Increasing Retention in First-Year Systems Analysis through Student Collaboration Using Real World Examples

Mark Bruce Freeman
School of Information Systems and Technology, University of Wollongong
Wollongong, Australia

Holly Tootell
School of Information Systems and Technology, University of Wollongong
Wollongong, Australia

Madeleine R H Roberts
School of Information Systems and Technology, University of Wollongong
Wollongong, Australia

Abstract
It is important in teaching Systems Analysis to maintain currency with industry trends, and for teachers of these subjects to maintain close relationships with students’ potential employers. This study presents a qualitative analysis of text responses from IS/IT students to open-ended questions concerning the introduction of a scaffolded small group problem based learning (PBL) task and the introduction of guest lectures. The results indicate that both of these enhancements to the subject have improved the learning experiences of students. These methods can be applied in other ISD subjects; and it is envisaged that enhanced student experiences will also be obtained through such applications.

Keywords: Guest Lectures, Problem Based Learning, Higher Education, Group Work, Systems Analysis Subject.

1. Introduction
Adjusting to the university environment can be a difficult process for students, with the first year of any degree a time when students assess whether they can be successful in their chosen field of studies. It is a time when some students will conclude that they are not equipped for the stressors of higher education or will find that personal issues are impinging on their ability to remain focused on the task at hand. In recent years the range of difficulties students experience has increased as the university cohort has become less homogenous with the increased recruitment of mature age, international and low socio-economic (LSE) background students to the university campus. The traditional university teaching structures of the lecture and tutorial are foreign to students entering the university for the first time – whether they are traditional or mature age, domestic or international or LSE students – and some find it difficult to adjust to this style of teaching and learning [16]. Many universities have recognized that the traditional lecture, though efficient, is not the most effective learning and teaching technique.

One method that has been identified in prior research is the use of small group learning, informed through the use of Problem Based Learning (PBL) tasks, in tutorials as a way to moderate students’ potential disconnection from the pursuit of their degree that may result from impersonal experiences associated with lectures. Small group learning can be one of the few points of personal contact between the student and the university and it is considered an influential factor in relation to student integration, progression and retention [6], [8]. This may be particularly pertinent to Information Systems and Information
Technology degrees (IS/IT), where some subjects are taught as an individual endeavor and working with other students is viewed as cheating. This establishes a false impression in their first year that IS/IT employees work alone, when in reality projects in industry require teamwork and collaboration [28]. Small group learning also provides an environment that supports the development of communication, problem solving and the sharing of ideas. Studies have indicated that students identify social contact as a valuable component of the learning experience [22], [31]. By providing opportunities for collaboration in small groups, a junction in the otherwise fragmented experience that many non-traditional and mature students have with university life can be achieved. These opportunities also impart valuable skills which traditional students need in the modern workplace.

A second method of improving the student experience, as argued by Koppi et al. [21], is that IS/IT students receive more industry related learning; this was recommended in surveys of graduates in the workplace. Weng et al. [34] also called for an increased focus on solving ‘real-world’ business problems. Roberts et al. [29,30] found that university IS/IT subjects lacked input from, or insight into, business and the workplace. Thus the engagement of industry-based professionals to provide a series of guest lectures could facilitate the discussion of ‘real-world’ business problems, allow students to understand why they are presented certain material, and consider how their learning relates to the modern workplace.

To increase the learning experience of IS/IT students, a first year core subject Systems Analysis was modified by: integrating ‘real-world’ business problems into scaffolded small group learning experiences (through a PBL approach) and engaging with Alumni, as contributors of guest lectures. These changes allowed students to be exposed to ‘real-world’ business problems that highlight the significance of collaboration, international perspectives and leadership skills. The scaffolded development of assessment tasks ensured continual engagement of all students while the Alumni guest lectures provided examples of the value of on-going graduate learning. These modifications were made with the expectation that both the small group learning assessment items, and the opportunity to hear about real life experiences in the workplace, were likely to improve student retention and future job-readiness, and to increase the overall student experience.

2. A Problem Based Learning (PBL) Approach

Problem Based Learning (PBL) is an increasingly popular method for encouraging higher education learners to engage with content beyond traditional examples and rehearsed case studies. Effective use of the PBL approach leads to the achievement of better learning outcomes, with research showing it can result in an increased level of learning by learners and an enhanced classroom experience [1]. PBL is an instructional model where learning arises from the students’ ability to fully consider and take ownership of the problem, typically through the use of small group learning exercise. It differs from the traditional case-based approach [32] that has been popular in IS/IT higher education, where learning is evaluated based on each learner’s understanding of the case. While the structure and content of PBL approaches will vary across IS/IT educational environments, there are a general set of principles and guidelines that are common. The initial premise of all PBL approaches is that learning needs to be actively influenced by ‘real-world’ factors or business problems. With IS/IT subjects starting to use such PBL approaches [25], the next area of focus is how to enhance these experiences to further increase learner outcomes and their overall learning experience. Thus the use of Alumni guest lecturers allowed for greater ‘real-world’ experiences and current practices to be discussed during the subject.

PBL approaches are classified as constructivist theories of learning. Constructivism is characterized by three propositions: “Understanding is in our interactions with the environment; Cognitive conflict or puzzlement is the stimulus for learning and determines the organization and nature of what is learned; and Knowledge evolves through social negotiation and through the evaluation of the viability of individual understandings” [32 pp. 135-136].

PBL approaches are self-directed and also must be student-centered, with the educator acting as a facilitator rather than a teacher. One typical way to implement a PBL approach
within an IS/IT subject is to give learners open problems for which they must find a potential solution [15]. This type of activity is supported by previous research in the IS/IT higher education space, which has identified the benefits (including creating value and increased student motivation) of exposing learners to 'real-world' problems [2], [9], [24]. Small group based activities are commonly used to engage students as they have been found to encourage students to develop deeper knowledge and problem solving skills [14]. Thus students have greater engagement and are more likely to continue their studies.

3. The Subject

The subject under evaluation in this research aims to introduce students to the use of techniques and technologies for performing structured Systems Analysis. It examines the roles of systems analysts, clients and users throughout the systems development life cycle (SDLC). The main objectives of the subject are that students should be able to: demonstrate an understanding of systems analysis methods; demonstrate an appreciation of the relationship between information strategy and organizational structure; understand the complementary roles of clients, users and analysts in the development of computer based information systems and demonstrate an ability to analyze a system and present a system description.

The first subject innovation was changing the major small group based assessment. This was originally a small component of the subject that was due as a single piece of work in the last week of session. The assessment was a scaffolded assessment consisting of the following tasks: an initial highlight report; a progress check interview; a narrative and use case analysis; and system description and requirements analysis.

The second subject innovation was to have Alumni who are working in the industry deliver interactive lectures. These industry-based lectures balanced the typical theory-based lectures of the subject discussing Systems Analysis methods. The industry-based lectures presented to students discussed the following topics:

- The skills that they learnt at university and how they now apply them;
- Their personal and business background;
- Their businesses approach to systems analysis or the role that they play in the process;
- Current trends and experiences with projects in their organisations; and
- A general Question and Answer session with the class.

Each of the lectures lasted approximately one hour during a typical two-hour lecture. There were three presentations throughout the session. The Alumni came from a medium sized ICT solutions company (consultancy, professional services and managed services); the internal university Project Management Office (PMO); and a small sized local web-based development company.

4. Method

This study employed the use of an online survey for students in the first year Systems Analysis subject. The survey was designed to elicit responses regarding students’ perceptions of: the subject; the small-group learning assessment items; and the introduction of Alumni guest lecturers to promote increased university engagement. A survey was chosen as it allows individual analysis of the issues identified in the research [4]. This paper reviews the quantitative data collected from students and provides an analysis of the new strategies that were implemented in the subject. Prior research has used similar approaches when reviewing retention surveys by students [21]. The survey gathered demographic details including the participants’ age, gender, enrolment status (part-time or full-time), background (domestic or international) as well as the degree in which they were enrolled (Bachelor of Information Technology - BIT, Bachelor of Business Information Systems - BBIS, Bachelor of Computer Science - BCS). The four open ended questions asked to students were:
• What was your highlight of the Systems Analysis subject? Why?
• What change would you like to see in this subject? Why?
• Which industry guest lecture(s) did you enjoy most? Why?
• Do you have any additional comments about this subject?

The questions were based on modifications by Koppi et al. [21] to Scott [33]. The purpose of this paper is to critically analyze responses to these four open-ended questions and identify the benefits and limitations of employing this approach. The findings of this experience have the potential to be applied in the future delivery of similar subjects.

5. Student Demographics

The completion of the survey was voluntary, with responses received from 43 of the 89 enrolled students in the undergraduate subject (48.3% response rate). Table 1 shows the demographics of the respondents. Students had an average age of 20.7 years (S.D. 3.4) with the youngest student 18 years and the eldest 36 years. This age range demonstrates that some of the students in the subject have not come from traditional backgrounds into their degree, highlighting the need for ensuring that the first year experience provides effective learning and teaching techniques to capture the cohort. The majority of the students were male 83.7%. With regard to their background, 74.4% of the students were domestic and enrolled in their degree fulltime (90.7%).

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6. Analysis of the Responses

6.1. What was your highlight of the Systems Analysis subject? Why?

As the majority of the students taking this subject were expected to be first year students (although some students could be studying the subject after a previous failed attempt) this question was designed to allow students to identify whatever aspect they thought had been the stand out in their experience. Responses to this question fell into three distinct categories: The first category of responses was about the group assessment. The following four students made explicit comments that the group report was a highlight in the subject:

• “Group project was fun, challenging and helped learn the content.” Male, 19, BIT
• “The group assignment, as it allowed me to have more of a challenge.” Male, 20, BIT
• “The highlight report” Male, 20, BIT
• “The pretend client meeting in week 4” Male, 22, BIT

The last two comments explicitly mentioned that the scaffolded nature of the assessment was a highlight of the subject; this was one of the changes introduced. However, while some
students stated that they wanted a greater amount of group work in the subject there were explicit statements that there should be less focus on group work.

The second category of responses identified by students was the guest Alumni lecturers with an industry focus.

- “Discovering how and what system analysts do.” Male, 20, BIT
- “Learning content related to the job.” Female, 18, BBIS
- “Guest lecturers” Male, 19, BBIS
- “Industry Guest Lectures” Female, 18, BBIS

The third category of responses identified by students was the staff teaching the subject and the way that they interacted with the material.

- “Interesting lectures, concepts, learning MS Visio.” Female, 19, BBIS
- “Other than lectures, there were resources made available and the lecturer actually tried to give us useful information to learn.” Male, 19, BIT
- “Talking to [names removed] in the tutorials and this was good because they had a lot of knowledge to give and they gave it freely” Male, 19, BIT

This is a positive result for the subject redesign as two of the three categories were focused on the newly introduced aspects of the subject. The responses demonstrate that the changes have had a positive effect on the students’ learning experience.

6.2. What change would you like to see in this subject? Why?

Unsurprisingly, some students did not have positive experiences with group work (e.g. “less group work” Male, 23, BIT), while a number wanted the guidelines for assignments and marking to be more specific. This may have been due to the nature of PBL assessments being open and having no actual answer. Rather, each student group developed a solution based on their understanding of the problem and the materials given.

Students commented on the need for more activities in tutorials and in the traditional lectures. Some students were critical of the lecturer’s performance; this had the potential to reduce their perceived benefits of the subject. It should be noted that for this subject the lecturer was changed prior to session commencement with only a few week’s notice due to unforeseen circumstances.

- “Less reading off the slides please.” Male, 20, BIT
- “Shorter more condensed lectures with more visual and practical aspects.” Male, 19, BIT
- “The lectures should be more interesting.” Male, 19, BIT

6.3. Which industry guest lecture(s) did you enjoy most? Why?

Approximately one third (34.9%, 15/43) of the students nominated the first guest lecturer who worked at a medium sized ICT solutions company (consultancy, professional services and managed services) as their most enjoyed. Comments were associated with the technical focus of his presentation (e.g. “he provided insight to the tech industry” Male, 19, BIT).

Four students indicated that the university staff member who worked for the PMO had been the best:

- “The gentleman from the uni who has a tech background and now is more higher management level.” Male, 27, BIT

Five students indicated that they thought all the lecturers were enjoyable, with comments such as “All of them because they really provide me with their experience that I could benefit from.” Female, 20, BIT
This is an encouraging result with approximately half the students commenting specifically about one or more of the guest lecturers and indicating that they had benefitted from this new aspect of the subject. It must be acknowledged, however, that several students directly indicated that they had not attended the lectures, for example:

- “Didn’t go to any.” Male, 20, BIT
- “Did not get to watch the guest lecture (sic) speak.” Female, 18, BBIS
- “Don’t attend lectures.” Male, 19, BIT

It is of concern that a major aspect of the newly modified subject was not experienced by all students. One of the students who had not attended the lectures was enrolled part-time; this may explain this student’s absence from the lectures, which were held during the day. All other students who had been absent were enrolled full-time.

6.4. Do you have any additional comments about this subject?

Some students were not in favor of group work at all:

- “Less group work, I think relying on others is a burden.” Male, 19, BBIS

Other students commented that they had enjoyed the subject:

- “Subject was better than I expected.” Male, 19, BCS

One student appreciated that the group project had been designed to accurately reflect workplace reality (i.e. the introduced PBL nature of the assessment):

- “The group project didn’t have any real scope or boundaries and that scared some people, however I personally enjoyed the open nature of it. Perhaps if it was blatantly stated that it was meant to be very open and that was one of the points of the assignment, be creative in your development.” Male, 27, BIT

Overall 18.6% of students identified that no changes were required to the subject and that the subject met its objectives. Some of the responses given in the open-ended questions have provided opportunities for reflection on the changes to the subject during this delivery, and informed consideration of where further changes are required to continue to increase the student experience associated with the teaching of Systems Analysis.

7. Discussion

A key component of teaching university students is assessing the effectiveness of the teaching and learning interactions, particularly when redevelopment and innovation has been introduced into a subject. The literature has argued that assessment of learning is best undertaken through the exploration of ill-defined problems [11] to challenge and engage learners; however some of the survey answers given by students contradict this notion. The literature argues that assessments as experiential learning activities play a key role in the learning process [18,19,20]. A well-structured PBL activity can allow learning and assessment to occur simultaneously. The results of this study indicate that successful implementation of PBL requires that the motivation for and potential benefits of PBL be explicitly stated upfront; effective implementation of PBL requires understanding of PBL by both educators and students.

For changes to the designated assessment approach within IS/IT subjects to be effective, educators (particularly those who have traditionally focused on using summative assessment) must be involved in the process of change. While previous research has noted resistance to change in the higher education space [5], explanation of the benefits of the new approach and a resulting ability for IS/IT educators to embrace such an approach can negate this resistance, as each educator assumes the role of a change agent [17]. Learners can be engaged through demonstration of the skills that they could develop as a result of full participation in the
assessment task, a clearly specified relationship between the task and subject objectives and graduate qualities, and understanding the value placed on these skills by employers [3, 13]. Learners can be encouraged to negotiate these outcomes using the PBL approach outlined above. To maximize the effectiveness of these methods of learner engagement, the role of educators must shift from lecturer to learning facilitator [7]; this places responsibility for learning in the control of the student. Some students highlighted this as an issue in their responses; it was a new experience for these students to respond to a problem with no established correct answer(s) and they recognized the need to be creative.

In prior research, small group work based assessment has been shown to provide students with motivational, social and cognitive benefits whilst increasing learning outcomes. Other benefits include increased problem solving skills and enhanced ability to deal with group dynamics including conflict and inter-group problems [12]. If groups are left on their own without instruction they can be unfocused [10] and can have unresolved conflict [23]. The issue of a ‘free-rider’ in group tasks has previously been identified in the literature [26, 27] – use of a scaffolded learning environment can automatically record contributions to minimize such problems. If these problems are not rectified then students could lose motivation on the project and not achieve the desired learning outcomes.

8. Conclusion

The changes to this Systems Analysis subject were made with the aim of enhancing the student experience. By providing variety in the lecture content and delivery and by providing PBL scaffolded small group learning experiences, students were able to connect with a ‘real-world’ approach to learning. Overall, an analysis of the open-ended responses to the survey data indicated that the majority of students enjoyed the small group learning assessment items, believed they had gained valuable information and insights into future careers from the Alumni, and intended to continue with their degree in light of their positive experiences within the subject.

Directions for future work include systematic inclusion of scaffolded small group PBL assessments and the use of Alumni guest lectures throughout relevant subjects. As a tool to enhance student engagement, further development of these techniques will contribute to a prolonged experience of student integration, progression and retention.

References


