



Engaging IT undergraduates in non-IT content

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Adopting an eLearning information system in the classroom

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Sandra Gallagher and Alan Sixsmith
*School of Systems, Management and Leadership,
University of Technology, Sydney, Australia*

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Abstract

Purpose – This paper aims to report on the efforts made to enhance the engagement of IT students with non-IT-specific content. The mechanism to foster this engagement was the introduction of an eLearning information system (ELIS) for a finance-related subject within an IT undergraduate degree at the university. The subject developers were primarily concerned with both the learning design and the engagement of the student to enable the effective incorporation of an ELIS into the classroom.

Design/methodology/approach – This interpretive research used a comparative case study as the aim was to gain an in-depth understanding of a particular situation. The research approach also allows an open-minded interpretation of the collected data as the researcher is interested in looking for the “Why and not the How”. Data were collected via an online university student feedback survey.

Findings – Four key themes emerged from the data as follows: IT students learning non-IT-related content was a major driving force behind the changes to the course; staff change brought fresh eyes to the subject content and enabled improvements to occur; introducing the ELIS assisted the teaching staff to reduce preparation time while also helping students learn at the own pace; and collaborative group work helped facilitated student insights into real life work scenarios. The findings show that each of the key themes identified played a role in improving student engagement and satisfaction with the non-IT subject matter.

Originality/value – The value of this paper is from its practical perspective. Engaging IT students in non-IT subject matter is a challenging proposition for which there is no simple solution. This paper shows that over a five-semester period and through a phased implementation of major changes, student satisfaction and engagement with non-IT subject matter has improved steadily. This paper is of interest, and hence value, to academics who encounter problems or issues of engaging students in non-domain-related subject matter.

Keywords Collaboration, Information systems, E-learning, Student satisfaction, Group work, Student engagement

Paper type Research paper

1. Introduction

It is apparent from many of the regular surveys conducted at our university that most IT undergraduate students believe that subjects which deliver non-IT related subject content should be bracketed in a group of last choice options. All students in any course and at both post-graduate and under graduate levels must engage in and gain fundamental knowledge of other domain specific content to “round” out their education. In order to change the thought process of students, IT academics must find effective methods of achieving engagement in non-domain specific content through alternate teaching and learning methods such as an interactive eLearning tool.

For an eLearning tool to be successful and engage participants, the accompanying information system (IS) must deliver a quality service, while being appropriate to the



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subject content, functionally simple and easy to use. An IS helps organize methods and processes, however, when transferred to the eLearning sphere, the information, content delivery and services offered are often inadequate due to the limited availability of resources or the poor or insufficient training undertaken by academics. Hence, more investigation is needed into the impact of eLearning on the quality of teaching and learning to ensure the required outcomes are achieved (Wan, 2012).

This paper reports on the efforts made to enhance IT student engagement in non-IT content through the introduction of an eLearning information system (ELIS) within a finance related subject in an undergraduate IT degree. The subject developers were concerned with the learning design and the engagement of the student. With this consideration in mind – deciding what the main components of the ELIS where and then breaking these down to enable an effective incorporation of an ELIS into the classroom.

The three main sections of an ELIS are the service provided, the delivery mechanism and the quality of the system. These three components fall neatly under the umbrella framework of the information technology infrastructure library (ITIL). Enabling a framework such as ITIL to be utilised, would also educate the students understanding of one of the business strategies that is used widely across the globe and would enhance their working knowledge and give the student a work based learning scenario.

The paper has the following structure. The next section provides an overview of the relevant literature. This is followed by the methodology and the findings from the case study research. Finally, conclusions are drawn, and then limitations and future research options are discussed.

2. Literature review

As educational technology and associated fields continue to evolve, conflicting findings have emerged regarding eLearning environments. In education today, there is a paradigm shift with critical challenges for universities to enhance innovation in teaching and learning. Schools and universities have been quick to embed computers into the classroom – however, it has taken a long time to incorporate ELIS and ensuring the effectiveness of use, examining why this phenomenon has been occurring we are trying to determine, why and ELIS should be incorporated into the classroom and identify an effective framework to enable a positive outcome of this integration.

Many theorists note that the introduction of ICT into the classroom – will only benefit the learner (Churchill *et al.*, 2013). However, very few of the studies undertaken actually look into the IS that is being used. Theorists such as Saba (2012) state that an important goal of eLearning systems is to deliver instructions that can produce equal or better outcomes than face-to-face learning systems, and that an understanding of systems quality, information quality and learning outcomes is required in the eLearning sphere. Wan (2012) notes eLearning has yet to make a significant impact on the quality of teaching and learning and pedagogical innovation. To date, the investments in eLearning tend to focus on the management of courses and are concerned with the automation of content delivery for teaching and learning. Conversely, Mar (2005) believes the major impact of eLearning is on the quality of content, which enables lifelong learning.

Selwyn (2010) points out that educational technology has become dominated by an interest in the process of how people learn rather than the how the technology can assist the learning process. A growing body of evidence has shown that interactivity is the key to human learning and intelligence, rather than abstract symbol manipulation,

internal representations or information processing centred on the internal mental processes of the individual (Churchill *et al.*, 2013).

Educational technology can be a challenging for academics, as finding the time to implement a new learning system into their course is complex. It is the not knowing how to go about making the changes, which include the resources, the activities, and the support of the ELIS and the evaluation of the student. Many have tried and subsequently failed and as Bain and Weston (2012) notes, there is an obvious lack of fundamental understanding of the requirements needed for introducing an ELIS into coursework and the implementation is not straightforward. Time-poor academics struggle with incorporating information into an ELIS that will deliver the correct content, provide student satisfaction, and deliver an overall quality system deemed worthy of deployment at their university.

However, for eLearning systems to improve teaching and learning quality or become mechanisms for lifelong learning, an appropriate framework for ELIS development and implementation must be present. Such a framework would assist with subject integration through improved functionality and system reliability. Abdellatief *et al.* (2011) suggested evaluating eLearning from a developers' view by investigating three elements, namely service content, system functionality, IT system reliability.

Functionality and system reliability fit neatly under the ITIL framework of service delivery, which includes the essential processes to deliver and improve quality (Cartlidge *et al.*, 2007). Schewe *et al.* (2005) propose that the dissemination of subject content or information can be enhanced by extending Abdellatief *et al.*'s (2011) three elements (service content, system functionality, IT system reliability) via best practice framework guidelines for web-based eLearning systems. Other frameworks for ELIS development and deployment have also been proposed for example Khan (2004) offers a people-process-product framework while MacDonald *et al.* (2001) suggest that appropriate content, delivery and service coupled with a quality structure act as a means to achieve various learner outcomes in web-based learning.

Maznevski (1996) notes that active involvement in learning increases what is remembered, how well it is assimilated by the student and how it is applied to new situations. This is, in part, because students need to think about what they are doing. Context is important in learning, and the concept of situated learning (Lave, 1996) is a key element in engaging students. Participating in activities that maximize learning allows students to grasp not only intended outcomes but also the underlying context on which the activity was based. Learning then becomes an experience and provides students with the knowledge to perform effectively.

Group work improves communication and understanding between individual students in a group and between student groups (and also between academics and students). Burns and Myhill (2004, p. 36) suggest understanding evolves from "interactive, social situations, scaffolded by, and in collaboration with, others". Tsui (2002) notes discussion creates a shared space for learning where students identify key aspects of a topic and the teacher obtains an appreciation of this learning experience and then attempts to broaden the common ground of understanding among all parties.

Enyedy and Goldberg (2004, p. 906) note that pedagogy has shifted "away from an exclusively individualistic, psychological view on learning toward a perspective of learning involving participation in social interactions within the context of a community". When students enjoy a class they are more likely to achieve better outcomes, keep their

attention levels high and therefore improve understanding of the content delivered. Engaging students in the learning process is particularly relevant when undertaking subjects which deliver content that is not considered appropriate to their field of study.

3. Methodology

This interpretive research uses a comparative case study as the intention of the research was to investigate the area under study in some depth and obtain a valuable insight of the given context (McGovern, 2003; Morse and Richards, 2002). Case study research allows for the exploration of significant features of the case to create credible interpretations from the everyday experiences of the participants (Crotty, 1998). A case study has the ability to increase our understanding of a particular situation by providing an in depth understanding of the context under study (McGovern, 2003; Morse and Richards, 2002). Although the findings of a case study may not be generalizable, it has been argued that a case study provides a rich and valuable insight into a given context and that the findings may be appropriate for someone in a comparable position (Duhan *et al.*, 2001).

The chosen approach is based on Feyerabend's epistemological thesis that research paradigms need not be limited to a specific method, but rather explored with an open-minded attitude regarding research design (Antimatter, 2011). This approach allows an open-minded interpretation of the collected data as the researcher is interested in looking for the "Why and not the How".

Each calendar year, two academic semesters are conducted at our university. During a five year period (2009 through to 2013), a subject titled "Finance and IT" (F&IT) has run in the first semester of each calendar year and has taught non-IT specific content to IT undergraduate students. A major issue faced by the teaching academics has been engaging these IT students in this non-IT content.

Every semester our university conducts a standard online student feedback survey (SFS). The data collected from this survey forms the basis of this comparative study of integrating eLearning of non-IT content into the IT curriculum. The survey comprised eight questions in total of which six were scale questions (quantitative data) while two questions allowed free form answers (qualitative data).

The six questions listed below used the following five-point scale: 5 – strongly agree, 4 – agree, 3 – neutral, 2 – disagree and 1 – strongly disagree:

- (1) The subject was delivered in a way which was consistent with the stated objectives.
- (2) My learning experiences in this subject were interesting and thought provoking.
- (3) I found the assessment fair and reasonable.
- (4) There were appropriate resources available to support the subject.
- (5) I received constructive feedback when needed.
- (6) Overall I am satisfied with the quality of this subject.

In addition the following two free form answer questions were also part of the survey:

- (1) What did you like particularly in the subject?
- (2) Please suggest any improvements that could be made to the subject.

The responses to the freeform questions were the subject of a preliminary analysis which identified a number of common themes. In consolidating these preliminary themes, four key themes emerged from this qualitative data as follows:

- (1) improved course effectiveness;
- (2) change in teaching staff;
- (3) implementation of an ELIS; and
- (4) the shift to collaborative group work.

Table I shows the number of students who participated in the subject survey each semester.

Figure 1 presents a comparison of the five semesters of the SFSs by question. As can be seen there has been a steady increase in all question scores and hence student satisfaction during this measurement period.

4. Integrating ELIS into the classroom

Since the first offering of the subject in 2009, F&IT has been through three versions. In the original version of the subject (2009 and 2010) the focus was very accounting intensive with numerous practical tasks requiring knowledge of both accounting principles and Microsoft Excel to undertake these tasks. The second iteration of the subject (2011 and 2012) saw the lecture component change to cover financial principles rather than accounting principles and terminology and use Pearson’s MyFinanceLab (MFL) for the practical components of the subject. In the current iteration of the subject (2013) the lecture component was amended further to cover concepts related to finance for IT businesses and collaborative group work was introduced into practical components of the subject.

Semester 1	Total students	No. of respondents	Percentage
2009	148	58	39
2010	128	53	41
2011	168	65	39
2012	163	72	45
2013	174	56	32

Table I.
Respondent numbers
and percentages

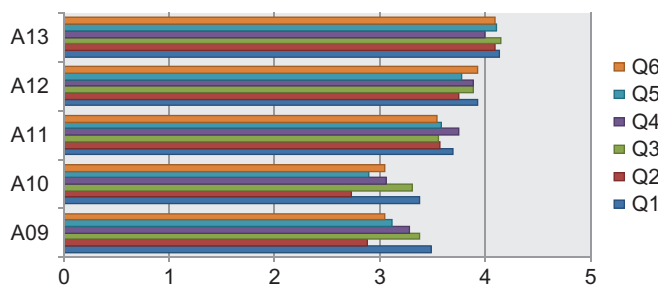


Figure 1.
Comparative results of the
SFSs over five semesters

4.1 Improved course effectiveness

Figure 1 highlights a steady increase in student satisfaction with the subject over the five semesters where data has been collected. The change in content over the three iterations of the subject has no doubt had an impact on the scores obtained from the SFSs.

In the first iteration of the subject, the 2009 and 2010 offering, the lecture material and practical components of the subject which were neither engaging nor realistic for IT students, as is clearly indicated in the SFS. Lecture material focussed mostly on accounting principles, terminology and example transactions while the practical component was heavily focused on understanding and processing accounting transactions. This also required students to possess a detailed understanding of Excel in order to produce the appropriate accounting solutions.

For the 2011 and 2012 offerings, the subject moved away from this accounting base. The lecture and practical components of the subject shifted to focus on financial principles. This removed the need for IT students to become familiar with, and understand accounting principles and terminology, as the emphasis was now placed on understanding financial management and reporting. The practical component utilized MFL and removed the need for students to work with Excel in order to process numerous accounting transactions on a weekly basis.

Finally in 2013, the lecture content again changed with the subject focused on presenting concepts related to finance for IT businesses. To compliment this change the practical component was undertaken through collaborative group work among students where IT businesses were set up and appropriate financial transactions were negotiated and suitable financial reports produced.

Comments taken from the 2010 through 2013 student surveys are shown in Table II. These comments indicate support for the change in subject content from an accounting to financial management focus. Also, the 2010 student survey comments support this notion of a heavily focused accounting subject, while the 2011 and 2012 student surveys indicated support for the change to financial management and the use of the MFL application. The 2013 comments predominantly support the subject structure changes.

4.2 Change in teaching staff

To coincide with the change in content in 2011 the original instructor retired and a new academic instructor took over the subject. This change in staff also drove large-scale change to the subject content as one of the original tutors took over the lecturing component. Having had experience with the subject content in both the 2009 and 2010 offerings the new lecturer had a comprehensive understanding of the problems faced by all students in relation to the accounting content. The subject content was drastically changed with both the lecture and practical components of the subject being aligned to an Australian textbook which also incorporated an integrated online component accessible via MFL.

Table III lists appropriate comments extracted across all student surveys which indicate that the change in teaching staff had an overall positive outcome for the subject.

4.3 Implementation of an ELIS

Successful integration of an ELIS into coursework subjects has been documented in the literature. A study by Alsabawy and Cater-Steel (2012) on students who participated in a trial of eLearning versus traditional learning, found eLearning to be an effective method

Positive	Negative
<p>“Material available is comprehensive and well documented with in depth analysis of concepts and definitions” (2010)</p> <p>“[. . .] it gives us a fundamental of finance and it since IT students don’t learn finance, however somehow we just need it to understand it” (2010)</p> <p>“My Finance lab was good. Very easy to self-learn, particularly if you had the textbook. I loved especially how they linked you to the pages in the text book. And I very much loved the show me an example thing for questions, particularly when some questions couldn’t be found in the book” (2011)</p> <p>“[The lecturer] used real world examples sometimes (e.g. tax, credit rating, airplanes, etc.) so we could see that finance is actually applicable in these cases” (2011)</p> <p>“The way [the lecturer] conducts her lectures and makes the subject interesting and fun to learn. The online labs are a really good way to learn this subject and fully understand the formulas” (2012)</p> <p>“I like the fact that Finance and IT concepts are balanced and that it does not involve too much of accounting formulae or maths in general. It provides a perfect balance as the name of the subject suggests” (2013)</p> <p>“A very practical subject which is something that I think benefits me more than a typical theory subject” (2013)</p> <p>“The lectures were so well documented and were presented in a clear and structured manner. The flow of the lecture allowed for questions or comments. The topics were interesting and useful” (2013)</p>	<p>“Some notes are unnecessarily complex for a subject that doesn’t assume any previous knowledge/experience in finance” (2010)</p> <p>“Too much material is covered in each weeks lecture. Some concepts are difficult for students with non-business backgrounds and insufficient time is given to these topics” (2010)</p> <p>“The subject has been named FINANCE AND IT. And therefore, the finance taught in the subject should be moulded to suit especially the IT students wanting to pursue managerial roles” (2011)</p> <p>“The subject is called ‘Finance and IT’ however it has nothing to do with IT! Please rename the subject so other students do not make the same mistake I did” (2011)</p> <p>“We need more material for this subject to help us understand the concepts” (2012)</p> <p>“[. . .] IT people, don’t need finance. [The Faculty] should remove this from core subject into an elective” (2012)</p> <p>“There is no point to this subject and there is no direction. There is absolutely no IT component and only includes some basic concepts of business which I learnt in first year” (2013)</p> <p>“[. . .] the subject does not seem to relate at all to finance nor IT” (2013)</p>

Table II.
2010-2013 student
comments about
subject content

which also deepened the student understanding of the subject. Jones and Gregor (2006) support this premise by suggesting that an IS used to support learning has a distinct advantage over competitors that do not integrate ELIS into their coursework.

An important factor we believe improved the survey scores was the introduction of an ELIS for the practical component of the subject to replace transaction processing and the use of Excel. In 2011 and 2012 the subject utilized the MFL application which provided students with an eLearning tool consisting of online examples with explanations, weekly tutorial quizzes, practical questions and online help facilities. This ELIS was also used for several assessment items in the subject (a mid-semester exam and an assignment). Through the use of the MFL application, a technical understanding of both accounting and Excel was not needed to successfully complete the practical component of the course (and of course the overall course).

Positive	Negative
<p>"I enjoyed TRYING to learn accounting" (2010)</p> <p>I had no understanding of finance whatsoever. But my tutor was fantastic and was always willing to help me through the problem step by step if I needed any help. "[The lecturer] made the lectures interesting even with material that was so boring, I can't imagine having any other lecturer" (2012)</p> <p>"The way [the lecturer] conducts her lectures and makes the subject interesting and fun to learn" (2012)</p> <p>"[The lecturer] was able to teach the subject well and create an enjoyable environment. In my opinion best tutor/lecture I've had so far in my uni life" (2013)</p>	<p>"[The lecturer] talks about material as though the students already have a background in Accounting" (2010)</p> <p>"[The lecturer] does not explain things in great detail sometimes when more detail is needed" (2011)</p> <p>"More communication between students and tutors" (2012)</p> <p>The tutor also seems clueless – not understanding any basic principles of accounting (which is considered necessary, although to demonstrate the use of "double entry bookkeeping, which is an important part of accounting, a simple YouTube video was shown during the lecture – perhaps a reflection on the quality of teaching)" (2013)</p>

Table III.
Student comments
on teaching staff

The second ELIS implemented into the subject was a toolbox from The Australian Flexible Learning Network which replaced the MFL application. The use of a learning-assisted toolbox titled "A Balancing Act" enabled the students to self-pace their learning of key financial concepts to help them achieve a positive learning outcome as per the SFS feedback. The toolbox provided students with case studies, exercises, examples with explanations and a series of templates to be used to produce financial reports.

From the surveys undertaken in 2011-2013 comments regarding the use of the two ELIS's are shown in Table IV. In the main they show that students were very positive towards the ELISs.

4.4 *The shift to collaborative group work*

The implementation of second ELIS coincided with the introduction of collaborative group work in the practical component of the subject in 2013 and this (the collaborative group work) is also considered to be a factor which has contributed to the improved survey scores. Collaborative group work was used in conjunction with the flexible learning toolbox (FLT) as a means to engage the students in the practical work. While the collaborative group work was the driver behind the engagement of students, the toolbox ELIS was used to help students produce the outputs required for the subject. The collaborative group work encompassed the setup of a virtual business and the ability to work on industry based scenarios each week.

Comments taken from the 2013 survey are shown in Table V and highlight the student satisfaction with the practical component of the subject being totally reliant on group work.

Positive	Negative
“The integrated online component, allowed students to do their work anywhere and still learn deep content” (2011)	“[...] there is too much reliance on the Pearson education online application” (2011)
“The new online format was great, I am a practical person and hence the online questions were fantastic ways for me to improve my knowledge” (2011)	“The online material should explain the correct result of the quizzes and lab so that we IT people don’t get headaches on how to achieve the final result” (2011)
“MyFinanceLab provides step-by-step instructions on how to calculate financial concepts such as Net Present Values and Relevant Cash Flows” (2012)	“The labs should be compulsory students would learn a lot more if they showed up. Then again, it was a lot easier going to a lab with only 5 other people” (2012)
“I liked being able to do the labs from home, made the subject so much easier to get through” (2012)	“More work needs to be put into providing worked solutions to students, this would benefit them greatly” (2012)
“The subject was quite hands on. The trading was very good and a great learning experience” (2013)	“[...] ensure that groups trade with other companies created in tutorials” (2013)

Table IV.
Student comments
regarding the ELIS

Positive	Negative
“One of the best parts of this subject is that it forces groups to trade with each other between tutorials. A great experience – it’s a shock at first but it’s a fantastic experience for students”	“[...] the tutorial work is pointless and has no reflection on anything at all – setting up a business is not as simple as [just] arbitrarily throwing scenarios at these businesses each week does not really have any meaning”
“The tutorial activities – i.e. Virtual Business. Really helps when you’re able to apply concept to real life situations”	“[...] ensure that groups trade with other companies in tutorials. I have heard one person made up their trades”
“Meeting up with group members, slacking off in class, having a reason to talk to the pretty girls”	“[...] make it easier to trade with other groups”
“It was a very practical subject which is something that I think benefits me more than a typical theory subject”	“Improve the tool box [...] now it is useless”
“The subject was quite hands on. The trading was very good and a great learning experience”	
“[...] introduce fake trades/companies”	

Table V.
Student comments
concerning group work

5. Engaging students in non-domain specific content

The hardest thing for academics to achieve is student engagement in the classroom. To achieve this, a series of changes were completed in the subject Finance and IT and this has delivered enhanced learning outcomes for both students and academic staff. This can be witnessed in the results of the standard university student surveys taken over the last five years in both the scale questions and the free-form student comments. Reflecting on why the subject has delivered better student learning, a number of factors come to light which may or may not have been reflected in the survey data presented in this paper.

This shift from accounting principles, terminology and Excel transaction processing to financial management and online practical materials has made the subject less theory-based and more engaging. This has been a major driver in improving student

engagement with the subject content (both theory and practice). The online learning environment coupled with the collaborative group work has seen students engage with the content through the use of practical and experience based scenarios as opposed to the previous theory-based learning approach. The interaction among all groups in the subject (both in their own tutorial and all other tutorials) as the groups “traded” with each other to compile a set of financial reports.

The vehicle for this interaction has been collaborative group work where student groups have developed their own virtual business. This journey has taken each student group through the various stages from business start up to business operations. This collaborative work has enabled students to enhance their knowledge of business process and strategies. To be able to see the true workings of a business, to use business terminologies and gain a fundamental understanding of business practices. Many of the students gain confidence during the semester being able to communicate with their peers in a business like environment. These group-based scenarios have shown that student engagement is achieved at a high level and the outcomes are positive for both the student the staff. In fact, one of the authors commented that this collaborative group work had produced the highest level of engagement among students witnessed in their more than ten year academic career.

Another driver in successfully engaging students with the subject content was the change in teaching staff. The original academic (a former accountant) clearly had a preconceived idea about what type of content students needed to grasp and also how this content should be taught. The results from the surveys would suggest that this style was unacceptable in the view of the students enrolled in the subject. The new academic staff member (a former finance manager) was amenable to change and very proactive in re-writing the content and in determining the most appropriate means to engage students in the subject’s practical components. Hence, the introduction of MFL mostly received good responses from the two student cohorts.

As the first eLearning application used in the subject, MFL paved the way for improved student outcomes. Several issues were encountered with MFL which included being a third party application, relying on multiple choice questions more than practical questions and allowing students the ability to have multiple attempts at attaining the correct answer. However, the concept of the eLearning application was the right direction for the subject and the second application, the FLT, was incorporated into the subject this year.

The current eLearning application used in the subject, the FLT, coupled with the concept of collaborative group work has provided the latest (to date) component in the improvement of this subject. Providing a toolbox consisting of examples, tools and techniques from which their practical group work could be based has ensured an engaging learning experience for all students.

6. Conclusions

To undertake this study three segments have been identified as follows: the service of the IS, the delivery of the system and the quality of the ELIS. These elements have been scarcely noted in the research as a combined components, although, as an individual paradigm each element; namely service, delivery or quality, has been the focus of previous studies. So incorporating these elements under the ITIL framework enables not only the academic but the learner to gain the best outcomes from the experience.

Introducing the use of ITIL into the classroom, and explaining this to the students, that a business strategy has been utilised to help them understand their learning within a classroom, would also give these IT students a fundamental knowledge of why businesses across the globe actually follow the guidelines of the ITIL. In doing so, we are giving the students a very different learning aspect, not only do they have a hands on approach to learning the basics of finance and setting up their own business, but we also get them to understand that having a business process in place will help them when they enter the work force in future years.

This paper has reported on information collected from the standard SFS conducted by the university. The findings have shown that engaging students in subject content relies on more than the delivery of material through various medium. Students are more engaged when working in groups and when coupled with the ability to collaborate across groups, the learning environment provides an appropriate means to foster improved student outcomes.

eLearning, although introduced more than two decades ago, still has a long way to go in order to provide suitable benefits to developers, academics and student. Hence, an appropriate ELIS combined with collaborative group work is a viable option to engage students in content which is not from their specific area of study.

7. Limitations and future research

A limitation of this research on engaging IT undergraduate students with non-IT specific content is that it is restricted to one subject within our university which has used two different ELISs. As such, this research provides a limited snapshot of delivering non-IT content to IT undergraduates.

Several avenues of future research are envisaged at this point in time. First, analysis of data previously collected from enrolled students via:

- (1) an anonymous open-ended questionnaire (2011 and 2012); and
- (2) a directed in-class group presentation (2013).

Both mechanisms obtained feedback from students on the operation of the subject and areas where improvements to content could be made and additionally in 2013 each student group provided feedback on how the group work aspect of the subject could be improved. Using this feedback, new or complimentary themes will be identified and then explored in detail to highlight areas where further improvements to the operation of the current ELIS. It is also envisaged that the current ELIS will be evaluated using an appropriate framework (Abdellatif *et al.*, 2011; Khan, 2004; MacDonald *et al.*, 2001 or Schewe *et al.*, 2005).

Second, future research will expand ELIS research by investigating an individual's learning perspective in regards to using an IS in an eLearning context. This will benefit not just the specific subject discussed in this paper but potentially any ELIS implementation as it will provide a means to ensure easy integration for academics no matter what the subject content involves. The future study aims to analyse traditional theories of self-regulated learning and compare these to new categories of learning which are derived from working both within and across groups.

Finally, future research will include more focus on the service delivery and quality of the ELIS to help ascertain if these components are significant and therefore warrant investigation under a framework such as ITIL. In doing this the aim is to establish whether ITIL is an appropriate approach to oversee the incorporation of an ELIS in the classroom.

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About the authors

Sandra Gallagher is a Learning Designer and Casual Academic at the University of Technology, Sydney, Australia, where she helps academics in the Faculty of Engineering and IT, align their courses to the universities strategic plan. Her academic teaching involves, Introduction to Information Systems, Project Management, and Business Processes and Strategy. Sandra has 25 years industry experience predominantly with a business management and financial background.

Alan Sixsmith is a Lecturer in information technology at the University of Technology, Sydney, Australia, where he mainly teaches project management and other IT management subjects. Before entering academia, Alan spent 20 years as an IT Practitioner working in software development, project and IT management and IT consulting. Alan Sixsmith is the corresponding author and can be contacted at: alan.sixsmith@uts.edu.au

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