Supplemental Instruction (SI), it was first introduced in 1973 at UMKC by Dr. Deanna Martin (Martin and Arendale, 1993). Since then, the model has been adopted by a large number of departments in universities across the United States of America (USA), and spread to include over 100 institutions in 12 other countries (McCarthy et al, 1997). SI is a peer tutoring scheme with a difference. Rather than tutoring, which implies teaching, SI is concerned with facilitation and an emphasis upon learning. Second-year third-level students volunteer to be trained to facilitate learning groups of first-year students on historically difficult courses, often involving concepts students entering higher education find hard to grasp initially and resulting in higher than usual failure and drop out rates. The emphasis of SI is to help all students on high risk courses, not to selectively target high risk students.

The core SI model in the USA is timetabled, voluntary, confidential and non-remedial and involves second-year students as SI Leaders, trained in tutoring techniques, attending up to four first-year lectures a week and running several SI sessions each week. This activity is paid and leaders act as student tutors. They meet their SI Supervisor on a weekly basis and the Supervisor sits on some of their sessions to provide feedback on their ongoing performance.

**Peer Supported Learning Groups (PSLG): Adaptation of SI in UL**

Historically, the first year of both Bachelor of Technology (BTech) courses, in Information Technology (IT) and Telecommunications and Electronic Systems, in the Department of Electronic and Computer Engineering (ECE) at UL has been identified as difficult. Students were experiencing difficulties in mastering course contents particularly in introductory modules in Electrotechnology and Computer Programming. This was reflected in high failure rates and increasing dropouts as illustrated in Table 1.

<table>
<thead>
<tr>
<th>PROGRAMME</th>
<th>COHORT SIZE</th>
<th>% OF STUDENTS ACHIEVING QCA OF &lt; 2.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTech in Electronic Systems</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>BTech in IT&amp;T</td>
<td>117</td>
<td>28.2</td>
</tr>
</tbody>
</table>

TABLE 1: FAILURE RATES FOR FIRST-YEAR STUDENTS, SEPTEMBER 1999 ENTRY (JANUARY EXAMS)
In an attempt to support the high-risk students, the Department has initiated a number of traditional schemes, such as extra remedial/tutorial sessions that are usually managed by faculty, teaching assistants, or course leaders. Other measures include the introduction of mid-term testing in core first-year modules and the introduction of CAL (computer-aided learning) approaches in teaching. However, such schemes have been found to be cost-ineffective. Besides, the indication is that those schemes have not fully succeeded in motivating the students or alleviating the on-going situation. In fact, based on feedback from the students, the situation was found related to problems experienced by the students due to:

i. Their previous experiences and expectations rather than ability;
ii. Lack of group work and communication between student-student and student-faculty;
iii. Poor study skills;
iv. Lack of structured support and student development both cognitive and social.

Based on the above, it was felt that a non-traditional approach that would not only provide remedies to the situation in terms of students' grades, achievement and progress, but also provide an efficient and effective learning environment that encourages active self-direction and involvement of the students and improves their study and critical thinking skills. Hence, in the academic year 2001-2002, the department piloted a Peer-Supported Learning Groups (PSLG) programme to target one of the historically-difficult first-year modules of the courses in question. Encouraged by positive results, the programme was then expanded to cover three modules and developed into a fully-structured scheme in 2002-2003, which has since then continued to run. The PSLG is a new tutoring programme that is based on a collaborative and peer-learning approach developed by adapting the SI model to best fit the third-level education system in Ireland. Hence, the PSLG is also timetabled, confidential and non-remedial but has a number of differences compared to the core SI model: (a) second-year students are not required to attend first-year lectures but are encouraged to do so and to take any opportunity to meet and socialise with first-year students, (b) the concept of tutoring was replaced by facilitation as the method of active learning, and (c) PSLG leaders work in pairs or in groups encouraging first-year students to process the material they receive in lectures and discuss their understanding in a safe and supportive environment free of assessment. The PSLG leaders are not allowed to teach content, only facilitate discussion and exploration of issues amongst the student group. Another difference between PSLG and traditional SI is the way in which the outcomes of the scheme are evaluated. In the case of the SI this is done on the basis of final grade comparison between SI and non-SI students; the PSLG also includes data gathered from a start-of-semester initial PSLG and mid-term tests in the comparison, as will be discussed.
PSLG: IMPLEMENTATION AND EVALUATION

Summary of Methodology and Implementation

During the academic year 2002-2003, the Department of ECE introduced the PSLG scheme to three BTech first-year modules: Electrotechnology I (ET4101) in the Autumn Semester, and Electrotechnology II (ET4102) and Computer Programming I (ET4702) in the Spring Semester. Based on recommendations from the faculty who teach these modules and on grades scored in the previous year, eight second-year students were invited for a short training programme in facilitation of study-skills at the start of the Autumn Semester. The training focuses on how to help the students become active self-learners rather than on teaching. Six of these students volunteered after training to work in pairs as PSLG Leaders to facilitate three study groups of up to 25 students each from 70 first-year students.

In addition to training, each leader was supplied with a PSLG Leader's Handbook, which explains the difference between a PSLG leader and a teaching assistant, and includes a full description of a leader's responsibilities and role, advice from previous SI leaders, a set of Frequently Asked Questions (FAQ) and answers, and tips on effective study-skills. Brochures explaining what the PSLG is and providing a schedule of all available PSLG sessions were given to all first-year students of the targeted class. Similar posters were put up in various lecture halls, laboratories and students' common rooms and social gathering places. This was then followed by a brief presentation to the targeted class in the first week of the semester, during which the six leaders were also introduced.

Prior to the commencement of the PSLG sessions, the students in the targeted class were given an initial PSLG test which is a form of aptitude test designed to assess their abilities and skills with regard to the targeted modules as based on their Leaving Certificate knowledge. Each PSLG group were then given one one-hour session per week, starting with the second week of the semester. Sessions were then increased to two hours a week mid-way through the semester. The whole process, including leaders' training, was facilitated, managed and monitored by the PSLG Supervisor (the author).

Monitoring and Evaluation

The PSLG scheme was monitored by feedback obtained from the students (leaders and tutees) and faculty both formally and informally. Formal feedback was sought during three meetings per semester held with the leaders, often taking place after visits to their sessions by the PSLG Supervisor. A more formal feedback was also obtained from the leaders using a PSLG Leader End-of-Semester Survey and Debrief form. There was a final review meeting between the leaders, the tutees and the supervisor at end of each semester. During this meeting, each student tutee was asked to complete a PSLG Survey questionnaire which includes asking whether they would consider working as
future PSLG leaders. All these surveys were used to qualitatively evaluate the outcome of the PSLG programme.

In addition to the above, a number of quantitative measures of students' performance were used to evaluate the effect of the PSLG tutoring. Marks and final grades gained by PSLG-tutored students during mid-term tests and final exams were statistically analysed and compared to those scored in the initial PSLG test to monitor progress. Collected data was also compared to similar data collected from non-PSLG students (students who did not participate in the PSLG scheme).

RESULTS AND DISCUSSION

Qualitative Results

Both PSLG tutees and leaders showed a high level of interest and enthusiasm in the scheme throughout the year. Formal feedback obtained from the tutees showed that they found the sessions very beneficial and appreciated the support they were provided with. This was indicated by students' responses to rating how helpful the PSLG sessions were on a 5-point scale with 1 being not helpful and 5 being very helpful. All tutees rated the sessions with 5, except for one student who rated them with 4. All respondents liked the tutoring they received and requested more to cover other modules and the majority expressed interest in acting as future leaders. Regarding skills development, students' feedback indicates that the benefits of the PSLG as perceived by the tutees lie in the combined social interaction and academic support. Indeed, this is reflected in the following comments which sum up what the tutees felt regarding the strength of the PSLG scheme:

Informal setting; ... Easy to ask questions; ... Small groups setting; ... The students help each other; ... Relaxed environment; ... Friendly students leaders; ... Close contacts with each other and with the tutors; ... Preparation for the exams; ... The group discussions; ... Practising what we learn from lectures; ... The leaders were in the same position last year as I am this year, so they made me feel comfortable with all aspects of the course and the discussions made the learning very easy.

For the PSLG leaders, the benefits were numerous. The PSLG experience helped them gain deeper knowledge of the subjects, increased their confidence, enhanced their study, communication and organisation skills and gave them a sense of enjoyment and satisfaction in helping other students. Again the following comments in response to how participation as a PSLG leader changed or helped the students personally and/or professionally reflect this:

It has given me a lot of confidence in my communication abilities and it will make a great addition to my CV; thank you for this opportunity.
I now feel more comfortable at speaking in front of a group and found it all a very worthwhile experience.

I think being a PSLG leader has helped me to become more adaptable with working with small groups.

It was a good experience; it helped me assess my personal attributes and social outlook.

I am more relaxed now when helping someone with their work. Before I could be very nervous of making a mistake or trying to approach a problem in a different way.

Here are samples of feedback regarding the most rewarding aspects of being a PSLG leader:

The most rewarding aspect of my role as a PSLG Leader only revealed itself last week when I met some of the students who were very grateful for the group; they believed they could not have done as well as they had done without the advice and guidance provided by the PSLG.

The most rewarding aspect of my role is the quiet respect people have for one's tutor. The sense of helping students learn and study gives overwhelming enjoyment.

Well not only was being a PSLG leader a great experience, but it helped me remember things from last year that I'd forgotten and that are quite useful this year.

Because the groups were relatively small, there was real interaction between various group members. It was also very informal; as such it was easy to help each other.

Meeting and helping other students, ... I got to see things from different perspectives.

Quantitative Results

In 2002-2003, the results of the quantitative analysis of the effect of PSLG tutoring were positive and encouraging in regard to: (a) students' performance in mid-term tests and final exams, and (b) participation rates of first-year students compared to 2001-2002. PSLG tutoring has significantly improved the performance of all tutored students in all the modules in which PSLG was offered, compared to non-tutored students, as indicated in Figure 1 where the average final marks scored in each of three targeted modules (ET4101, ET4102 and ET4702) are shown.
Analysing the performance of each group, Table 2 gives a breakdown of the final grades scored by the 25 tutored students who participated in the ET4101 PSLG group, noting that the student who scored D1 grade had only attended one PSLG session. As an indication of student progress, Table 2 also gives a breakdown of the number of students within this group who improved on their initial and midterm test scores, where the term Even refers to no improvement. Compared to non-tutored students, the ET4101 PSLG group performed significantly better and maintained a fairly steady progress throughout the Autumn Semester, as evident from Figure 2. Tutored students achieved an overall pass rate of 96% compared to 83% for the class total. In fact, Figure 3 demonstrates that the PSLG students raised their performance and maintained their progress in the Spring Semester with regard to ET4102 module which is a continuation to ET4101.
FIGURE 2: EFFECT OF PSLG TUTORING ON TEST SCORES AND FINAL EXAMINATION PERFORMANCE FOR ET4101

![Graph showing effect of PSLG tutoring on test scores and final examination performance for ET4101.]

FIGURE 3: EFFECT OF PSLG TUTORING ON TEST SCORES AND FINAL EXAMINATION PERFORMANCE FOR ET4102

![Graph showing effect of PSLG tutoring on test scores and final examination performance for ET4102.]

By comparing the average test/exam scores of tutored students who attended four or more PSLG session during a given semester with those who attended less than four sessions, Figure 2 and Figure 3 also demonstrate the effect of consistent participation in the PSLG group on the continuation of progress and performance improvement.

One area that has not yet been quantitatively evaluated is the effect of PSLG on development of study and professional skills, such as communications, organisation and time-management skills. The plan for next academic year is to add an objective skills test, such as the LASSI test (Learning and Study Strategies Inventory), to the quantitative measures described above.
Problems Encountered

Most of the problems encountered in running the PSLG over the last two years were in common with those usually experienced by SI and other peer-supported learning programme teams at various institutions around the world. Four principal problems were encountered: scheduling arrangements, students' participation, faculty and colleagues' support and training of PSLG leaders. Some of the problems have now been resolved. Solutions to some problems are yet to take effect, whilst others are currently being discussed by the PSLG team and support is being sought from various student learning and support units in UL. These problems are now discussed.

Scheduling Arrangements: This was the first problem encountered during the implementation of the programme in its first year. Finding a suitable meeting room and allocating weekly time-slots that fit the already busy time-tables of both the first- and second-year BTech students were and still are not easy tasks. The space problem has been resolved by the establishment of a dedicated Student Peer Support Centre at the Department of ECE to facilitate all PSLG sessions and other related student support activities. Regarding scheduling, various arrangements were attempted, such as selecting different times and days of the week, scheduling sessions between or after classes. However, an arrangement that best suits the tutees and the leaders and does not adversely affect participation has proven elusive to date.

Students' Participation: Although participation in the PSLG sessions has been satisfactory, it was inconsistent. Participation was usually high at the beginning and towards the end of the each semester. For the weeks in between, there was often a noticeable decrease in participation. This was mainly attributed to the scheduling of sessions, coursework/assignments deadlines and assessment schedule. The PSLG team are currently working on a number of measures to enhance and maintain student participation. These include various activities to publicise and sell the programme by the Supervisor and Leaders, and the setting up of a dedicated web-site that would also include other resources such as previous test/exam papers and lecture notes. Support from colleagues within the department and from other learning and student support units to sell the programme also being sought. The ideas of introducing an accreditation system for tutees and leaders and integrating the PSLG programme into the curricula and the formal time-table of targeted courses are currently being discussed with the relevant bodies in the university.

Faculty and Colleagues' Support: The support received from faculty members who teach the targeted modules has been excellent. The PSLG team is planning to draw more on colleagues' support within the department to help advertising and selling the programme to their students.

Training of PSLG Leaders: So far, training of the PSLG leaders has been conducted by the author, being the PSLG Supervisor and an accredited SI
leaders' trainer. The training is done through a one-morning programme during the first week of the Autumn semester. Recently, a new member of staff joined the PSLG team as Co-ordinator of the programme and the Student Support Centre. Plans to seek support of Student Counselling Services in UL to run a complete one-day training workshop prior to the start of the semester are currently being considered.

CONCLUSIONS

The authors believe that the PSLG scheme has improved first-year students' learning and academic performance within the Department of Electronic and Computer Engineering at UL. This has been demonstrated by the results of qualitative and quantitative measures, analysis and comparisons between tutored and untutored students, presented in this paper. The authors also believe that the PSLG can be a useful addition to all undergraduate courses in UL, and should be adopted by the university via a top-down approach, as a formal accredited student support programme. In fact, a formally established PSLG would contribute significantly to increasing student motivation, enhancing their quality of learning, improving their academic performance, helping students' adjustment to campus life/culture, reducing failure rates and increasing retention.

ACKNOWLEDGMENT

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