

SkillQuests: Bringing real life to the classroom with a collaborative computer-based instructional tool

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This paper explores the development and implementation of a structured computer-based learning tool, named a “SkillQuest”, for undergraduate students studying introductory project management at Bond University. This SkillQuest, “*Making sense of all the dollars*” was developed as an alternative to a lecture on project budgeting. Students are placed in a real-life working environment via a project scenario relevant to their chosen degree. In alignment with the theories of Gestalt, Constructivism and Experiential Learning, the SkillQuest provides a collaborative, student-centred approach where the lecturer acts a facilitator to the learning process. Student survey responses indicate the SkillQuest was a useful learning tool, interesting and a pleasant change from lectures. Statistical analyses of exam results support the use of the SkillQuest as a teaching tool. Use of the SkillQuest to actively engage students in the learning process was deemed a success. It is the belief of the authors that this type of computer-based, collaborative learning can allow students to learn more interactively and in an environment that more closely aligns with their learning preferences. Such a tool can be used in any university discipline in place of the traditional lecture-style approach or as a complement. SkillQuests can be undertaken with the instructor present in a classroom setting or as homework, making them also useful for online studies. This was a small pilot study in a single application. The authors hope that others will adapt this tool for use in their classrooms.

Keywords: computer-based active learning tool, scenarios, project management, collaborative

Background

Purpose of this paper

The purpose of this paper is to introduce the concept of a SkillQuest (SQ) as a learning tool for use in university instruction. In doing so it:

- Defines the general term “SkillQuest”;
- Describes the purpose of this specific SQ and its target audience;
- Introduces and outlines the scenario upon which the SQ is developed (i.e. explains the problem the students are asked to address);
- Discusses the alignment of this SQ with various learning theories; and
- Analyses both qualitative and quantitative data as to the effectiveness of the SQ as a learning tool.

Introduction: Why was the SkillQuest developed?

In an introductory Project Management subject for the Bachelor of Property and Sustainable Development Degree at Bond University, the lecturer sought a better, alternate, method of delivering the content which would make it more interesting and provide more active learning opportunities for students. A computer-based instructional tool, named a “SkillQuest”, was developed to assist students in learning subject content through a collaborative, interactive, problem-based process. Nine core knowledge areas (i.e. elements) of project management were taught within this subject. One area, cost development, was selected for a pilot study on the efficacy of the use of a SQ in delivering the content. This SQ was aptly named “*Making sense of all the dollars*”.

The traditional lecture-based format of instruction continues to be used extensively in teaching, especially in university courses (Prince, 2004). Since the traditional lecture will appeal mainly to one learning style, a multi-modal delivery (which appeals to multiple learning styles) is considered to be more effective

(Sivilotti & Pike, 2007). One study on the traditional model showed that the basic lecture was “generally ineffective as a teaching method over others, such as learning by doing and situated learning” (Howard, Morgan, & Ellis, 2006, p. 2). Furthermore, according to Sivilotti & Pike (2007, p. 362), the lecture has been shown to result in “decreased student engagement, frequent student inattention and exclusion of nonverbal learning modalities”.

What is a SkillQuest? Applications and expected benefits

A SQ is a structured computer-based lesson, which is designed according to the template for a Webquest, having an Introduction, Task, Process, Resources, Evaluation, & Conclusion. Webquests were designed by Tom March & Bernie Dodge, as a student-centred, project-based approach for information inquiry (Dodge, 1995). They are mostly designed as group activities and an important requirement of a WebQuest is that it allows students to apply what they’ve learned to a new situation (Dodge, 1995). In contrast to a WebQuest, which requires students to research and access information on the internet, a SQ provides all of the required materials as links within the SQ. This avoids the problems of students getting off task and ‘surfing’ on their own. It also keeps students focused on the information provided.

SQs are suitable for use across all disciplines within universities, schools and corporate applications. SQs are easy and cost-effective to develop as they require only basic software, such as Microsoft Publisher.

The use of computers to assist in the learning process has been shown to provide positive outcomes such as improved student performance and attitudes (Kulik, Kulik & Cohen, 1980; Khalili & Shashaani, 1994). Brucklacher and Gibert (1999) found that activities requiring the application of knowledge provide improved learning outcomes. In addition, learning is also enhanced by activities that develop students social skills, such as collaboration and accountability. The structured process adopted in the development of a WebQuest can facilitate the development of new knowledge. (Patterson & Pipkin, 2001). One study found that WebQuests can help to inspire students to learn. (Gorghiu, Gorghiu et al, 2005).

Project cost development SkillQuest

Please see Appendix A for an example from the SkillQuest pages.

Purpose, target audience, timeframe and variations

The purpose of the SQ was to acquaint students with the key planning processes used to develop the Project Budget. It was aimed at undergraduate students studying an introductory project management subject within a sustainable development degree. No knowledge of sustainable development related studies was required to complete the activity and it was therefore suitable for any undergraduate students studying project management. The project upon which the scenario is based could be easily altered to make it more appealing to other areas of study.

The SQ was designed for use within the classroom, in groups of three, in place of a traditional lecture, with the teacher present to provide guidance as required. However, alternatively, it could be an individual online homework task and hence be useful for external study. The SQ could also be used in conjunction with a traditional lecture as an active reinforcement, making it appealing to subjects held in intensive mode. The duration of this SQ is 2.5hrs to allow its use in a 3hr class timeslot. The SQ could be run over 2 class time slots if a 3 hour window was unavailable.

The scenario: The project in question

The scenario: A company has been engaged by the local school to plan and build a new sustainable classroom. The project manager for this project has left rather suddenly and the student (an employee of the same company) has been asked to take on this role temporarily, without any formal handover. The project budget had recently been presented to the boss and he has asked the new project manager (i.e. the student) for a detailed explanation/justification of it. In order to respond to the boss’s request, the new project manager must first *understand* some key processes and techniques and then *apply* this knowledge in *analysing* the budget spreadsheet provided.

Given a tight timeframe, the boss kindly allocates 2 other employees to assist the project manager (the student), both of similar knowledge and experience to him/her. Hence the stage for group work is set. The first section of work, which requires the explanation of the key terminology, is divided among the 3

participants and they are then required to explain their findings to each other before proceeding to the budget analysis stage.

Guidance provided

A mentor is provided to assist the project manager and his/her group. The group is not allowed to proceed to the budget analysis stage until they have liaised with the mentor and he/she is satisfied that they have understood the key terminology. The lecturer fulfils the role of the mentor. Finally, the group meets with the boss and provides their justification of the budget. Again the lecturer acts as the boss and takes the opportunity to address any questions the students may have.

The SkillQuest as a teaching and learning tool

The theoretical underpinnings of this SQ lie within Gestalt theory, Constructivist theory and Experiential Learning theory. Gestalt theory states that learning is best achieved if based on understanding (Munn, 1942). This is referred to as ‘insightful learning’ and occurs when the student has understood the principles behind the material to be learned, rather than just memorising specific information (King, Wertheimer, Keller, & Crochietiere, 1994). Once insightful learning has been achieved, the learner can easily apply what they have learned to new situations and will retain the knowledge for a long time (Hergenhahn & Olson, 2005). This is supported by experimental studies conducted by both Wertheimer and Katona (Hergenhahn & Olson, 2005; Munn, 1942).

The SQ, in comparison to the traditional lecture, puts the onus on the students to understand the key terminology. In order to complete the second half of the SQ, they need to apply their knowledge of the key terminology, obtained in the first half, to a real-life example. Hence, they cannot complete the SQ if they haven’t first understood the necessary concepts. Thus, in alignment with Gestalt Theory the SQ lends itself to a greater probability that the students will remember the terminology because the learning is based on understanding, not simply rote learning.

The SQ also aligns well with some key concepts of John Dewey’s Constructivist theory and Carl Rogers Experiential Learning Theory, as shown in the table below.

Table 2: Alignment of SQ with key concepts of John Dewey’s constructivist theory and Carl Rogers experiential learning theory

John Dewey & Carl Rogers key concepts	SkillQuest alignment
Curriculum should be integrated and based on student’s interests (Roblyer, 2004). The student perceives the subject matter as being relevant to him/herself. (Rogers, 1969)	Introductory project management is a compulsory subject for 3 of the 4 majors of Bond University’s Bachelor of Property and Sustainable Development Degree. A reasonable level of interest in the scenario provided by the SQ is assumed based on the students’ choice of degree.
Lecturers should encourage student-centred experiences that are flexible to meet the needs of different students (Krause et al, 2006; Glassman 2001). The student actively participates in the learning process and has some control over its nature and direction (Rogers, 1969).	The students are at the centre of the learning experience, being actively involved in understanding and applying the knowledge. By having the SQ on their individual computers and being able to navigate around the site at their own pace and select what supporting materials they wish to use, the students also have a degree of <i>control</i> over this <i>flexible</i> learning experience. The SQ can also be completed individually at home.
Education should focus on developing life-long skills and occur via connection with the real-world rather than only the curriculum (Roblyer, 2004).	The SQ is based on a <i>real-life</i> scenario, a project the students may well find themselves working on at some stage in their careers.
The teacher acts as a facilitator to the learning process, rather than prodding or dominating students. (Rogers, 1969)	The teacher’s role in the SQ is clearly of a <i>facilitating</i> nature. The students are the centre of the learning process and the teacher acts as a guide to this learning.

Results and analysis

Qualitative

Methodology

A small pilot study, n=55 on the effectiveness of the SQ as a teaching and learning tool was conducted. On completion of the SQ, students were asked to fill out an anonymous online questionnaire, consisting of multiple choice and short answer questions. The link to the questionnaire was provided on the SQ site at the student feedback page.

The SQ has been used in three introductory project management classes since its creation: an undergraduate class of 18 students (17 attended SQ class) in January 2008; an undergraduate class of 32 (20 attended SQ class) students in May 2008; a postgraduate class of 18 students in May 2008.

Findings

As a result of the surveys, it was found that a significant majority of students believe the SQ was a useful learning tool and a pleasant change from lectures as seen in Figure 1 below.

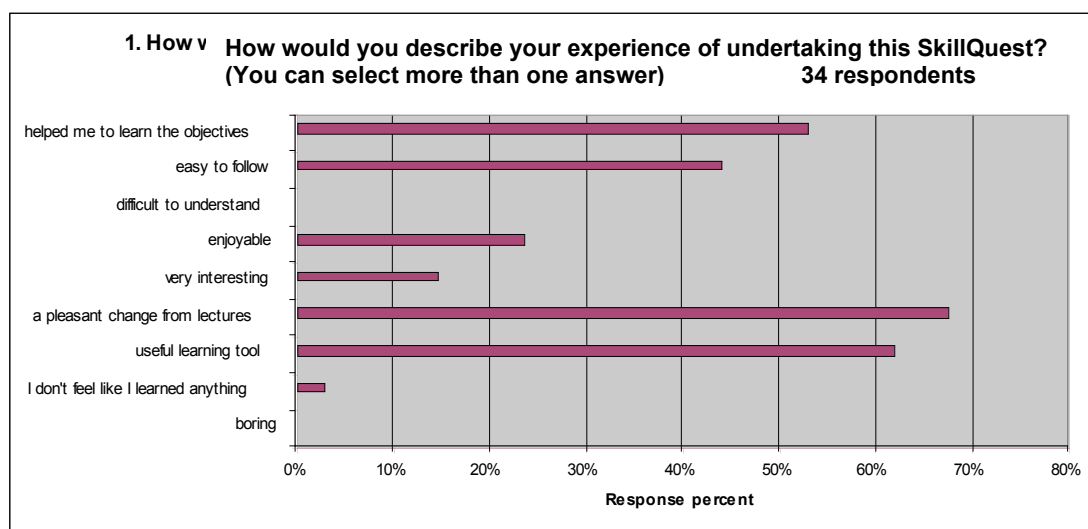


Figure 1: Student responses relating to their SkillQuest experience

When asked the question “Did you find the SkillQuest more or less interesting than a traditional lecture?” an overwhelming 31 of 32 respondents (97%) indicated they found it more interesting. In addition, when asked “Do you think that this SkillQuest helped you to achieve its objectives? i.e. to learn what you were meant to learn”. Nearly all students, 32 of 34 (94%) indicated that the SQ did help them to learn the lesson objectives.

Twenty-five students responded to the question “What did you like best about this SkillQuest? Why?” The most frequent responses given were: Practical/do it yourself (6); Interactive (3); Group/teamwork (6). Some specific student responses include:

Practical, hands-on, clearer understanding because you're getting in and doing.
Good learning tool, applying it, not just learning theory.
Closest thing to a fun way of learning the topic properly.

The survey clearly indicates the SQ was well-received by students.

Quantitative

Methodology

A quantitative, experimental design was employed to investigate the impact of the SQ on the results of undergraduate mid-term examinations. The mid-term exam, consisting of multiple choice and short answer components, was given to student groups before (2007) and after the SQ was developed (2008).

The short answer section has been analysed for the purposes of this study. There was a slight difference in the exams administered in 2007 and 2008.

As the subject is compulsory for most students studying a Sustainable Development related degree, the samples are assumed to be normally distributed and hence the data were analysed using an independent samples t-test. Levene's homogeneity of variance was calculated. The analysis compared the performance in 2007 and 2008 on the cost management section of the exam and the other sections (scope and time management) as well as the exam as a whole.

Hypothesis 1: Use of SQ would result in improved overall exam grade.

Hypothesis 2: Use of SQ would result in improved grades on the exam for section that specifically addresses cost management.

Hypothesis 3: That the grades on the other sections of the exam (Scope and Time management) would stay constant.

Findings

Hypothesis 1: There was a significant improvement in overall exam grade across from 2007 to 2008 $t(69) = 4.07, p < .001$. 2008($M = 66.67, SD = 18.01$); 2007($M = 50.86, SD = 14.28$).

Hypothesis 2: There was a significant improvement in grades for the cost management component in the exam across 2007 to 2008 $t(69) = 4.31, p < .001$. 2008($M = 70.40, SD = 21.37$); 2007($M = 52.17, SD = 13.04$).

Hypothesis 3: There was also a significant improvement in grades for the combined Scope and Time management sections across group 1 and group 2 $t(69) = 3.30, p < .01$. 2008($M = 64.83, SD = 19.22$); 2007($M = 50.00, SD = 18.39$).

Analysis and Interpretation

An analysis of the data shows that whilst the marks for the cost management section did improve significantly when the SQ was introduced, the marks also improved in a similar proportion, for the other sections of the exam. The improvement in the performance on the other sections of the exam could possibly be attributed to additional active learning teaching tools (kinaesthetic manipulatives) introduced in those semesters as a complement to lectures. However, it is acknowledged that this improvement may be attributed to other factors and further study is necessary to justify the benefits of the SQ in relation to exam performance.

Conclusion

This SQ, within a university setting, has been shown to be well-received and a useful learning tool. It is the belief of the authors that this type of computer-based, collaborative learning can allow students to learn more interactively and in an environment that more closely aligns with their learning preferences. Such a tool can be used in any university discipline in place of the traditional lecture-style approach or as a complement. SQs can be undertaken with the instructor present in a classroom setting or as homework, making them also useful for online studies. The results of this small pilot study in a single application are encouraging and warrant adaptations of this tool for use in other classrooms.

Suggestions for future study

To further investigate SkillQuest impact on student exam results, student related variables such as grade-point-average, age, gender, and program of study would need to be examined to determine their influence on exam results and to justify the assumption of a representative normally distributed sample across semesters.

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Appendix: An example from the SkillQuest pages



Principles of Project Management for undergraduate students

Making sense of all the dollars! Understanding Project Budgets

Introduction

PMBOK Background

Objectives of this web quest

Your task

Project background info

Deliverables & requirements

Task duration

The process to follow

Resources to assist you

Evaluation of your performance

Conclusions

References

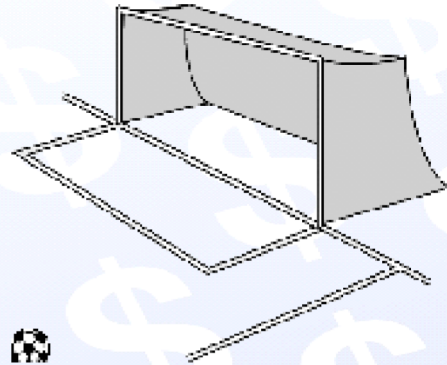
Student feedback please!

Notes for instructors

Objectives of this web quest

On successful completion of this web quest, you should be able to:

1. **Distinguish** between cost estimating and cost budgeting;
2. **Distinguish** between the four cost estimating techniques;
3. **Explain** what a project budget consists of;
4. **Understand** the various cost budgeting techniques;
5. **Distinguish** between direct and indirect costs; and
6. **Explain** what a contingency reserve is used for



[Introduction](#) | [PMBOK Background](#) | [Objectives of this web quest](#) | [Your task](#) | [Deliverables & Requirements](#) | [Task duration](#) | [The process to follow](#) | [Resources to assist you](#) | [Evaluation of your performance](#) | [Conclusions](#) | [References](#) | [Student feedback please!](#) | [Notes for instructors](#) | [Home](#)