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AC 2011-589: IT'S A WRAP: A REAL-LIFE ENGINEERING CASE STUDY AS THE FOCUS OF AN ONLINE LIBRARY TUTORIAL

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It's a wrap: a real-life engineering case study as the focus for an online library tutorial

Introduction

The University of Auckland (UoA) Faculty of Engineering recognizes the importance of excellent information retrieval and information utilisation skills in both academic learning and professional practice.¹

First and second year UoA engineering students are taught how to use the Library catalogue to find books and journals, how to search for information on the Internet, and how to select and search databases for journal articles and conference papers. This teaching is made up of a one hour hands-on-computer tutorial structured around a research assignment in each year and a one hour lecture in the second year. Each session has an associated exercise sheet and a handout with extensive backup material. The teaching materials are made available online to students through the University's Learning Management System (LMS) after the lecture and tutorial. Individual help from the appropriate subject librarian is also offered.

It had always been difficult to integrate information literacy into the third year programme. Only one paper was common, and compulsory, for all 550 third year students. This is *EngGen303* which covers "An introduction to modern theory and practice of management, including project, quality and financial management appropriate to the engineering profession". When there was a change of direction in the course, the new teaching staff were receptive to the idea of library collaboration. They realised that the students need to find and use information that is not necessarily strictly 'engineering', and need to know how to do this quickly and efficiently.

Subject librarians and faculty discussed the most effective way of delivering a tutorial that would achieve this. It was agreed that an online and interactive tutorial was the best solution, given the high numbers of students and the already very full library teaching load at the busiest time of the year. The tutorial was to be designed to be used in modules or sections as and when the students needed each particular type of information throughout the year-long course. It can be found at <http://www.flexiblelearning.auckland/enggen303/>.

The tutorial was ready in early March, 2010, the beginning of Semester One, and the first assignment in the course was to complete the tutorial and take the subsequent multiple-choice test in the LMS.

An online feedback form was available from the tutorial screens and, in addition, a qualitative survey was handed out and completed in a lecture later in the semester. This was analysed and has been used to fine tune the tutorial as detailed under Evaluation below.

The project

Prior to the start of this project, the subject librarians had discussed the possibility of using the medium of an interactive online tutorial in their teaching. Since the *EngGen303* tutorial needed to be delivered in March, and the subject librarians were already totally committed to other teaching courses at that time, this was the ideal opportunity to design an online tutorial. The teaching staff were also enthusiastic so, with the assistance of the Centre for Academic Development (CAD) and the Library's Learning Services staff, the planning began. The time frame was tight - from October 2009 to the first week in March, 2010.

The University uses *Coursebuilder* for its online tutorials. Designed and built by CAD, this is a website creation tool for online tutorials. CAD staff trained the subject librarians, and shared their experiences of developing online tutorials. These included the Library's Business Information Skills tutorial (http://www.flexiblelearning.auckland/business_information_skills/), which was developed by subject librarians in that discipline. Throughout the development of the tutorial the CAD staff assisted with the more complicated technical issues including altering navigation between modules, resizing images and videos and formatting the more difficult activities.

After discussing the content of the course with the Faculty, it was decided to centre the tutorial around an engineering case study based on a local research project that had been carried out by the senior tutor in the course. It was felt that students would find it more relevant to their studies if it resembled an engineering business case.

Many other online library tutorials were viewed to determine what could work in this particular situation. At the time, no other engineering library online tutorial was found that had been designed in this way. Techniques emulated included: mouse-over for information ², interactive quiz/activity formats ^{2-4,6,7}, the use of real or plausible stories as examples ⁵⁻⁷, informal imagery ^{2,4,6,7}, quizzes and self-tests ^{2-4,6,7}, helpful responses ^{2,3,5-7}, and a story-line to hold it together ^{4,7}.

The senior tutor in the paper wrote the case study for the tutorial based on his actual project for a furniture company and provided relevant images. The subject librarians planned how to best fit the information sources around this. The case study begins: *"You are a student working at Criterion Furniture, reporting to the Business Innovation Manager. Criterion is carrying out a life cycle inventory analysis on their products and processes. They use polystyrene for packaging their products. This ends up in landfills and has an impact on the environment. It is your job now to find out if this is really a problem and if there are viable alternatives to its use as packaging."*

After further discussion it was decided to divide the tutorial into modules that reflected the main management themes of *Enggen303* and covered the information resources these required. All of these modules contained tips, self-tests and interactive exercises as detailed above. Most also contained short videos which showed students how to access particular types of information. The modules became:

Module 1 - *'Is polystyrene bad?' There are varying opinions on the environmental impact of polystyrene and you will need to do your own research.* 'Finding articles' introduces students to effective ways of searching using Google and Google Scholar including a live Google Scholar search, the multi-database search interface that delivers results from up to ten databases in one list, how to get the full-text of a paper, and how to evaluate websites. 'Finding official information and statistics' explains what official information and statistics are, and provides information on finding them, with reference to a number of websites .

Module 2 - *'Best practice' Your Manager has asked you to explore what other companies are doing with their packaging and see if you can find a better solution.* 'Finding company information' introduces engineering students to online resources on New Zealand and international companies via the UoA Library Business subject web pages.

Module 3 - 'Cutting edge research?' *Apart from business best practices, your manager has also asked you to use your connection with the University and explore any new material that might be developed.* 'Finding patents' includes information on finding patents, and an activity using the Derwent Innovations Index database

Module 4 - 'Time to do testing' *After selecting the material for packaging, we now need to test it to see if it fits the purpose. We want to do this correctly and in a standard way so that we have a good means of comparison.* 'Finding standards' concentrates on efficient searching of the New Zealand standards database, but also provides information on other standards organisations and their publications.

Module 5 - 'Time to change the packaging' *To successfully implement this new packaging and make stakeholders enthusiastic about the change, we must manage the process efficiently and ensure that they are well-informed, happy and cooperative. How can we do this?* 'Finding books, 4th year projects, and audiovisual materials' teaches students to use the Catalogue to find books, the Library's web pages to find lists of students' previous fourth year projects, and the internet to find audiovisual materials.

Module 6 - 'Let's celebrate our success' *The Business Innovation Manager is very pleased with the information you have found. The tutorial concludes: Criterion won the 2007 'Keep New Zealand Beautiful' Packaging Systems Award and also received high commendation in the 'Reduced Environmental Impact' category.* 'Finding conference papers and newspaper articles' concentrates on finding New Zealand publications using the Knowledge Basket databases.

It was agreed that the tutorial would be a "work in progress" and, as such, would be modified as and when required.

ENGGEN 303
Engineering Library online tutorial

THE UNIVERSITY OF AUCKLAND LIBRARY
Site Map Feedback

Home
Is polystyrene bad?
Best practice
Cutting edge research?
Time to do testing
Time to change the packaging
Let's celebrate our success

Case study

You are a student working at [Criterion Furniture](#), reporting to the Business Innovation Manager.

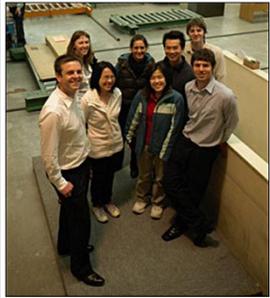
Criterion is carrying out a life cycle inventory analysis on their products and processes.

They use polystyrene for packaging their products. This ends up in landfills and has an impact on the environment.

It is your job now to find out if this is really a problem and if there are viable alternatives to its use as packaging.



Criterion specialises in creating environments in the home and office which work for their customers. Among its best-selling ranges are home entertainment centres, computer workstations and office furniture.



Benjamin Small (Criterion Business Innovation Manager) with students on projects at Criterion: Camille Cowley, Kai-Ann Teh, Marielen Schoen (AUT), Xin Yi Wong, Peter Luk, Manuel Seidel and Richard Cross.

After a meeting of those involved, a CAD learning designer prepared a project plan. This included the proposed structure of the tutorial, the tasks to be carried out, a timeline with a list of responsibilities for meeting the various deadlines and the contact details of the project team.

The subject librarians wrote the first module which was then critically evaluated by the members of the project team. More interaction and exercises and less text were needed. It would have been desirable to use animation and interaction along the lines of *Second Life* but the short time frame and the technology available did not allow for this. What was possible was the use of quizzes, multiple-choice self-tests, drag-and-drop exercises, mouse-over exercises, embedded live searches, and videos.

The subject librarians worked in pairs on their allocated modules. They also wrote the scripts for the videos which were then prepared by Learning Services staff, who also provided experienced advice, assistance with self-tests, and drafted the section on the use of Google. After intensive work over a two month period the initial draft was completed by Christmas, 2009. There were just two months until launch date, and there was still a lot of work to achieve the final product:

It was necessary to ensure that the tutorial was easily accessible on University of Auckland public computers and that the server could cope. Each module was standardized. This included the file size of the pictures, the video format, the number of exercises in each module and their level of difficulty.

Copyright was checked and requested, with one image being purchased through the Internet.

User testing was crucial. Library assistants and fourth year engineering students were chosen as the most suitable testers and the students were given book vouchers as an incentive to participate.

A pool of over one hundred questions was compiled for the LMS test covering all the module topics. Each student was to complete an individual test comprising fifteen multiple-choice questions randomly selected from the pool. The test was worth 3% of the final mark for the paper.

It took a surprisingly long time to achieve an overall professional polish.

Evaluation

Four different evaluation techniques were used to assess the success of the tutorial. Data was collected by direct observation, from the online feedback form, deduced from the LMS test results, and from the questionnaire completed by students during a lecture.

Direct Observation

An initial evaluation was carried out at the testing stage. Students were randomly chosen to test the tutorial. Subject librarians acted as observers and noted everything the testers did as they worked through the tutorial.

Very different approaches were observed. Some students spent a long time on the tutorial and followed up every link to outside information, working through each quiz and exercise in detail. Others skimmed it, picking up the major points. This testing was very valuable as it allowed the developers to see, for example, which sections were too wordy, which screens were too long, which exercises were best - in short, what worked and what did not work. This information was used to improve and streamline the tutorial.

Online feedback

After launch, evaluations were collected from the online feedback form. Interestingly, most of the online feedback by this means came from other librarians, rather than from the students doing the tutorial, for instance, “[I] love the idea of integrating different steps of the product with the information literacy.” The “case study approach” and “the website presentation and smooth interaction” were praised. Some technical problems were reported, for example, the existence of broken links.

LMS library test results

Informal evaluations can be deduced from the LMS test results. Ninety-nine percent of the 550 students enrolled in the paper thought it was worthwhile pursuing the 3% mark for the Library test. It was pleasing to see that the Library test results showed that 94% (508) of the students in the class scored over 75% (worth 2.2%) and 36% (196) of the students achieved a score of 100% (3%). The average mark in the class was 92% (2.76%). This would seem to imply that the students had assimilated the tutorial’s lessons as many of the skills required by the LMS test would have been new to them.



Evaluation form

Library Learning Services staff assisted in the drafting of a paper-based, qualitative, evaluation form that was distributed and collected in a lecture later in the semester. The responses from the students were thoughtful and therefore useful.

The responses to the four questions were:

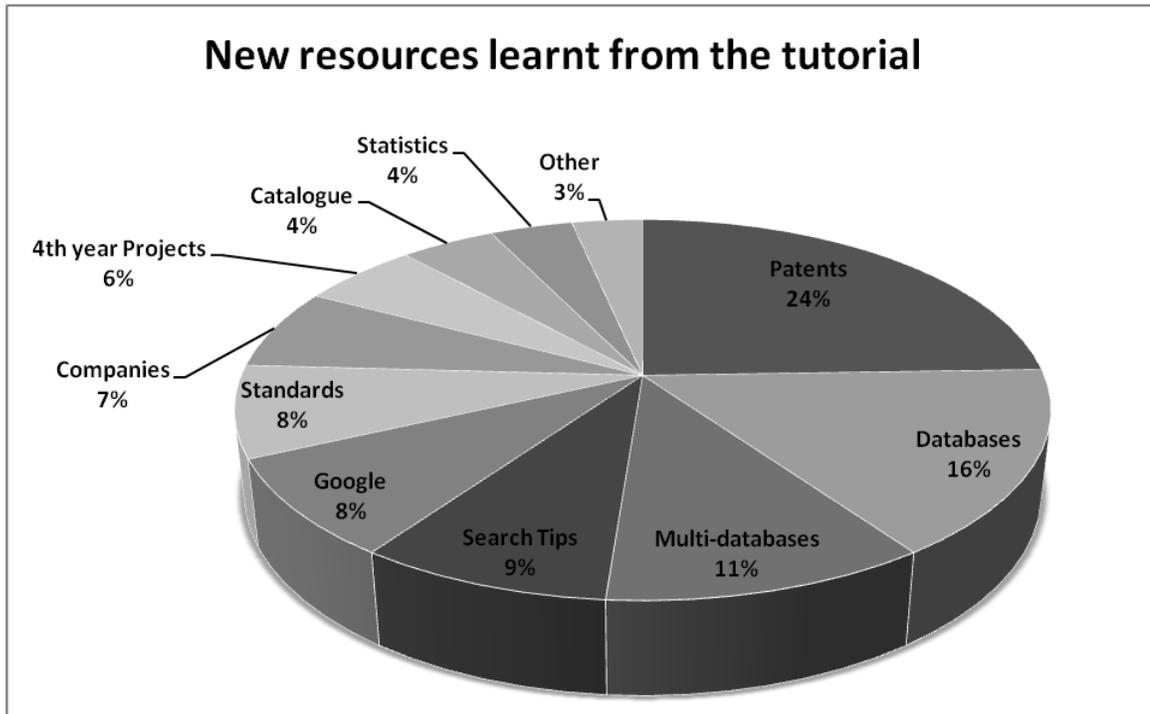
1. Was the tutorial easy to use and navigate?

98% of 294 students who responded thought that the online tutorial was easy to use and navigate. This comment summarizes what many of them wrote: “It was very interactive

and user-friendly. The step-by-step introduction to information searching and evaluating make it very easy to grasp and navigate.”

2. List 2-3 new things that you have learnt about finding information from the online tutorial.

Of the respondents to this question, 24% identified patents, 16% databases, 11% multi-database search and 9% search tips as the new resources that they learnt about from the online tutorial. Indeed, they may have come to realize that there were more useful scholarly resources for finding information than Google.



3. Do you think you are able to apply what you have learnt from this tutorial to other courses?

256 respondents (87% of 294) thought they were able to apply what they learnt from this tutorial to other courses, while 30 respondents disagreed and 8 did not answer this question.

4. Any other comments e.g. what I like about the tutorial, what I didn't like about the tutorial, how the tutorial could be improved.

Of the students who responded to this question, 49 (25%) stated they liked the entire tutorial. The top three 'likes' were videos 36 (19%), exercises and tests 10 (5%) and interactivity 9 (5%). The top three 'dislikes' were the length of time required 40 (21%), file size/downloading issues 18 (9%) and videos 14 (7%).

One typical comment was “The tutorial is well structured and easy to navigate. It demonstrates how to search for information efficiently. The time required to complete the tutorial is just adequate.”

Other points the students mentioned were:

- There was no indication of how long it might take to complete the tutorial, nor the length of the videos.
- The point of the tutorial was not clear; it seems that as it was the first week of the academic year the students had not yet appreciated the full range of the course requirements.

Where to from here?

The evaluation forms yielded valuable feedback which has resulted in improvements to the tutorial. Handing out and collecting these during a lecture gave a high response rate. This exercise will be repeated in 2011 using modified forms and closer to the date of the LMS test for clearer student recollections.

The tutorial has been updated to reflect the students' comments in these evaluations. The navigation tools have been improved with mouse-over information. Video times and file sizes have been added. Links now have sub-headings and fonts have been improved. In 2011, the course lecturers will give a more detailed explanation to the students of the relevance of the tutorial to the whole year's course.

Conclusion

A contextualised, interactive, online library tutorial in a unique format was developed to contribute information literacy content to the compulsory third year engineering management course *EngGen303*. This was based around a case study of a furniture manufacturing company. With 550 students in the class at a very busy time of the year, this was a practical way of up-skilling students on new information resources.

The tutorial completed a structured four year programme of information literacy for engineering undergraduates. Engineering Subject Librarians have been providing curriculum-integrated information literacy lectures and tutorials to first, second and fourth year students since 2006. There are incremental changes in the content and complexity at each level to ensure a good fit with course content.

The Engineering Subject Librarians realised this project in collaboration with faculty, and staff from the Centre for Academic Development and the Library's Learning Services section.

It was developed using Coursebuilder, and is available on the Library web site;
<http://flexiblelearning.auckland.ac.nz/enggen303/>

In modular format, it was designed around the main management themes of the course and the associated information resources. The learning styles of NetGen students were accommodated by including interactive activities. The ten videos have proved to be generally applicable and have been integrated into other engineering library courses.

A multiple-choice LMS library test worth 3% of the final mark was a course requirement and was written specifically for this tutorial.

Four evaluation methods were used to assess the success of the tutorial, with very positive results: direct observation, online feedback, deductions from the LMS test results, and a qualitative questionnaire. These showed that the students liked the format – online, self-paced and centred around a case study. The skills students learnt from this course are transferable not only to other university work, but for future information retrieval.

While this exercise was very labour-intensive and required considerable commitment as well as diversity of skills, it was also extremely successful. It needs only to be updated for future classes.

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