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# Course-Integrated Learning Outcomes for Library Database Searching: Three Assessment Points on the Path of Evidence

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*Article*

**Course-Integrated Learning Outcomes for Library Database Searching: Three Assessment Points on the Path of Evidence**

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**Abstract**

**Objective** - This study aims to assess student learning with respect to basic database searching at three different points within a required first year course.

**Methods** - Three methods were employed at three different points to identify evidence of successful learning:

1. Analysis of in-class exercises from the initial library workshop, e.g. how many students showed evidence of satisfactorily achieving the stated learning outcomes.

2. Participant observation of student presentations, noting themes, strengths and weaknesses of student research strategy; written observation reports from librarians were coded and quantified to identify major themes.
3. Interviews with course instructors responsible for grading the final submitted projects, focusing on both student achievement and instructor perceptions of the impact of library involvement.

**Results** - Though performance on in-class exercises showed evidence of successful learning in over 70% of students, observational data indicated that very few students showed evidence of applying new knowledge and new search skills to their own topics two weeks later. Instructor interviews revealed a perception of similar difficulties in final project submissions, and instructors suggested that students did not appreciate the need for library resources.

**Conclusion** - In this study, students showed evidence of learning in a simulated environment, but were unable or unwilling to demonstrate this learning in authentic situations. Multiple assessment methods reveal a lack of student ability to apply search skills.

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## Introduction

This study aims to assess student learning with respect to basic database searching at three different points within a required first year Information, Communication and Technology (ICT) course. For the purpose of this study, basic database searching is defined as accessing two recommended databases, constructing an effective search statement, and accessing the full text of relevant articles. Student exercises, oral presentations and final projects were examined to determine whether or not students were able to effectively find newspaper, magazine and journal articles to support a project designed to introduce students to the information management cycle.

The authors also self-assessed the study against an evidence based practice framework, with the aim of improving research performance at the Hong Kong Baptist University Library. For many practitioners, the idea of research or evaluation often comes as an afterthought to the daily work that needs to be done – work that often arises quickly with little time for thorough planning. Still, the methods, data, and results of this are often both rich and plentiful. If used and improved

upon, both in terms of programme development and assessment methodology, practicing librarians can take further steps towards using and further developing the evidence-base of our profession.

While looking for opportunities to comment on and improve upon the methodologies employed in this study (which will be discussed separately in the Discussion section of this paper), the main focus remains on the data that was collected in the hopes of improving student learning in future implementations. Specific questions for this study are:

1. Were students able to successfully complete assigned exercises submitted at the end of a library resources problem-solving session?
2. Two weeks later, during their presentations on data collection, did students demonstrate that they could successfully apply what they had learned about database searching to their own project topics?
3. Did final project submissions show evidence of student ability to

effectively utilize library databases in their information management cycle projects as perceived by course instructors?

### Context

Hong Kong Baptist University (HKBU) is a mid-sized government-funded university offering a wide range of undergraduate and postgraduate programs. In the spring of 2008, the Library identified a first year, required course in information technology as a course that might benefit from an information literacy component, and approached the Computer Science Department who had been running the course for several years. The course was being redesigned and renamed "Information Management Technology", and would include lectures, labs and tutorials. Tutorials were named "problem-solving sessions" (PSS), and would focus on the "information management cycle". It was decided that the Library would facilitate a PSS session on using library resources for the data collection stage of the overall cycle.

The Library had recently adopted a clear outcomes-based template for designing and delivering library instruction – one that identifies outcomes, assessment methods, curriculum and pedagogy. The learning outcomes for the Library PSS were that students would be able to:

1. Access two recommended library databases (Academic Search Premier and WiseNews)
2. Construct effective search strategies for use in these databases
3. Access the fulltext of articles where available, using our link resolver, when necessary.

As 50 sections of the course had to be taught in one week (approximately 20 students per section), nine librarians were involved in the teaching. Session content included what a database is and how to access them, how to construct a simple search statement, and how to access full text. Pedagogies employed were

large-group discussion, mini-lectures and hands-on exercises. Two weeks after the library PSS, a Phase One submission was required of students focusing on needs identification and data collection activities for their independent projects. Though all students had to submit a PowerPoint presentation at this point in the semester outlining their work thus far, one third of students were also required to orally present their work. Librarians were invited to attend these 50 presentation classes, and, in collaboration with the course instructors, to provide on the spot feedback to students.

### Literature Review

The literature on assessment of library instruction is voluminous, and has grown considerably in recent years. Rader (2002) noted in her thirty-year review of information literacy literature, that assessment of learning outcomes had been minimal but had begun to increase (p. 244). In his review of the literature on information literacy assessment, Matthews (2007) revealed that studies reported contradictory results as to whether or not library instruction improves student performance (p. 72). Koufogiannakis and Wiebe (2006) systematically reviewed the literature on effective teaching methods for information literacy skills instruction to undergraduate students focusing on the state of the research base and comparative teaching methods (p. 3-43). For the purpose of this study, a focus on current methods used in assessing learning outcomes will be emphasized over comparative assessments of instructional methods.

Lorenzen (1999) articulated a clear connection between outcomes-based learning and library instruction. After defining outcome-based education (OBE) as "A method of teaching that focuses on what students can actually do after they are taught" (p. 142), he posited that library instruction has always had an outcomes-based perspective due to the goal of having students be able to do something following instruction, such as use a catalog or find an article. Brettelle (2007) reviewed

assessment methods in health libraries noting that most study designs were quantitative in nature (p. 22). Beyond health libraries, quantitative designs are an increasingly prevalent assessment approach in many academic libraries as adopted in studies conducted by Burkhardt (2007, p. 32), Emmett and Emde (2007, p. 216), Byerly, Downey, and Ramin (2006, p. 592), and Portmann and Roush (2004, p. 462). Multiple-choice questionnaires, surveys and student perception instruments are also frequently used, for example, in Furno and Flanagan (2008, p. 265), Houlson (2007, p. 101), and Wong, Chan and Chu (2006, p. 386). Walsh (2009, p. 21) reviewed the common types of information literacy assessments categorizing them under the headings of questionnaires, tests, self-assessments, analysis of bibliographies or essays, portfolios, observations of search behaviors, and simulations. Most assessment studies focus on the cognitive and affective domains - on what students know at a given time, and their perceptions of what and how well they had learned from library instruction interactions. The challenge of assessing concrete ability to demonstrate and apply information literacy skills in authentic situations remains.

Fewer articles discussed using formative assessment such as Classroom Assessment Techniques (CATs), and authentic assessment such as performance assessment methods, to measure student learning outcomes following instruction. Choinski and Emanuel (2006) used the one-minute paper together with an assessment rubric to assess student learning in one-hour library sessions (p. 150). Knight (2006) assessed bibliographies compiled by undergraduate students in their first-year research and writing course according to a scoring rubric based on course learning objectives (p. 46). Diller and Phelps (2008) discussed learning outcomes and authentic assessment through the use of electronic portfolios (p. 79). The portfolios contained self-selected samples of student work and self-reflections on perceived learning in relation to the learning outcomes. Judd et al. (2004) used a worksheet to assess students' ability to

search the catalogue/database in a business course library session, and then further determined how well students understood the resources taught by observing students work in out-of-class group assignments that followed the library instruction (p. 276). Emmett and Emde (2007) adopted a pre- and post-test model with the assessment questions developed as "information-needed scenarios" with multiple-choice and short-answer tests (p. 216). Warner (2003) used multiple methods including student journals, librarian reflections, observation of student speeches, and a survey tool that asked students about resource use (p. 171). Overall, a general trend in these studies can be observed wherein students tend to perform lower in demonstrating or applying higher order skills in formative and authentic assessment situations.

Though our study did not set out to measure student attitude about information sources or searching, it became an increasingly important theme, and as such a brief review of recent literature provides some necessary context. Several studies (CIBER, 2008, p. 31; D'Esposito & Gardner, 1999, p. 458; Griffiths & Brophy, 2005, p. 545; Head & Eisenberg, 2009, p. 11; Kim & Sin, 2007, p. 658; OCLC, 2005, p. 1-26;) reported on students' preference and use of internet search engines for assignments, especially as their first source. These studies noted student satisfaction with their search results and the information found, or student frustration with the difficulties involved in using library resources. Zoellner, Samson and Hines (2008) investigated the importance that students ascribed to different information resources, and found that library resources increased in importance following instruction (p. 378). Ursin, Lindsay and Johnson (2004) reported that despite anecdotal evidence supporting student appreciation and learning, students did not actually use the resources recommended by librarians (p. 291). Kim and Sin (2007) studied perception and selection of sources, and suggested that accessibility and ease of use (real or perceived) played a crucial role in source selection (p. 663).

Interestingly, the literature on assessment of information literacy instruction suggests what it embodies – that is, many authors suggest that multiple assessment methods are necessary in any study in order to assess the richness of student learning, and, in parallel, a wide-range of assessment approaches and methods exist in the literature itself. This study begins from the perspective of using multiple assessment methods to assess very specific learning outcomes, but will eventually lead to an even broader view of the many variables that affect deep learning and authentic assessment.

## Methods

A multiple assessment approach was undertaken which assessed student learning through submitted database-searching exercises, librarian observation of student presentations two weeks later, and perceptions of IMT instructors on student performance in their final project submissions. With over 1000 students enrolled in the course, 966 students submitted the three in-class exercises, and approximately one third of students made oral presentations.

### *Method for Assessment of In-class Exercises*

As the course was constantly evolving, even during the semester, it was only at the last minute that the Computer Science instructors requested that librarians collect student worksheets in the Library PSS, and provide feedback on them before the next PSS the following week. All librarians were asked to review the submitted exercises from their sections (see Appendix) and provide general comments on the strengths, weaknesses, and patterns to the coordinating librarian. The coordinating librarian, taking all comments into account, wrote a general summary of student work, along with providing suggestions for improvement. This feedback was posted on the course website so that all students could access it. Students did not receive individual feedback on their submitted work.

Further, given that the exercises would be submitted to and reviewed by librarians, a new opportunity was seized upon – to very quickly ascertain the number of students who were successfully achieving the learning outcomes that had been set. Two librarians, who had been involved in the library's outcomes assessment exercises for other courses, assessed each of the student worksheets to determine whether the learning outcomes were being achieved to a satisfactory degree. Due to time constraints, a very simple "yes" or "no" scheme was used for each student worksheet. The database access outcome was considered achieved if at least one of the two exercises requiring database use (one exercise for WiseNews, and one exercise for Academic Search Premier) was completed without major errors. The search strategy outcome was considered achieved if the strategy was free of major errors that would make the strategy untenable, e.g. wrong Boolean operator, and included at least two of the following components correctly: synonyms, the Boolean AND, the Boolean OR, truncation, and parentheses as needed.

### *Method for Assessment of Presentations*

Two weeks following the Library PSS, selected students, who were randomly selected by the course instructors, orally presented their Phase One submissions of their final projects. There were 50 PSS sections in which students presented their chosen topics, focus areas, needs identification, and the resources they used or planned to use for data collection.

For each section, the assigned instructor and librarian provided on the spot feedback to students – sometimes after each presentation, but usually as a summary at the end of the class period. After the first two sections, the coordinating librarian decided to seize on another assessment opportunity and asked all participating librarians to take brief notes and write a short one or two paragraph summary of their observations of each class, i.e., each set of presentations, with each set consisting of 8-10 presentations. As six sections did not

require student presentations, and two librarians combined two sections in one report, 40 observational reports of 350-400. The observational reports were compiled into one document, and a simple content analysis was undertaken to determine major themes, issues, strengths and weaknesses. A first reading of the reports was undertaken by the project team of three librarians to get a general "feel" for the nature of the data. A second reading was undertaken by two of the librarians (Librarian A & B) in order to identify themes that were embedded in the textual content. The themes that naturally came from the observational data were then mapped to and categorized under the three learning outcomes, in order to focus our analysis, i.e. access databases to find articles, construct an effective search strategy, and access full text. The themes were further subdivided in order to tally whether the observational data reported evidence of successful learning, evidence of unsuccessful learning, or no evidence as shown in Table 1.

The third reading of the reports was undertaken separately by two of the librarians (Librarian A & C) and resulted in the analysis of each report against the categorized themes and the evidence of learning provided. Statements not related to the learning

Open-ended questions were used to allow interviewees to express thoughts and opinions freely without being influenced by pre-defined answers suggested by the interviewer. Five questions were formulated for the interviews. Three questions focused on the general perception and evidence of student learning based on instructors' observations throughout the course and on the final project submissions. Two further questions focused on instructor perceptions of library involvement and impact, and on soliciting suggestions for improvement in the future.

Interview content was transcribed by the two interviewers (Librarian A and B). Content was then analyzed and coded under categories in relation to the interview questions by one librarian (Librarian A). These categories were

student presentations were available for analysis.

outcomes were classified into separate clusters by themes, and tallied to simply indicate whether or not a report mentioned this theme. The third librarian (Librarian B) then reviewed the two files, identified discrepancies, made the final judgments, and prepared the final version. This process resulted in the identification of the most common threads observed by librarians, and noted, where applicable, evidence of successful or unsuccessful learning.

#### *Method for Instructor Perceptions/Assessment of Learning*

Interviews with the IMT instructors were conducted four weeks after the student presentations and by the time of the interview, the instructors had received final project submissions from students. Six out of a total of nine instructors accepted our interview invitation with a participation rate of 66.7%. The interviews were conducted by two members of the project team, with an attempt to match interviewers and instructors who had not worked together during the course. This was the case in five of the six interviews.

derived from the interview content, and further signified as being either positive or negative in nature. The interview content and coding were then second read and reviewed by the other two librarians (Librarian B and C). Positive comments would speak to areas of successful student learning or benefit from library involvement in the course, and negative comments would speak to areas of weak student learning or lack of benefit from library involvement.

#### **Results**

A total of 966 students attended the Library PSS and submitted the three required exercises. A total of 954 students attended the Phase One presentation sessions, with approximately one third of those students

Table 1  
Content Analysis Worksheet in an Excel Format

Learning Outcomes	Access an appropriate database to find news/journal articles									Construct an effective search strategy																		Access FT using Web Bridge								
Themes derived from data	Google/Wiki/ Web			Lib DBs			Lib catalogue			Think around/ different angles			Focus the topic			Identify main concepts/ KWs			Identify synonyms/ RT			Avoid soft words			Truncation			Boolean operators AND/ OR			Search limits provided by Db			Access FT		
Evidence suggests achievement	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM
Session 1																																				
Session 2																																				
...																																				
Total																																				

KEY: Y=yes N=no NM=not mentioned



giving a five minute oral presentation of their project work to date. As feedback on presentations was provided from librarians and instructors, it was hoped that such feedback could reinforce learning for all 954 students in attendance.

#### *In-Class Exercise Results*

Written comments provided by all librarians following each of the Library PSS sessions showed similar threads. Most students were able to access databases from the library homepage, apply limits provided by databases platforms such as date and publication type, and determine if full text was available for a given article. Students struggled with working through the steps of building a search strategy, and needed quite a lot of feedback and support. This was viewed positively as the "problem-solving" approach gave students the opportunity to work through their difficulties and get feedback from the librarian and the course instructor who were moving around the room, helping students work through their exercises. Librarians noted that more time would have been useful, so they could attend to all students or provide more examples.

In assessing the student worksheets, using a simple pass or fail methodology (wherein a pass meant that the two learning outcomes that were feasible to assess were demonstrated to an acceptable level on the submitted exercises), 71% of students achieved the learning outcomes, that is, they were able to access the recommended databases and construct an effective search strategy.

#### *Presentation Observation Results*

The following observations were most commonly made in the reports prepared by the attending librarians relating to the learning outcome which addressed the ability to access appropriate databases to find articles. Use of library databases was mentioned in 39 of the 40 reports, with 29 reporting that evidence suggested achievement of the learning outcome, and 10 reporting that the outcome

was not achieved. Use of internet search engines was noted in 30 of the 40 reports, with all mentioned indicating evidence that students could successfully use a search engine to find information for their projects.

It was regularly commented upon that the presentations seemed to indicate that internet searching had actually been undertaken by students, while library searching, when mentioned, was often as part of a future plan. It seemed that many students had not yet searched for articles on their topics in library databases - of the 39 reports commenting on use of library databases, only 9 provided evidence of actual use (by stating what they had found or what limits they had used).

Constructing an effective search strategy was the second learning outcome. Unfortunately, as a group, students were unable to demonstrate their knowledge or skills to a great extent. There were some indications of learning - 24 reports mentioned identifying main keywords with 22 indicating success, and 2 indicating problems. 25 reports mentioned student ability to identify appropriate synonyms/related terms, with 20 indicating success and 5 indicating lack of success. However, use of inappropriate terms in searches, such as "in" "of" and "effect" were noted in 11 reports. Use of Boolean operators was noted in 28 reports, with 14 suggesting that generally students successfully used these operators, and the other 14 suggesting that students demonstrated considerable difficulty. Truncation was mentioned in 23 reports, with only 10 suggesting appropriate use and 13 reporting problems. Several reports noted that students were using Google-type search operators such as "+" in databases that would not support such operators. The fact that 30-40% of reports did not mention Boolean or truncation suggested that students were not sharing their search strategies in their presentations at all, indicating a lack of evidence of learning.

Overall, the student achievement as demonstrated in their presentations was far less than satisfactory. It was clear that students

had spent most of their information-searching energy using internet search tools such as Google and Yahoo. Many presentations only included “plans” to use library databases. Even for those students who had used library databases, their ability to construct effective searches was quite weak overall. Most students could not put together all the pieces they had learned two weeks earlier and apply what they had learned to a new topic. Finally, many students simply did not demonstrate what they had tried so it was difficult to assess their progress thus far.

*Interview Results*

Instructors were asked how well students performed in demonstrating achievement of course learning outcomes in their final project submissions. Responses on 9 out of 17 statements (53%) focused on students’ weaknesses in the areas of creative thinking, formulating search strategies, and awareness of the importance of using academic resources

in their research. Responses that spoke to students’ strengths (47%) highlighted strong software application skills, and the ability to identify synonyms and related terms for searching purposes.

When specifically asked whether students demonstrated concrete evidence of learning to effectively access or search the library databases, responses from the instructors varied. Half of the responses were positive, especially in identifying keywords, coming up with synonyms and related terms, and listing at least one database taught in the IMT classes. The other half of the responses were negative, with comments on an inability to focus and narrow a topic or search, and the lack of justification for the search tools selected. Another common problem identified was confusion in using appropriate search operators in Google and library databases (See Figure 1).

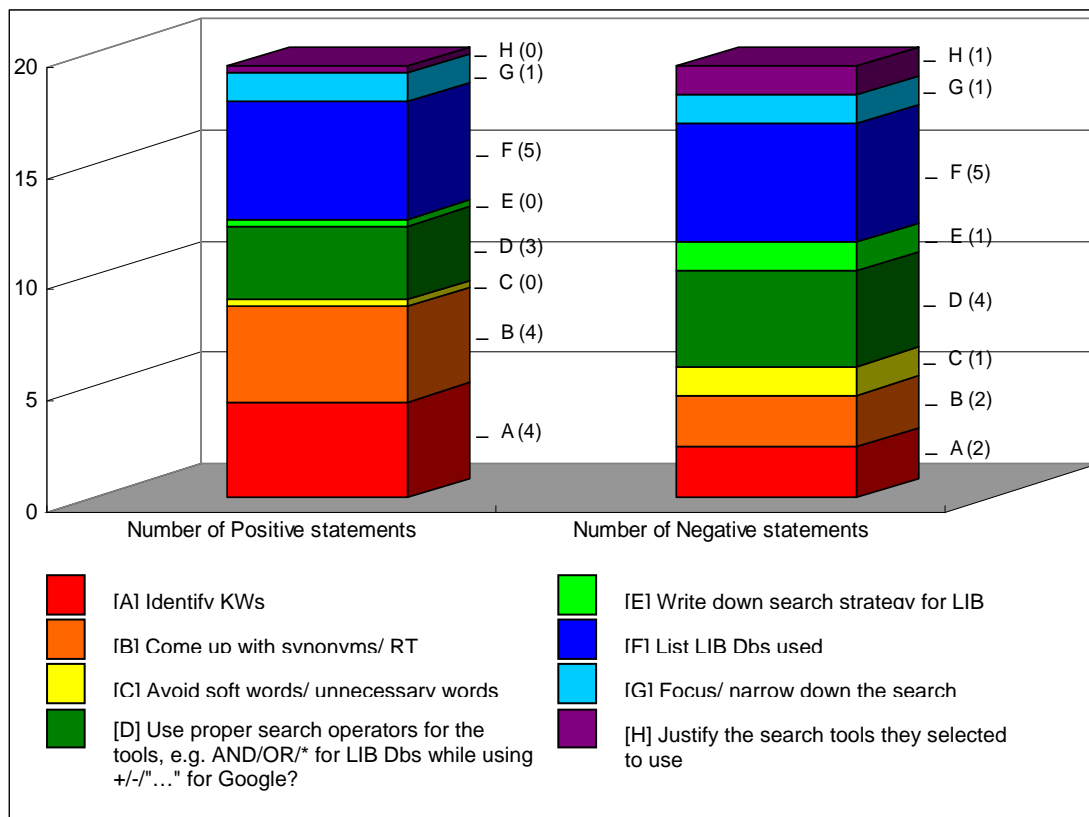


Fig. 1. Themes found in comments on whether students demonstrated concrete evidence of learning to effectively access/search library databases.

The majority of instructor statements (13 out of 16, 81%) indicated that there was insufficient change in student information searching abilities resulting from librarian involvement in the course. Students' perception on the need for scholarly journal articles, along with the difficulty of searching library databases were mentioned as hindering any changes in students' abilities.

Despite the lack of results in student learning, instructors' overall impression of librarians participating in the IMT classes was positive (15 out of 20 statements, or 75%). Comments about the positive contribution of the library involvement included: librarians gave enthusiastic motivation for students to go further in their research, constructive comments were given to students, the databases introduced were very appropriate to Year-1 level study, and a general understanding of the differences between magazines and journals was beginning to take shape. The negative or unsuccessful aspects of library involvement included: student anxiety over the presence of a librarian in the classroom, insufficient time spent on database searching, and, as some of the project topics were very general, scholarly articles were not necessary.

Suggestions for future improvement are divided into two categories: those addressed to the library (10 out of 24 statements, or 42%) and to the IMT course designers (14 out of 24 statements, or 58%). Many suggestions were made in relation to time allocated, content covered, project topics, and instructions and guiding questions in the project handbook. Suggestions addressed specifically to the library included providing more specific comments to individual presentations (not only general comments to all which was often the case due to time constraints), spending more time on search strategies and less time on navigating the library's database pages, and comparing how search results would differ between the internet and library databases. Suggestions addressed to the course designers included clarifying the questions (expectations) and terminology used

in the project handbook, announcing the possible project topics earlier to students, connecting the library session worksheet directly with the students' project topics, and increasing the time allocated for the library session.

## Discussion

### *Discussion of Results*

Learning is about the interplay of knowledge, skills and attitudes, and perhaps more importantly, it is about learning to apply new knowledge, skills and attitudes. The three questions posed by this study were aimed at determining whether 1) students were able to successfully complete in-class exercises, 2) students were able to apply skills to their own topics as demonstrated in presentations, and 3) students showed evidence of an ability to effectively utilize library databases in their information management cycle projects as perceived by course instructors. Though 71% of students successfully completed the exercises, very few demonstrated that they could utilize new tools and apply new search skills to a new topic, or that they could incorporate new knowledge of resources and searching techniques into their final projects. Given that the "Information Management Cycle" conceptual approach and the "Problem Solving Session" pedagogical approach was being used for the first time, it was not surprising that outcomes would only partially be met. Previous experience with the assessment-improvement cycle in our classes suggests that in the next incarnation of the library session, with modifications to content focus and wording of exercises, it is likely that approximately 80% of students will be able to demonstrate successful learning via the exercises. However, the low success rate in students being able to later apply this learning to their own information needs is problematic indeed. Even if a 100% success rate with immediate, in-class exercises was achieved, how useful is such success if only a small percentage of students can transfer and apply their learning to their own projects?

In-class exercises showed a basic level of comprehension, but a deeper level of affective and cognitive understanding appeared to be lacking. Most students were unable to demonstrate in their presentations that they could apply searching skills to new situations, and they showed little evidence of believing that this was worrisome. Performance-based exercises at the end of a library session, though perhaps more useful than self-assessment or multiple-choice tests, is clearly not enough to gauge true, internalized learning.

Interview data revealed that instructors of the IMT course believed that one of the reasons students did not use library resources to a satisfactory extent was that they did not understand or appreciate the need for including professional or academic sources in their projects. Were students unable or simply unwilling to find resources from library databases? As the 50 minute library PSS session focused on how to search and access articles, where in the course was the question of why one would search and access articles covered?

The results of this study suggest that authentic application and attitude should be closely examined in relation to student learning. Less time might be spent on skill development and more time on attitudinal perspectives about the use of library/scholarly resources. What use is it for students to learn to access appropriate databases and construct an effective search strategy, if they are not inclined to use a database in their information gathering? If more attention is paid to student knowledge and attitudes about scholarly resources, then motivation might make up for lack of skill. Even if their database searching skills are somewhat basic, they might apply these skills more readily in authentic information-seeking situations, and they might seek assistance and respond to feedback if they believe that library resources are important to the quality of their work. In this way, their skills can be improved upon over time, and actually put to use.

### *Discussion of Methodology*

The newness of the course meant that course delivery was constantly in flux, leaving librarians to quickly respond to requests, and in some instances identifying assessment opportunities only after the fact. Still, certain comments can be made about the methods employed to assess student learning, and how they might be improved upon in the future.

As it was not known that there would be the opportunity to assess in-class exercises ahead of time, the method used was not as rigorous as it could have been. With no time for creating assessment rubrics and only one week to return close to 1,000 worksheets, the “quick and dirty” assessment was considered the best that could be done at the time. Experience with assessing similar types of worksheets for other courses provided an acceptable degree of confidence in the findings.

Observation “data” from the presentations was not initially identified as such. Curiosity of the library course coordinator prompted the request for librarians to send emails summarizing their observations of the presentations. The realization that these emails held an immense amount of insightful qualitative data only came after the fact. As such, observation data was difficult to normalize and analyze, but the major themes and threads were apparent. The data indicated that student application of the knowledge and skills they had learned two weeks earlier was weak.

Interviewing IMT instructors was better planned and more standardized than the other two methodologies employed in this study. However, our interest in library-related learning outcomes did not necessarily match with how instructors were assessing the final projects. Instructors were certainly able to give their general perceptions of student ability and attitude, which was certainly a useful indicator of student learning, but it was not possible to determine how many students showed evidence of achieving the library-related outcomes in their final projects.

## Conclusion

This study attempted to assess student learning of database searching skills, both within a library session and as applied over an entire course. Three different assessment methods were used at three different points in the course, which shed light both on student learning, behaviors and attitudes. Though students showed evidence of learning in a simulated environment, that is, successfully completing exercises as part of classroom learning, they were unable or unwilling to demonstrate this learning in authentic situations as reflected in their presentations and from instructor interviews. When working on their own projects, students generally did not use library databases, or if they did, they did not apply the searching skills that they had previously demonstrated.

Simply put, the information seeking behaviour of students did not change as a result of librarian involvement in this course. Course instructors suggested that students did not appear to value the use of library resources over internet resources, and did not understand that university level projects would require the use of professional and/or scholarly resources. Though students can learn the skills related to library information seeking (as shown in other studies as well), this study suggests that much more attention needs to be given to the attitudes that drive student information seeking behaviour. Given that Google is so much easier than our comparatively complicated databases, students need to learn why it is important to search library databases, not just how to do so. Without the former, the latter is without meaning or use.

## Recommendations

### *Recommendations for the course*

Discussions with course instructors have already identified some changes, which will be implemented into the course. Students will be required to submit the results of preliminary searching before the library session, in the

hope that this will better introduce the library session as a way to expand upon “background” internet searching, and move into a more academic or professional arena. It was agreed that an attitudinal focus on why and in what circumstances one might go beyond Google was badly needed.

Assessment of student learning can be improved in a number of ways, and thus continue to inform a practice of continuous assessment and improvement. Assessment of in-class exercises should be done using a standardized assessment rubric allowing for consistency and the identification of varying degrees of success. Gathering qualitative data from observing student presentations would also benefit from a more structured approach, possibly using observational checklists or from following a stronger methodological framework for content analysis of observations. Further, inter-rater reliability methods should be adopted for example, Oakleaf (2009) investigated a rigorous rubric approach to information literacy assessment by analyzing the inter-rater reliability of rubric scores (p. 970).

Finally, library-related learning outcomes should be adopted by IMT instructors so that they can clearly ascertain whether or not students are achieving these outcomes as evidenced in their final projects. Such outcomes, with an assessment rubric, might be developed by librarians, accepted by instructors, and shared with students (alongside other project learning outcomes) in order to clearly guide students in their learning and their ability to demonstrate that learning.

### *Recommendations for Practice*

This study confirms what most practitioners already know from anecdotal experience - that assessing skills is not enough when it comes to assessing authentic student learning in the realm of information literacy. Librarians cannot limit assessment efforts to determining whether or not students know how to search (skills), but must also pay

attention to whether or not students know why to search certain resources for certain types of information needs (knowledge & attitude).

Undergraduate students need to learn how to think about research, not just how to carry out certain skill-based steps. If librarians are to move beyond skills, and become more deeply involved in the richness of authentic student learning, close collaboration and teamwork with faculty is crucial. Wider exploration and discussion of the processes involved when undertaking research should be included in instruction, and reflective research exercises should be built into instruction sessions and into course research assignments.

Results of the systematic review by Koufogiannakis and Wiebe (2006) indicated that inadequate research has been conducted to assess higher level learning outcomes (p. 12). As large-scale information literacy assessment tools are becoming more widely adopted at the institutional level, it is important that librarians rigorously assess these tools in themselves to ensure that the affective and cognitive realms are adequately addressed. If such tools only tell us that students are aware of a variety of resources and that they possess the requisite search skills to use them, they do little in telling us whether students have truly learned about the importance of information in all of its many forms, for all of its many purposes, and can put that learning into appropriate action.

#### *Recommendations for Further Study*

As a result of this study, several areas for further study have also presented themselves, leading us further down the path of integrating research into practice. Possible studies may include pre- and post-testing with a focus on cognitive awareness and attitudinal change, investigating whether a short, additional online exercise immediately following the in-class exercises will result in improved retention and application of skills, investigating whether library-constructed rubrics for course learning outcomes have an

effect on student learning, and comparing various ways in which such rubrics might be used. Studying permutations of course delivery comparing librarians and instructors delivering different parts of the content, or comparing face-to-face and online instruction are also potential studies. Two systematic reviews highlighted that the majority of studies reviewed were in the U.S. context (Brettle, 2007, p. 21; Koufogiannakis & Wiebe, 2006, p. 20). Further studies that can add to an international evidence base are certainly needed, as students in Hong Kong, Brazil, Nigeria or Europe might learn quite differently than the average American student.

Research should inform the decisions and activities of practitioners, and the activities of practitioners should form part of the research base. "Evidence-based library and information practice (EBLIP) seeks to formalize the links between research and professional activities ..." (Given, 2007, p. 16). Eldredge (2000) proposed a conceptual framework for EBL that recognizes and allows for pragmatism, diversity, continuous improvement in research rigor, and the application of best-available evidence (p. 291). This study begins from a place of relative immaturity, where environmental constraints, the speed at which a new course changes, and the culture of librarian practice did not encourage the use of research in daily practice. In light of pragmatic considerations and best-available evidence within a local setting, first attempts at undertaking research will need to be assessed and improved upon in later incarnations. Librarians are very familiar with the continuous-improvement cycle used in library instruction and other areas of service performance assessment. It would be of great benefit to apply such a cycle to our research practices, as well.

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## Appendix 1: Database Exercise Example

### Part II: Search Strategies for Library Databases

#### What is the most important part of searching a database?

Taking a minute to THINK about:

- the most important aspects of your topic
- what keywords could be used
- how to connect your terms and use \* to form the best search

1. **Step One: Define your question/information need.**

*Do children in Hong Kong eat a healthy diet?*

2. **Step Two: Identify the MOST IMPORTANT ideas (Tip: Ignore ‘soft’ words)**

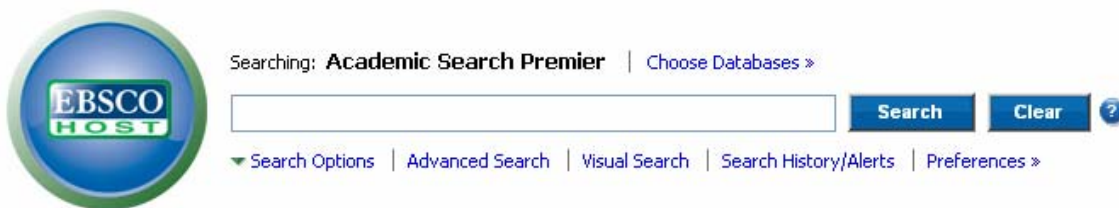
3. **Step Three: Brainstorm for synonyms or related terms**

4. **Step Four:** Decide which terms to try first, and combine terms to build your search.

Common Connectors	Search Example	Search Result
“ ”	“health care”	Exact phrase search
AND	influenza and children	Articles containing both/all terms
OR	influenza or flu	Articles containing either term
*	child*	All words starting with child e.g. child, children, childhood
( )	child* and (influenza or flu)	Orders search properly so results are relevant

Write out **TWO** possible searches for our topic:

Now, using your search strategies above, try searching Academic Search Premier (from EBSCOHost) for a good article on our topic.



Article Title: \_\_\_\_\_

Journal Title: \_\_\_\_\_

Volume/Issue: \_\_\_\_\_ Year: \_\_\_\_\_ Pg: \_\_\_\_\_

Is it available in Fulltext? Yes \_\_\_ No \_\_\_

Appendix 2. Textual Analysis of the Observations in the Problem-Solving Sessions

Learning outcomes	Access an appropriate database to find news/journal articles									Construct an effective search strategy																							
	Google / Wiki / Web sites (to find basic info)			Lib DBs, (or print / e-journals)			Lib catalogue (to find books)			Think around / different angles (creative thinking)			Focus the topic			Identify main concepts/ KWs			Identify synonyms / RT			Avoid soft words / unnecessary words			Truncation			Boolean operators AND / OR			Search limits provided by database e.g. date, headline, academic		
Evidence suggests achievement	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM	Y	N	NM
Total	30	0	10	29	10	1	8	2	30	2	0	38	6	5	29	22	2	16	20	5	15	6	11	23	10	13	17	14	14	12	4	0	36

Learning outcomes	Access FT using WebBridge			Other observations not related to learning outcomes											
	Access FT			on the nature of the topic		on the nature of the info. sources and evaluation criteria		on the experience of using Internet search		on the experience of using lib. resources		on confusion relating to use of lib DB page or homepage		on confusion relating to the assignment e.g. what to write for "search strategy"	
Evidence suggests achievement	Y	M	NM	M	NM	M	NM	M	NM	M	NM	N	NM	M	NM
Total	0	4	36	2	38	10	30	9	31	12	28	3	37	5	35

Y= Yes  
 N= No  
 NM= Not mentioned or evidence not provided  
 M= mentioned