7th ANNUAL CONFERENCE ON THE TEACHING OF COMPUTING - DON'T DISS' IT, QUIZ IT.

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ABSTRACT

Loughborough University Library and the Department of Politics International Relations & European Studies (PIRES) wished to enhance second year student information literacy skills, so that they were able to produce good quality research dissertations. To achieve this information literacy skills were embedded into the EUB608: Research Methods module which was delivered via the University's Virtual Learning Environment (VLE), called Learn. The students' understanding of the principles of information searching was assessed using computer aided assessment (CAA).

Keywords

Information literacy; computer aided assessment; CAA; Online tests.

1. INTRODUCTION

Information Literacy is defined by the Chartered Institute of Library and Information Professionals [1] as:

"knowing when and why you need information, where to find it, and how to evaluate, use and communicate it in an ethical manner"

Student information literacy skills are variable and it can be quite difficult to motivate students to attend information literacy courses.

For several years the Library had provided a two-hour voluntary workshop for second year PIRES students undertaking a final year dissertation. Attendance at this workshop had been poor, as students did not wish to give up their free time for something they believed they knew how to do or could learn from friends. This is not unusual and De Rosa would argue that the majority of people chooses to learn about electronic resources from friends [2].

While students were confident in their information searching skills, their lecturers were unhappy with the quality of information the students were using for the dissertation. The PIRES department expressed concerns over the quality of student literature searching skills, the type of material used and the citation techniques and generally wanted to enhance student performance.

After much discussion it was agreed that the Library should deliver a workshop as part of the preparatory module for the dissertation, EUB608: Research Methods. In addition supporting material should be placed on the University's VLE, Learn, and the students comprehension of information searching techniques should be assessed. It was felt that assessment would provide extrinsic motivation [3] for students to attend the workshops.

Funding to enhance the question bank was sought and successfully won from the HEA-ICS Development Fund [4]. The project team would like to thank the Department of Politics International Relations & European Studies (PIRES) for their help with the project.

2. TEACHING INFORMATION LITERACY

PIRES and the Library agreed learning outcomes for the Library input into EUB608. It was originally envisaged that the Library would teach the students face to face and provide supporting material online.

2.1 Supporting material on Learn

Supporting material was placed on Learn and covered:

- Formulating a search strategy with particular emphasis on combining keywords;
- Searching techniques for particular subject databases appropriate for PIRES;
- Evaluation of information resources. Students were given four book abstracts, which they had to rank for usefulness and justify their answers;
- Ethical use of information including plagiarism and citation.

Reflective checklists were used to encourage students to think about their own knowledge and confidence in searching for good quality information. Links to the INFORMS tutorials [5] were provided so that students could practice searching 'live' databases in a safe environment.

Although it was originally agreed that the Library would have face to face contact with the students within core module time (an hour's lecture to introduce the subject and the online learning material and then an hour's hands on workshop) this did not happen. The PIRES department was so pleased with the online material that it decided the Library did not need to see the students face to face. Against better judgment the project team agreed.

The online course material was promoted to the students (103) by the Internal Examiner for module EUB608. The students were encouraged several times to visit the site and use all the materials. Web page logs show that the online material was most heavily accessed in February and March of 2005 (the beginning of the module), but continued to be used through the semester and the summer vacation. The project team believes that the supporting materials on Learn would have been more heavily used if an introductory lecture had been given by Library staff on the topic. The Internal Examiner has since agreed that the Library will be able to give the online material a “face” and an hour lecture has been timetabled into the module for an introduction to literature searching. The results of the test will help determine both the lecture and the online material.

3. ASSESSMENT

It was originally envisaged that the assessment would be summative, however, it eventually became voluntary and a formative method of assessment. Several forms of assessment were considered: short paper question and answers about the Library and information resources; production of bibliographies; and creation of portfolios that outline how a student carried out a literature search [6]. The PIRES department was concerned about over assessment and marking load. It was therefore agreed that the students’ information searching skills would be assessed online using Questionmark Perception (QMP).

Swinney [7] argues that library tests normally only assess knowledge not comprehension. However, the authors would argue that this is not necessarily the case. If questions are designed to assess learning outcomes and are worded carefully, they can test understanding and application. It is easy to equate multiple choice questions with simply testing declarative knowledge. These are certainly the easiest to draft. However, according to Haladyna [8] and Race [9] it is possible to craft more challenging questions, even using multiple choice that test higher level cognitive skills, such as problem solving and critical thinking skills.

3.1 Designing the online assessment

The project re-purposed an existing question bank of fifty questions. The existing question bank had been designed to test PhD students understanding of the literature search process. New questions, 28 in total, were added to the question bank. The new questions were designed to assess specific learning outcomes, skills and subject knowledge of PIRES students.

Inspiration for the new questions came from other UK institutions (University of Leeds, Leicester University and the Open University) for which permission was sought and granted. The SAILS project [10] would have been happy for the project to re-purpose their questions as long as they were not made publicly available on the web. As the results of this project are going to be made available via the HEA-ICS website it was decided to remove their questions from the publicly available question bank.

The questions were enhanced and changed to meet the needs of undergraduates. The project team noted the heavy reliance on the multiple choice question type within other information literacy question banks and was keen to incorporate a variety of question types. This variety is both more interesting from an authoring point of view, as well as for the student learning experience. Therefore to aid learning, a variety of question styles was used. In QMP over 15 different types of questions can be created. Descriptions of the different question types can be found on the QMP website [11]. As of March 2006, around half of the questions in the question

bank is of the multiple choice question type, just over a quarter is multiple response questions and just under a quarter is of other styles including drag and drop, matching, true / false, short answer and gap-fill. The project team has plans to add a greater variety of question types to the question bank. Several of the tests from other institutions include confidence type questions. As confidence checklists were already incorporated within the pages of the VLE, the project decided to avoid these and to try and create questions that tested knowledge and comprehension.

Creating quality questions was harder than first anticipated. Writing meaningful questions and answers was both taxing and time consuming. Webber and Johnston [12] argue that multiple choice questions should not be used to test higher order questions and it is true that the project team found it easier to design factual questions testing knowledge, than good quality questions testing cognitive and critical thinking skills. For example, it is easy to design questions that test student knowledge about library opening hours and how many books they can borrow. It is more difficult to test a students application and understanding of Boolean logic, truncation, choosing appropriate sources to search and selecting relevant references to read.

Library jargon, such as 'boolean logic' and 'bibliographic databases' was avoided, as the Library wanted to test student understanding of how to find information, not their understanding of terminology. Feedback was provided for each question, as well as for the test as a whole. Considerable consideration was given to the feedback, as the project team wanted the participants to learn from the test not just obtain a summative mark. It was felt that the feedback should be informative but succinct. The feedback refers to particular areas on Learn where students can discover more on the topic.

Using QMP for writing multiple choice questions is relatively straightforward, but careful consideration must be given to ensure sensible distracters are provided. The scoring algorithm is simple as the author can allocate whether a correct answer receives one or more marks. All the questions received a score of one, except for multiple response questions where more complex variables were attempted, such as deducting scores for incorrect attempts. The project team recommends that interested parties ensure that appropriate IT support is available before moving beyond the 'default settings'. Writing multiple response questions is far more challenging and the project team believes many librarians would find this rather too complex without IT (ie learning technologist) support. The key is to source an existing scoring template for questions where for example 3 out of 5 answers are correct (or 4 out of 6 and so on).

Similarly attempting other styles of questions, for example, drag and drop, can prove more difficult than at first sight as images need to be manipulated before being inserted into QMP. True and false, matching and fill in the blank questions are also relatively straight-forward to create and are good for testing knowledge and comprehension. Gap fill questions can be more complex for students and the project team has noted that some subject based tests on offer at Loughborough University provide the students with a range of missing words, including a distractor, from which students select an answer.

Without appropriate IT support from the Computer Aided Assessment officer, the project team would have been unable to create questions in styles other than multiple choice. Librarians without IT support may wish to explore alternative online testing programs such as the HotPotatoes [13] range of quizzes. These are extremely straightforward to use but have the drawback that scores cannot be stored.

As noted earlier the PIRES lecturer was very concerned about over assessment and the length of time the test would take to be completed. It was felt that students should have the opportunity to undertake a short "bite size" [14] test. Ten questions were presented to the students. The system randomly chose the ten questions from the question bank. A random presentation of questions was deliberately chosen so that if students re-took the test, their knowledge would be assessed, rather than memory of the answers. The project team decided that students would not be able to see the feedback for each individual question until they had completed and submitted the test. There were concerns that some of the feedback would provide clues to the answers to other questions in the question bank. At the end of the test formative feedback provides links to appropriate learning materials on Learn.

3.2 Delivery of the test

The online test was created using Questionmark Perception and delivered in the second semester of 2005. The students were given the whole semester to take the test. There was no time limit set for the test, so students could take as long as they wanted

to complete it. As the test was designed to be both summative and formative to encourage self-reflection, there were no restrictions on how many times students could take the tests. The test was accessed thirty times but only completed by nineteen students. The department was asked to chase the students on a regular basis, but as neither the completion of the online material or the tests was compulsory the students decided to concentrate on what gave them course marks.

The target module (EUB608) was delivered in the second semester, therefore the project was unable to re-deliver the test within formal teaching time. To compensate for this the PIRES department agreed that the original cohort of students on the module could be approached to re-take the test in the firsts semester of their final year. Of the 105 students registered on this module 20 students re-took the test. Surprisingly a large number of students (over 300) from other departments took the test without it being advertised to them, including those from the Chemistry Department and several Engineering departments.

3.3 Results of the tests

QMP generates reports so that lecturers can review how many questions a student has taken and the answers given. Comparisons can be made between a student's answer against a particular question and their performance in the whole test.

Below is an analysis of the PIRES responses. On average, the test took six minutes to complete. The scores obtained by the students are not comparable, as the test presented random questions of variable marks. If the project were to be repeated, the team believes the same questions should be presented, so that a comparison of comprehension and scores can be made. Most students scored just under or over 50% and tended to find multiple response questions more difficult. Students also found the short answer questions relating to truncation hard. The project team believes this is because the students did not understand the concept. This reflects classroom experience at Loughborough University.

A brief review of all the completed tests from students from other departments shows that there were similar scores, responses and trends to those of the PIRES students.

4. REVIEWING THE LEARNING MATERIAL

The project team was very keen to enhance the quality of the learning material presented to the students. The project aimed to analyse reports produced by QMP and obtain feedback from the students.

4.1 Analysing the test questions

The project team wished to investigate the quality of the questions in the question bank. QMP provides data on the frequency of correct versus incorrect responses as well as an individual student's performance across the entire test. This can be used to ascertain the level of difficulty of a question. The level of difficulty ranged from 0 (the most difficult) to 1 (the most easy). From this analysis the team discovered that the questions tend to fall in the 0.2 to 0.5 range and therefore can be considered reasonably challenging. The levels of difficulty of each question was obtained and added as a metadata tag. The project team is now considering whether harder questions should have a higher score

The team investigated the questions where more then one student gave an incorrect answer. The team felt the majority of these questions (one fifth of the question bank) was too ambiguous. Therefore the wording of the question or the distracters were changed

The project team also reviewed each question and mapped them to the:

- Learning outcomes of the course. Where there were gaps, new questions were added, 28 in total;
- SCONUL Seven Pillars [15] , so they should be more accessible to the wider HE library community;
- Bloom's Taxonomy [16] and;
- Name of the originating institution.

In the question bank 1% of the questions can be mapped onto the first pillar of the SCONUL's Seven Pillars; 28% for pillar two, 17% for pillar three, 28% for pillar four, 9% for pillar five and 17% for pillar six.

In the question bank 43% of the questions can be can be mapped onto the first level of Bloom, 33% onto the second level, 19% on third and 6% on the fourth. From this the team recognises that more questions need to be created that will test higher order thinking.

4.2 Student feedback

The project team aimed to obtain student feedback via a questionnaire and a focus group.

The project team produced a web-based questionnaire as a means to obtain feedback; unfortunately just eight forms were submitted

despite several reminders from the staff member in PIRES and the Library. Therefore the data obtained from the questionnaires are not statistically reliable and very few inferences can be drawn. However, students remarked that the material on Learn was helpful and easy to use. In addition the repondents agreed that the reflective checklists encouraged them to reflect on their own skills; the tests highlighted their strengths and weaknesses and the materials enhanced their searching skills.

Attempts were made to obtain reflective feedback from a sample of students via a focus group. Despite the offer of incentives, such as £10 printer credits, as well as several reminders from the Library to the main contact person within PIRES, the students failed to attend the focus group. This was a very disappointing aspect of the project. After consultation with the department it was decided not to attempt to hold another focus group.

4.3 Review of student dissertations

One way of assessing whether the material on Learn and the online test made a difference, is by assessing the literature review, citation technique and bibliography within the student dissertations. At the time of writing the lecturers are currently marking the dissertations. They are going to provide the project team with feedback on whether they feel the student dissertations have improved in these areas.

4.4 When should the tests be used?

From this project it is obvious that students will not take a test that does not count towards their final degree, despite great encouragement from their Internal Examiner. However, perhaps if the test had been promoted to the students as a diagnostic tool that could help them choose their own route through the material on Learn (similar to that used by Susie Andretta [17] and South Bank University Library [18]) it may have been used more. If the Library and PIRES are going to continue to use the test, a decision must be made about its role within the learning process.

5. CONCLUSION

The project was a success in terms of creating new and more innovative styles of questions. This is significant given the reliance in other published information literacy tests on multiple-choice questions. Further the team successfully quality-checked and enhanced the original questions. It is challenging designing from scratch good quality questions that test comprehension. The project proves that questions can be customised to be either subject or institution specific. Given the investment in mapping the questions to both Bloom's Taxonomy and the SCONUL Seven Pillars, the team considers this project deliverable will have wide appeal. Once this question bank is available to the wider community the team hopes that others will be inspired to use, adapt, create and disseminate new questions.

The online materials provide many more opportunities for student engagement and reflection than previous offerings. The use of checklists and the abstract evaluation exercise encourages development of a wide range of information literacy skills than is required by simply reading text on screen. The materials are simple to use and effective - a view echoed in the student feedback. The team hopes to enhance the online materials by including new activities such as HotPotatoes exercises.

The project experience shows that strong links with and the total support by the academic department is vital for success. In addition designating the attendance at workshops, the use of the tests and online materials as credit bearing, in other words, fully embedding within a module is more likely to produce the desired results.

QMP is a complex program for authoring purposes but it is a powerful assessment tool. Whatever tools librarians choose to use to create tests, they will need appropriate technical / pedagogical support to gain most benefit.

6. REFERENCES

[1] Chartered Institute of Library and Information Professionals., *Information literacy: definition*. CILIP (1999) http://www.cilip.org.uk/professionalguidance/informationliteracy/definition/

[2] De Rosa, C., *Perceptions of libraries and information resources: A report to the OCLC membership*. Dublin, Ohio: OCLC Online Computer Library Centre (2005). http://www.oclc.org/reports/2005perceptions.htm

[3] Walton, G.,. Assessing students is essential for success. *Library + Information Update*, **4** (1-2), pp. 36-37 (2005).

[4] *HEA-ICS Development Fund*. http://www.ics.heacademy.ac.uk/Devfund/index.shtml

[5] *INFORMS: the information skills project*. http://inhale.hud.ac.uk/cgi-bin/informs.pl

[6] Swinney, V., A*ssessment tool-box (2001)* http://www.twu.edu/cope/slis/imls/assessment/toolbox.htm

[7] Ibid.

[8] Haladyna, T.M., *Developing and validating multiple choice test items*. 2nd edn. Mahwah, NJ: Lawrence Erlbaum Associates (1999).

[9] Race, P., (ed.) *2000 tips for lecturers*. London: Kogan Page (1999).

[10] Thompson, M., *Project SAILS: project for the standardized assessment of information literacy skills* (2005). http://sails.lms.kent.edu/projdescription.html

[11] Questionmark Perception. http://www.questionmark.com/uk

[12] Webber, S. and Johnston, B., Assessment for information literacy: vision and reality. In: Martin, A and Rader, H. (eds.), *Information & IT literacy: enabling learning in the 21st century*. London: Facet Publishing (2003) pp. 101-111.

[13] Hot Potatoes. http://hotpot.uvic.ca/

[14] Robinson, A. and Nelson, E., Plug-ins for critical media literacy: a collaborative program. *Online*, **26** (4), pp. 29-32 (2002).

[15] SCONUL Advisory Committee on Information Literacy., *Briefing paper: Information skills in higher education*. London: The Society of College, National and University Libraries 1999. http://www.sconul.ac.uk/activities/inf_lit/papers/Seven_pillars2.pdf

[16] Bloom, B et al., *Taxonomy of educational objectives*. New York: David McKay (1964).

[17] Andretta, S., *Information literacy: a practitioners guide*. Oxford: Chandos Publishing (2005).

[18] Godwin, P., Information literacy, but at what level? In Martin, A. and Rader, H. (eds.) *Information & IT literacy: enabling learning in the 21st century*. London: Facet Publishing (2003).