Educating Information Literacy for Electronic Resources in the Digital Age: Empowering Engineering Students for Research Excellence through Information Literacy Program.

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Abstract

This article traces the development of the information literacy modules in engineering community in higher education environment. It examines the user's education necessity of being information literate, and explores the research related to the concept. Included are reports on the research and findings from Subject Areas Relevancy Survey (SARS I and II) that has been conducted. Also examined are recent revisions in information literacy modules for subject matter standards that imply recognition of the process skills included in information literacy for electronic resources. The research outlines the impact of information literacy programs on the usage of electronic content for engineering students. It provides examples of information literacy in various contexts. The 'live' research is parallel with the implementation of subject guided or so called 'taxonomy' in searching process for electronic resources content.

Keywords: Information literacy; Electronic resources; Taxonomy; Subject guided; Information literate; Electronic resource literate

Information literacy combines skills or competencies that together make for effective use of information. In an era of lifelong learning, this effectively means that information literacy has relevance for all ages from primary school to senior citizens. Information literate people understand more than how to find information, they understand its limitations and the need to examine how they use information, and they understand how to manage and communicate information.

The term "information literacy" is used in this paper to refer to the set of skills required to identify information sources, access information, evaluate it, and use it effectively, efficiently, and ethically, focusing on electronic resource content. This study was motivated by a recognized gap between the importance placed upon information literacy skills, generally within the literature on information literacy and particularly with respect to 'engineering students' expected skill levels, and the actual skills that students are able to demonstrate. Thus, despite clear evidence that sophisticated information literacy skills are beneficial to research success, students are generally unsophisticated information seekers in academic contexts. From a disciplinary perspective, our interest focused on university engineering students, because as an inquiry-based

field of study, it would seem logical that information seeking skills, including critical evaluation of information, would be carefully inculcated.

When engineering is presented as a stable body of knowledge, learners are discouraged from developing their own explorations and explanations of observed phenomena. Learning outcomes associated with inquiry dimensions of engineering and science include generating a hypothesis, developing a plan for gathering data, and constructing evidence based on data.

Overview

The development of Information Literacy modules for electronic resources in UNIVERSITI TEKNOLOGI PETRONAS started in June 2007. Constructing a syllabus is not as challenging as implementing syllabus for different categories of students, and measuring the impact to their study and teaching process. Several approaches have been tested for small groups of engineering students. The objective of electronic resources training is to produce electronic resources literate (ER literate) students which are capable to explore and access, evaluate and use the available electronic contents.

Despite the argument that technological advances have made access to information easier, there is an ongoing concern that university students still are not becoming information literate, that they cannot retrieve and evaluate the information that will be required for problem-solving and decision-making in the workplace and in society generally[1]. The survey also found that the respondents depended on personal collections and other engineers for their information, and were not making good use of the growing number of electronic options. More than half the survey respondents attributed this to their inability to find and use appropriate information.

Geoscientists and also students from Geosciences, for instance, find the burgeoning literature of their fields to be problematic and so rely on personal contacts as the primary means of identifying relevant information, thus overlooking other important sources. The academic librarians can make a crucial difference in ensuring that information literacy skills are integrated into the student's program in some manner and must make significant efforts to work with faculty. However, this is not an easy task, and numerous studies have shown that librarians and faculty do not understand each other's role or expectations very well.

Methodology

1. **Subject Area Relevancy Study (SARS) Cycle**

   The study design is qualitative, triangulating data from three methods: Analysis of an in-class task assignment with questions relating to students' process of information seeking (observation), and semi-structured interviews with students, and the survey conducted using feedback forms.

The study participants included students of engineering from three categories, foundation, undergraduates and postgraduates. The feedback gathered from 10% from 6, 178 of student's population. The campus population includes many different ethnic groups, from different background of countries, races, education and culture.
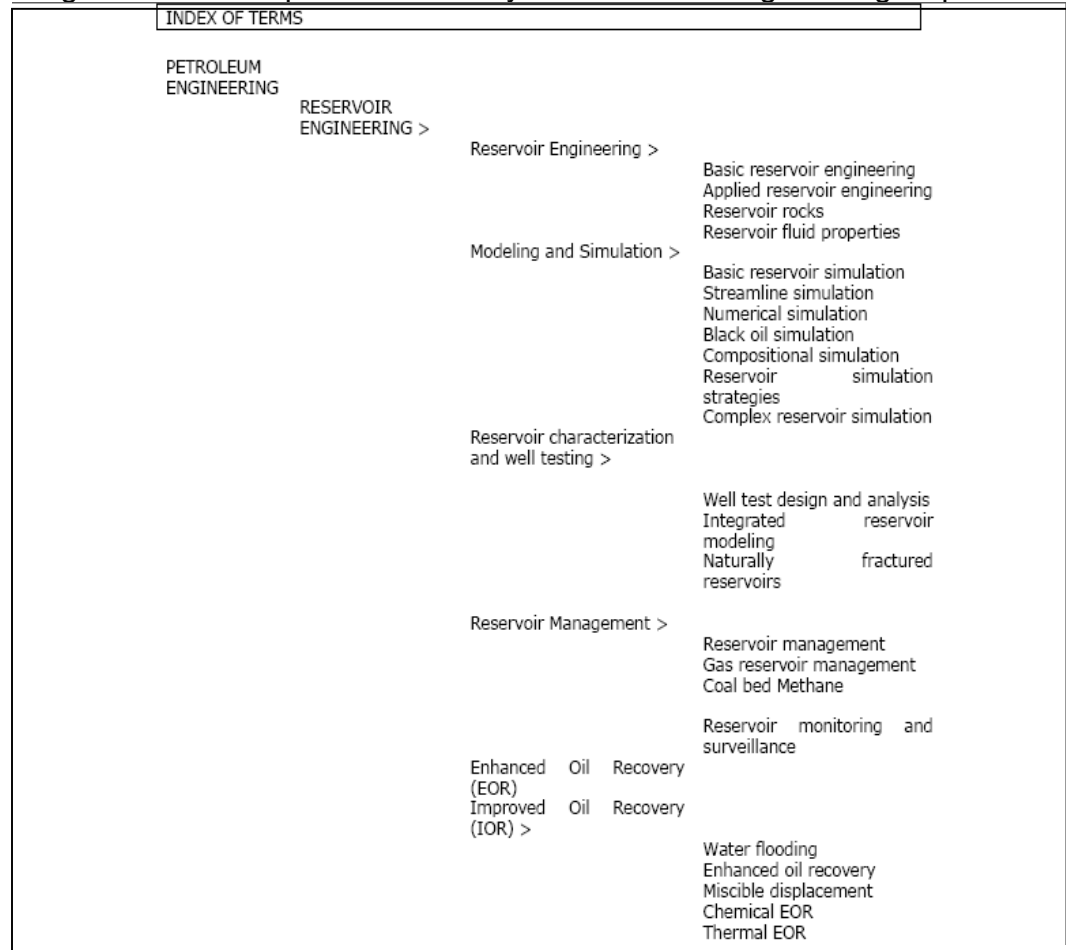
DIAGRAM 1.1: Series of Subject Area Relevancy Study (SARS) Cycle
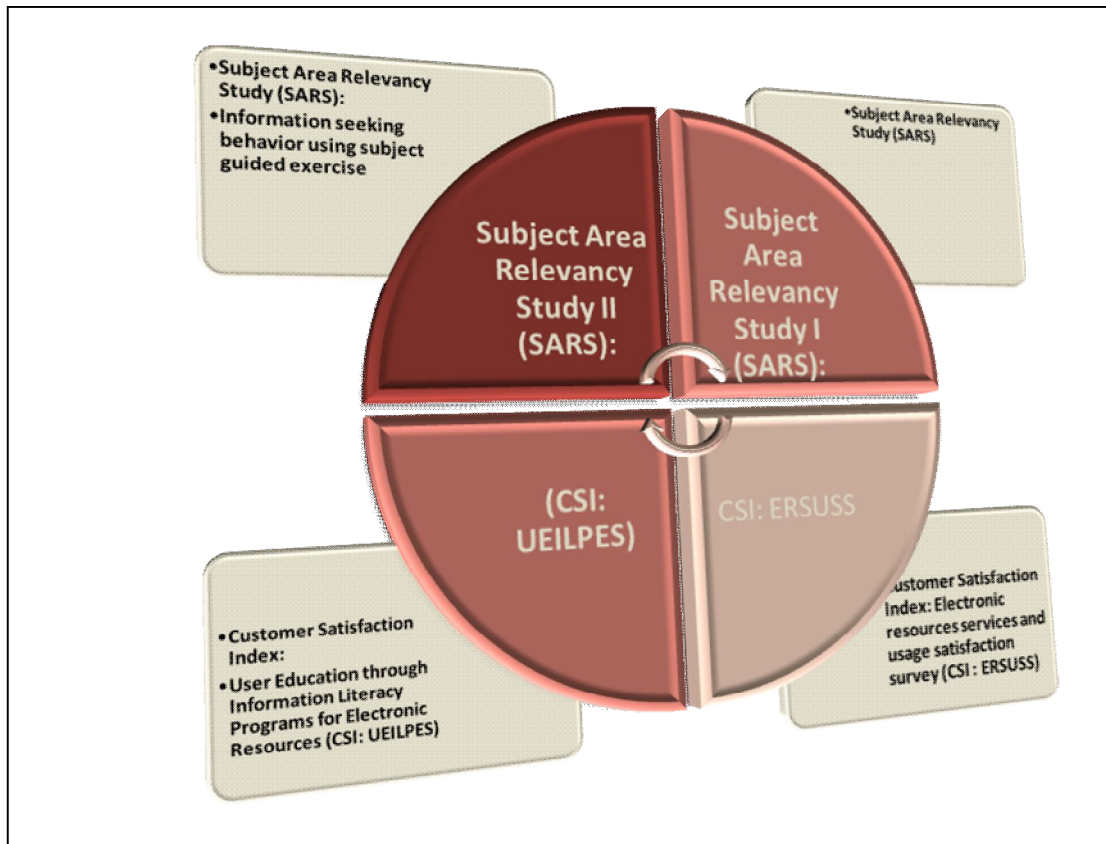
The above diagram shows the cycle or series of studies conducted as a tool to gather information on modules development and enhancement. Subject Areas Relevancy Study (SARS) are also tools in developing thesaurus of terms, taxonomy and subject guide for electronic contents.

Findings

Diagram 1.2: Example of Taxonomy in Petroleum Engineering Department

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INDEX OF TERMS

PETROLEUM
ENGINEERING
          RESERVOIR
          ENGINEERING >
                        Reservoir Engineering >
                                                 Basic reservoir engineering
                                                 Applied reservoir engineering
                                                 Reservoir rocks
                                                 Reservoir fluid properties
                        Modeling and Simulation >
                                                 Basic reservoir simulation
                                                 Streamline simulation
                                                 Numerical simulation
                                                 Black oil simulation
                                                 Compositional simulation
                                                 Reservoir          simulation
                                                 strategies
                                                 Complex reservoir simulation
                        Reservoir characterization
                        and well testing >
                                                 Well test design and analysis
                                                 Integrated          reservoir
                                                 modeling
                                                 Naturally           fractured
                                                 reservoirs
                        Reservoir Management >
                                                 Reservoir management
                                                 Gas reservoir management
                                                 Coal bed Methane

                                                 Reservoir  monitoring  and
                                                 surveillance
                        Enhanced   Oil   Recovery
                        (EOR)
                        Improved   Oil   Recovery
                        (IOR) >
                                                 Water flooding
                                                 Enhanced oil recovery
                                                 Miscible displacement
                                                 Chemical EOR
                                                 Thermal EOR
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Above is the outcome from Subject Areas Relevancy Study (SARS). The thesaurus of terms, constructed in a hierarchical format according to area of research conducted in UNIVERSITI TEKNOLOGI PETRONAS. There are maximum five levels of subject areas representing the core areas and the sub components. SARS had been conducted for group of six academic departments which had been attended by the research experts, academician and head of research departments. A set of standard question been asked to all the departments representatives during the interview session.

The representatives will give feedbacks on the most familiar and frequently used terms in their research department to be used as a subject guide. Structures of term or the department's taxonomy will be used in developing search strategies in electronic resources content, as well as printed content. Please refer to Appendix 1: A Quick Reference Guide to Petroleum Engineering and Geosciences.

Diagram 1.3: Quick Reference Guide to Electronic Content from Library Portal
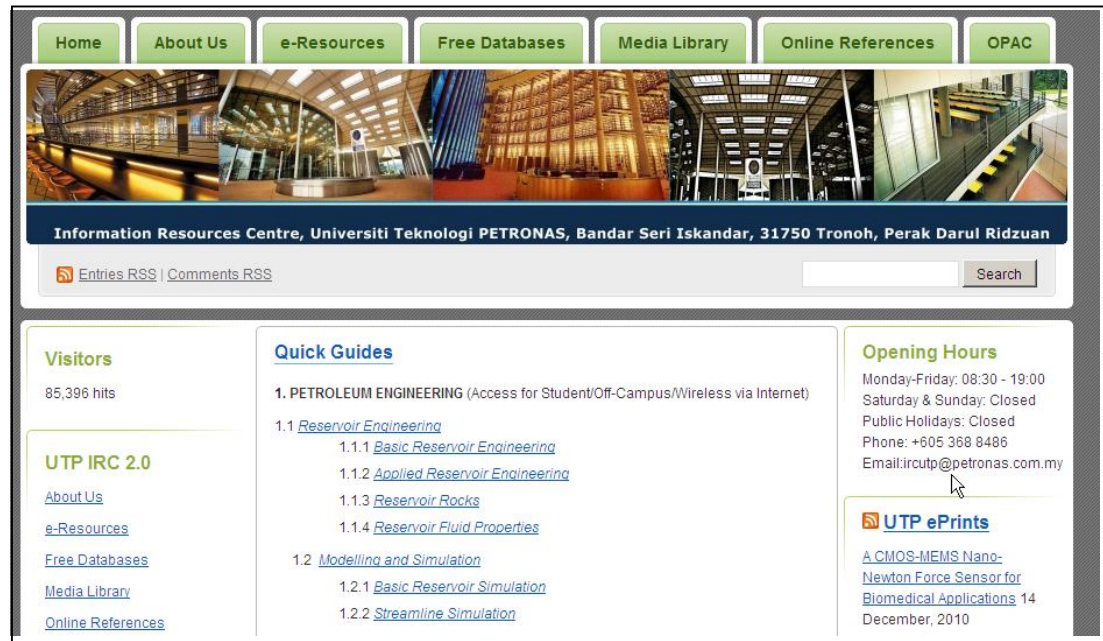
The internet access version of Quick Reference Guide to printed and electronic resources also develop in library portal to access the electronic content. Subject guided approach implemented in information literacy modules to support search strategies for students, as well as the researchers and academician. The frequently used terms will allow them to be more well verse with keywords and terms for searching and using taxonomy for browsing.

Engineering students from foundation, undergraduates and postgraduates will use the search terms and taxonomy browser in seeking for information.

After the information literacy session completed, they will give their feedbacks for modules improvement. Then, **Customer Satisfaction Index: Electronic Resources Services and Usage Satisfaction Survey (CSI: ERSUSS)** will play the roles to collect feedbacks on overall module content, subject or taxonomy relevancy and also the module enhancement.

The trend of electronic resource usage in four (4) quarter (FY2010/2011) shows the significant increment. More than 30% increment on electronic databases access, retrieve, use and evaluated by the users.
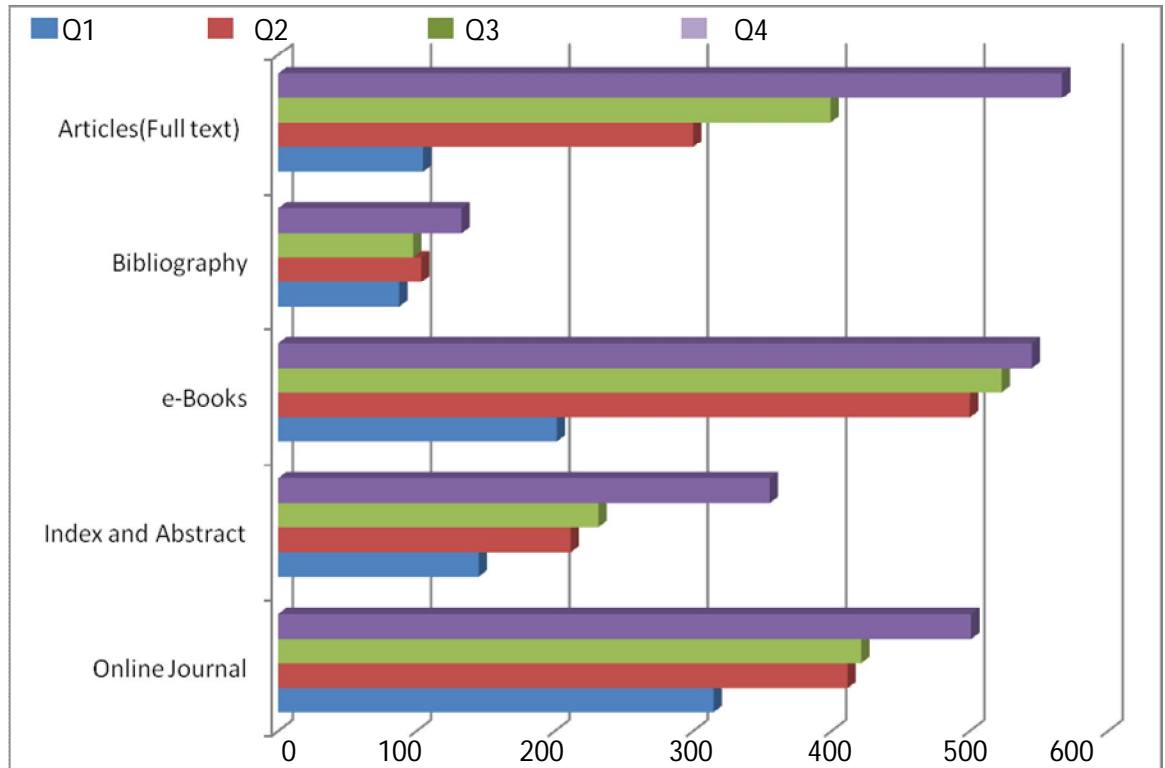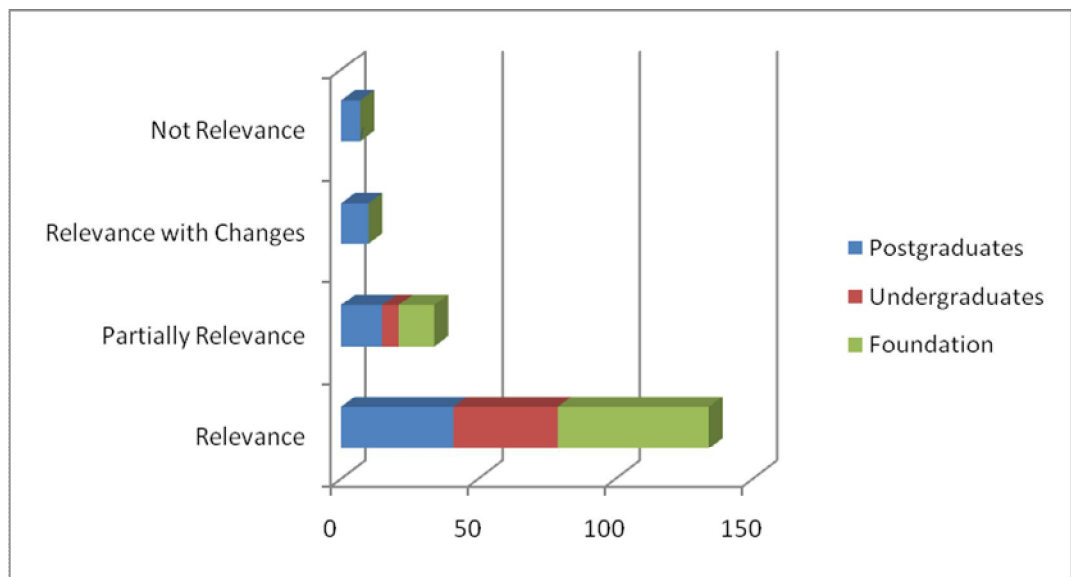
Diagram 1.4: Subject Area Relevancy Study (SARS) II – Findings on subject / taxonomy relevancy feedback

In four (4) months duration, the usage of taxonomy structure will become more matured. The maturity of taxonomy terms can be measured using **Customer Satisfaction Index: User Education through Information Literacy Programs for Electronic Resources (CSI:**

UEILPES). The findings from this research will help the improvement modules as well as the relevancy of subject/taxonomy. Staff competency, knowledge and teaching skills need to be improvised in this stage.

Benefits of SARS Cycle:

a) The internal keywords, subject guide and taxonomy for academic departments and university's practice can be developed in parallel with Information Literacy modules
b) Customer Satisfaction Survey and development of Customer Satisfaction Index will be conducted to measure quality of reference services, twice in a year
c) The Information Literacy modules for electronic resources are develop according to user's feedback
d) The librarian's knowledge and competencies level can be measured based on their training and teaching capability.
e) Librarian's subject knowledge will be developed in parallel with university's mission oriented research (MOR) requirement.

Conclusion

The result significantly shows that the library research instructional activities will not succeed if it is kept generic. The collaborative efforts between library and academic department through liaison librarian and subject matter experts' initiative will help to integrate both parties. Taxonomy are the product of collaboration at the meeting point, whereas, librarian using their skills in categorization knowledge and subject experts will contribute their knowledge into the structure. Information literacy programs for electronic resources literate, which comprises the flexible pedagogical and instructional approaches, are the product for user's education that need to revised according to user's and academic expectation frequently.

Notes

Lilith R. Kunkel, Susan M. Weaver, and Kim N. Cook, "What Do They Know? An Assessment of Undergraduate Library Skills," *Journal of Academic Librarianship* 22 (Nov. 1996): 430–34;

Robert Ivey, "Teaching Faculty Perceptions of Academic Librarians at Memphis State University," *College & Research Libraries* 55 (Jan. 1994): 69–82;

References:

Robert Ivey, "Teaching Faculty Perceptions of Academic Librarians at Memphis State University," *College & Research Libraries* 55 (Jan. 1994): 69–82;

Jean Major, "Mature Librarians and the University Faculty: Factors Contributing to Librarians' Acceptance as Colleagues," *College & Research Libraries* 54 (Nov. 1993): 463–9; Anne Lipow, "Outreach to Faculty: Why and How," in *Working with Faculty in the New Electronic Library* (Ann Arbor, Mich.: Pierian Pr., 1992), 7–24;

G. Divay, A.M. Ducas, and N. Michaud-Oystryk, "Faculty Perceptions of Librarians at the University of Manitoba," *College & Research Libraries* 48 (Jan. 1987): 49–62.

Anne Lipow, "Outreach to Faculty: Why and How," in *Working with Faculty in the New Electronic Library* (Ann Arbor, Mich.: Pierian Pr., 1992), 7–24;

Sonia Bodi, "Scholarship or Propaganda: How Can Librarians Help Undergraduates Tell the Difference?" *Journal of Academic Librarianship* 21 (Jan. 1995): 21–26;