An effectiveness evaluation of an online learning environment

Shirley Agostinho and Jan Herrington
Faculty of Education
University of Wollongong
Australia
shirley_agostinho@uow.edu.au, jan_herrington@uow.edu.au

Abstract: This paper reports on an effectiveness evaluation conducted on a postgraduate course that was delivered totally online. The purpose of the evaluation was to determine whether the course was effective in terms of facilitating student learning, and to gain insight into how the course could be improved for subsequent offerings. The purpose of this paper is to provide an example of how an effectiveness evaluation can be conducted in order to guide practitioners in evaluating online learning environments. The evaluation design is explained and the findings of the evaluation are presented.

Introduction

An educational technology postgraduate course on evaluation was implemented by incorporating the use of a scenario whereby assessable tasks were grounded within the context of a fictitious consultancy company. The scenario was driven by the use of a fictitious character—a 'Chief Executive Officer' (CEO) and the reconfiguration of the teacher as a company-recruited 'Academic Advisor'. The use of character was intended as a motivational device to drive the online activity for the course, which was delivered completely online to a predominantly offshore student cohort. The course was evaluated to determine whether the use of this scenario-based strategy was effective in facilitating student learning and what improvements could be made for future offerings of the course. The evaluation design is the focus of this paper. The evaluation findings are summarised.

The course design

Students were immersed in the role of new employees in the company. Tasks were assigned by the CEO in the form of 'commissioned work', and the company's Academic Advisor (the teacher) provided appropriate support for the completion of the tasks. The scenario was to provide an evolving, engaging and authentic framework for learning about implementation and evaluation of educational technology.

The nature of the content was influenced by the idea of creating evaluation tasks of increasing complexity, starting with a small-scaled task and working towards more complex tasks. Just as in real life, a new employee might be given more straightforward tasks and then move towards more complex tasks as they become fully involved and capable members of the company. Thus, the sequence of tasks would serve as a scaffold for learners.

The plan devised for sequencing student activity is illustrated in Table 1. Each activity phase (apart from the first) led to the production of an assessable piece of work. The rationale for each phase is explained and the artefacts produced by the students are outlined. (For more detail about the course design, see Meek and Agostinho, 2003.)

The implementation

Ten students (all part-time) were enrolled in the course. There were five women and five men. Nine students were offshore and one male student was interstate. The nine offshore students knew each other as they had been a student cohort for the previous 18 months. The interstate student did not know the other nine students.

The course was implemented using the following information and communication technologies:
- Course web site (housed on the faculty server).
- Email mailing list (used to provide course updates to the students and as an asynchronous discussion tool for the first four weeks of semester).

- WebCT site that provided access to online library resources and synchronous and asynchronous discussion tools (chat and discussion forum respectively). The discussion forum was used from Week 5. (Due to technical problems experienced with the university's learning management system, the teaching team was advised to implement the course web site on the faculty server and utilise email as the an asynchronous communication mechanism until the problems were rectified.)

Table 1: Five phase delivery plan

Phase	Activity and Rationale	Artefact produced
Orientate	Discuss subject objectives, assessment requirements, content, delivery strategy, etc. Trial/test the technology (i.e., online access and tools). Explore initial perceptions about subject content.	• Learner profile stating initial perceptions about the subject content and expectations of the subject (non-assessable)
Do	Conduct a small usability evaluation (instrument supplied) to foster 'learning by doing' to anchor thinking about evaluation issues. Reflect on initial task and propose an alternate approach.	• Usability evaluation results and reflection • Alternate usability evaluation approach and rationale
Explore	Examine other perspectives about evaluation by critiquing several evaluation studies.	• Critique of Evaluation Studies
Apply	Transfer 'theory' into 'practice' by writing an evaluation proposal.	• Evaluation Proposal
Reflect	Reflect and assess overall understanding of content by constructing a concept map, considering initial perceptions, and reviewing a peer's evaluation proposal.	• Concept Map and reflection • Evaluation Proposal Peer Review

An introductory workshop comprising three online chat sessions took place whereby the teacher provided an orientation to the course and the technologies used. A warm-up activity, where 'employees' had to devise a company name, was used to encourage students to start thinking in company-mode. This also enabled the class to trial the communication technology. At the conclusion of this orientation phase of the course, the students were ready to commence their first task.

Each assessable task culminated in the completion of one phase of the course. Each phase was initiated by an agenda distributed by the CEO in the form of a Company Minute based on a meeting held between the CEO and the Academic Advisor. This mechanism drove the scenario and was intended to serve the following:
- Provide a realistic and plausible reason for student action;
- Create the illusion of greater 'presence' in the learning space; and
- Provide scaffolding to support learning (each company minute contained advice in the form of guidance on how to complete the complex tasks).

The evaluation

The purpose of the evaluation was to determine whether this implementation was effective in terms of facilitating student learning, and to gain insight into how the course could be improved for subsequent offerings. Thus, this evaluation is best described as an *effectiveness evaluation*. To undertake this kind of evaluation, the following evaluation frameworks were considered:
- An integrated evaluation framework (Bain, 1999). (An adaptation of the framework by Alexander & Hedberg, 1994.)
- A learning-centred framework for whole project evaluation (Phillips, Bain, McNaught, Rice, & Tripp, 2000). (An adaptation from Alexander & Hedberg, 1994, and Bain, 1999).
- A decision-oriented rationale for evaluation (Reeves & Hedberg, 2003)

These evaluation frameworks are appropriate for evaluating an educational innovation and provide guidelines for evaluation in each of the major phases of the innovation project, such as, design, development, implementation and institutionalisation (Bain, 1999). Thus, the frameworks encompass both formative and summative evaluation.

This evaluation focused on the implementation phase of the Bain (1999) and Phillips et al. (2000) frameworks. These two frameworks provided overall guidance as to the relevant issues to address in the evaluation and suggested appropriate methods to maximise data collection for the summative purpose of this evaluation. Reeves and Hedberg (2003) offered guidance by providing scaffolding for the evaluator in the form of four questions, each of which is addressed below.

What kinds of decisions can be anticipated from the evaluation?

The evaluation was required to inform a decision on whether the course should continue to be offered in its redesigned format, and whether any improvements could be made to the course.

What questions need answering in order to make the decisions?

Six questions were devised to inform the anticipated decision and are listed below. These questions were formulated based on the guidance offered by the Bain (1999) and Phillips et al. (2000) frameworks, namely to consider what learning outcomes were achieved and whether the design of the course was educationally appropriate.

1. What were the students' perceptions of the use of scenario in this course in terms of facilitating their learning?
2. What were the students' perceptions of the learning design (that is, the sequence of tasks, the resources provided and the support mechanisms supplied) in terms of facilitating their learning?
3. Was the online implementation strategy effective in facilitating student learning?
4. What learning outcomes were achieved?
5. What were the students' perceptions about their learning experience?
6. What improvements can be made to this course?

What information is needed to answer the questions?

To answer the questions, the information required included obtaining students' perceptions of the learning experience in terms of the knowledge they felt they had gained and the perceived usefulness of the implementation plus the teacher's perception of the implementation.

What data collection instruments are required to obtain the information?

The following list illustrates the specific data collection methods used in the evaluation. (Note that the first four data sources were collected regardless of conducting an evaluation).

1. Email correspondence amongst students and the lecturer during the semester
2. Online synchronous 'chat' transcripts
3. Online asynchronous discussion transcripts
4. Student-produced artefacts (eg., non-assessable and assessable tasks)
5. Student interviews (conducted at the end of semester)
6. Student questionnaires (a formative questionnaire completed during the semester and a summative questionnaire completed at the end of semester)
7. Teacher survey (conducted externally by the university)

The *student interview* was designed to explore the influence of the redesign of the course on the student's learning process and their perception of whether they felt they experienced a positive or negative learning experience. The interview was conducted in the synchronous chat space and was guided by questions such as:

- Do you think the learning design implemented in this subject was effective in terms of assisting you to construct your own understanding of the subject content?
- What motivated/engaged you in the subject?
- Did this subject meet the expectations that you stated at the beginning of this subject?
- How would you rate your learning experience (positive or negative)? And why?

The *formative questionnaire*, distributed via email, served as an opportunity to gauge student perceptions about the online course and enabled students to suggest changes to the remainder of the course. The *summative questionnaire*, distributed via email, was designed to determine students' perceptions of the effectiveness of the course in terms of its redesign and delivery. It included open-ended questions closely aligned to the overall

questions driving this evaluation plus a series of questions based on the evaluation framework for High Quality Student Learning (Boud & Prosser, 2002). This framework advocates that four principles influence high quality learning: engaging and challenging learners, providing practice and acknowledging the learning context. Boud and Prosser (2002) provide a set of questions to probe whether these principles are evident in a learning environment. An adaptation of this set of questions was included in the questionnaire. (The questionnaire is provided in the appendix.)

A data collection matrix (Reeves & Hedberg, 2003) presented in Table 2 shows how the information collected related to the questions posed.

Table 2: Data collection matrix

Data Collection Methods: Questions:	1	2	3	4	5	6	7
1. What were the students' perceptions of the use of scenario in this course in terms of facilitating their learning?					X	X	
2. What were the students' perceptions of the learning design (that is, the sequence of tasks, the resources provided and the support mechanisms supplied) in terms of facilitating their learning?				X	X	X	X
3. Was the online implementation strategy effective in facilitating student learning?		X	X	X	X	X	
4. What learning outcomes were achieved?	X	X	X	X	X	X	
5. What were the students' perceptions about their learning experience?	X			X	X	X	
6. What improvements can be made to this course?	X			X	X	X	X

This data collection strategy facilitated triangulation as responses from the interviews could be corroborated with the responses from the questionnaires.

Evaluation Findings

Seven of the ten students agreed to participate in this evaluation. Six students were interviewed, three students completed the formative questionnaire and five students completed the summative questionnaire. Eight students completed the externally administered teacher survey. The data collected was analysed by using the six questions that guided the evaluation as overall themes and determining the issues that emerged relevant to each theme. In summary, the evaluation found:

- The majority of participants rated the use of the company scenario and use of characters as effective in facilitating their learning. Two students, however, concluded the scenario did not work for them.
- An aim of the course design was to facilitate students' construction of their own understanding of the content. Most participants concluded that the nature of the course did encourage them to construct their own understanding of the content.
- Students rose to the challenge of involvement in a fully online course. The synchronous and asynchronous discussions tools whilst utilised, were not used to the extent the teacher had intended. This was due to the teacher's assumption that students would engage in online interaction for purposes of asking questions amongst themselves and generating discussion. However, the students' perceived purpose of the asynchronous discussion forum seemed more focused on posting answers than exposing their limitations in understanding the content. An interesting issue that two students raised as being significant when determining the overall effectiveness of an online learning environment is that 'little online discussion does not equate to ineffectiveness'.
- From the teacher's perspective, all participants in this evaluation achieved the intended learning outcomes as well as a range of unintended learning outcomes. From the students' perspective, the majority of participants felt that they had achieved the intended learning outcomes.
- Most students rated their learning experience as positive.

Students offered a range of suggestions to improve the course in terms of the tasks and the implementation of the scenario. This is invaluable feedback in reviewing and refining the course for future offerings. Two students, reported negatively on the scenario, which suggests that the use of scenario should be more flexible, to allow students with appropriate real-life contexts to substitute their own evaluation needs while still fulfilling the requirements of the course. Research by Herrington, Reeves and Oliver (2003) also

shows that students vary in their ability to suspend disbelief, and some need to be encouraged to engage in the fictitious world that has been created for them in the learning environment.

Conclusion

The evaluation described in this paper is considered an effectiveness evaluation and examined the course as a whole. However, there are many ways in which this course could have been evaluated to determine its effectiveness. Effectiveness evaluations can be narrowly focused or broadly focused, and can examine a number of dimensions such as effectiveness in terms of the interface, effectiveness in terms of learning outcomes achieved, or effectiveness in terms of the entire learning experience. It is dependent on the evaluation purpose–the decisions that can be informed from the evaluation. Thus, the framework by Reeves and Hedberg (2003) served as invaluable guidance prompting continual reflection on the overall purpose of the evaluation, and assisting the evaluator in the construction of the data collection instruments, and in analysing the data.

From this evaluation, it is plausible to suggest that the majority of students who participated in the evaluation deemed the course 'effective'. Of more significance, however, is the richness of data collected that can provide insight into why the students and teacher perceived the course as effective and how the course could be improved for subsequent offerings.

This paper has described the design and the results of an effectiveness evaluation of the course. As such it has aimed to provide an example of the kind of in-depth evaluation that is needed to gain substantiation for innovative approaches to online learning. In subsequent implementations it is envisaged that an additional data source, that of a "peer-evaluator" Bain (1999), will inform the ongoing evaluation of this course.

References

Alexander, S., & Hedberg, J. (1994). Evaluating technology-based learning: Which model? In K. Beattie, C. McNaught & S. Wills (Eds.), *Interactive Multimedia in University Education: Designing for change in teaching and learning* (pp. 233-244). Amsterdam: Elservier.

Bain, J. (1999). Introduction: Learning centered evaluation of innovation in higher education. *Higher Education Research and Development, 18*(2), 165-172.

Herrington, J., Reeves, T., & Oliver, R. (2003). Patterns of engagement in authentic online learning environments. *Australian Journal of Educational Technology*, 19(1), 59-71.

Meek, J. & Agostinho, S. (2003). An online subject delivered with help from an "absent CEO". *Proceedings of the Interact, Integrate, Impact, Proceedings of the 20th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education, (ASCILITE)*, 7-10 December 2003, Adelaide, SA, pp. 658-661. ASCILITE.

Phillips, R., Bain, J., McNaught, C., Rice, M., & Tripp, D. (2000). *Handbook for Learning-centred Evaluation of Computer-facilitated Learning Projects in Higher Education*. [Online]. Retrieved 11 March, 2003, from http://www.tlc.murdoch.edu.au/archive/cutsd99/handbook/handbook.html

Reeves, T. C., & Hedberg, J. G. (2003). *Interactive Learning Systems Evaluation*. Englewood Cliff, NJ: Educational Technology Publications.

Appendix: End-of-Subject Questionnaire

1. Please respond to the following questions by placing a cross 'X' in the appropriate box using the scale provided.

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
a. I was encouraged to construct my own knowledge about the subject content.					
b. The sequence of the tasks enabled me to build on my prior knowledge and understanding.					
c. The templates and reading resources supplied in the subject provided appropriate models to help me complete the assessment tasks.					
d. I was able to experience the concepts/ideas/issues of the subject in a variety of different ways (eg, working through the guide provided by the Academic Advisor in each Announcement, accessing the Resource list, discussing					

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
issues with my peers, doing the assessment tasks, etc.)					
e. There were a variety of opportunities to interact with my peers and the lecturer.					
f. The assessment tasks supported my engagement in the subject.					
g. The tasks (both assessable and non-assessable) enabled me to reflect and consolidate my thinking at various stages throughout the subject.					
h. The use of a fictitious character – the 'CEO' made the tasks more inviting.					
i. I felt I had a sense of control over my learning.					
j. The assessment tasks represented authentic tasks (that is, tasks that could be conducted in the 'real world').					
k. The use of a company scenario was effective in terms of creating an authentic learning environment.					
l. The knowledge demands of this subject (eg., level of difficulty, knowledge assumed) was appropriate.					
m. The company scenario employed in this subject makes cultural assumptions that limit its use.					
n. The assessment tasks are closely aligned with the intended learning outcomes.					
o. The assessment tasks encouraged me to be self-critical of my assumptions about the subject content.					
p. The use of a fictitious character – the 'CEO' hindered my learning.					
q. Feedback from the lecturer about my assessment tasks helped me identity the strengths and limits of my knowledge.					
r. The assessment tasks enabled me to articulate and demonstrate what I was learning.					
s. The assessment criteria stated in the subject outline helped me determine what was required.					

2. Did the staggered nature of the content (eg., the posting of company strategic minutes throughout the semester as 'Announcements') support your engagement in this subject? Yes/No, please explain why.
3. Was the role of the instructor, as an 'Academic Advisor', effective in terms of facilitating your learning? Yes/No, please explain why.
4. Please explain what effect the scenario approach taken in this subject had on your learning. Did it help or hinder? Did your response to the scenario (and the 'CEO') change over time? For example, did you initially dislike the approach but towards the end of the subject thought it was useful?
5. What are your thoughts about how the synchronous online chat sessions were scheduled and conducted? That is, did you think they were effective? How would you suggest improving the use of the online chat space?
6. The asynchronous discussion forum was provided to allow you to discuss and/or clarify issues. Whilst the lecturer tried to facilitate this, not much online discussion occurred in the asynchronous discussion forum. Why do you think this happened?
7. The intended learning outcomes were [as stated in the subject outline].

   a. Do you think you achieved these learning outcomes? Yes/No, please explain why.

   b. Did other learning outcomes emerged from your experience in this subject? (For example, gaining proficiency using online discussion tools, developing skills in managing your own time, developing skills in other content areas, etc.) Yes/No, please explain why

8. Did this subject meet your expectations? Yes/No, please explain why
9. What did you like most about this subject?
10. What did you like least about this subject?
11. How would you improve this subject?
12. Please provide any other comments about this subject below.