

Ethical Use of Information – How University Students Fare

Szarina Abdullah¹, Nor Rashimahwati Tarmuchi¹, Norliya Ahmad Kassim¹,
Mohd Sharif Mohd Saad¹ and Rasimah Aripin²

¹ Faculty of Information Management

Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia

² Faculty of Information Technology & Quantitative Sciences

Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia

E-mail: drszarina@salam.uitm.edu.my

Abstract

Ethical use of information is an important component of information literacy, particularly among university students. This paper reports on the finding of a study conducted among university students to identify their information literacy (IL) competency, with specific attention on "Ethical use of information". The study used a self-administered questionnaire as the instrument for data collection. Respondents were 1,100 final year students from various disciplines from 4 public and 2 private universities in the Klang Valley of Malaysia. The level of competency was measured by students' ability to identify 3 main things: a) which types of information use require users to acknowledge the information sources, b) which activities are considered plagiarism, and c) which types of information are considered copyrighted. Students need to answer 13 item questions. Each answer was assigned scores for the purpose of computing competency levels, namely: 0=wrong answer, 1=beginner, 2=intermediate, 3=advanced. Results of the analysis revealed that majority of the respondents' competency fall under the beginner level (43.4%), followed by the intermediate level (38.0%), and advanced level (18.6%). Other interesting results are obtained by cross-tabulating competency data against various characteristics, such as their information-related activities in the library, the nature of academic assignments, the type of information skills course they have attended, the university where they attended, and other demographic variables. Implications from findings are discussed.

Keywords: Information literacy evaluation in Malaysia, Information ethics, University students.

1. Introduction

The knowledge economy is based primarily on the production and strategic use of information and knowledge. The ability to produce and use information effectively is thus a vital skill for citizens of the world. Countries in North America, Europe, and Asia have implemented programmes to develop information literacy (IL) skills at various levels of education. There are also standards to be used as guidelines for developing IL programmes in higher education, the most recent one being IFLA international guidelines on information literacy (August 2004). However, none of the above standard provides a specific measuring instrument to determine the competency levels of students who graduate from a university within the Asian context. Hence, this research is conducted to measure IL competency levels among university students, with the ultimate aim of designing an appropriate matrix to indicate IL competency levels to be used in higher education.

As Malaysia is moving towards information and knowledge-based society, it is critical that her would-be university graduates who are going to form educated workforce in various sectors of the country possess competencies and skills in information literacy. The question that seeks to be answered is to what extent our human resources (would-be graduates) possess the level of competencies and skills in information literacy that will enable them to seek gainful employment, to pursue life-long learning, and contribute to the overall national competitiveness. The measurement of information literacy among its

citizens has become necessary as the nation aims to become developed and globally competitive, on par with other nations' workforce.

2. Definition of Information Literacy

In a nutshell '*information literacy*' is a set of abilities enabling an individual to recognise when information is needed, where to locate, evaluate and use it effectively. An '*information literate*' individual is able to:

1. determine the extent of information needed for certain purposes
2. access and retrieve the needed information effectively and efficiently
3. critically evaluate information and its sources
4. incorporate selected information into one's knowledge base
5. use information effectively to achieve specific purposes
6. use information with understanding and acknowledging cultural, ethical, economic, legal, social issues surrounding the use.

The above definition of information literacy has been used (with certain degrees of variation) in several studies in schools and universities in US, Canada, Australia, UK, New Zealand, Europe, and Asia (American Library Association 2004; Bruce 2002; Correia 2002; Mohd. Sharif and Zainab, 2004).

3. Aim and Scope of the Study

This study is a preliminary attempt to test instruments in measuring selected IL skills in order to place students at certain competency levels, namely: beginner, intermediate, or advanced, based on their IL knowledge acquired throughout their university education. Subjects of the study include only final year students based on the premise that final year students are about to complete their study and should be ready to seek gainful employment upon graduation. They are expected to make up the educated workforce and should be equipped with adequate IL skills to make them competitive in the information-based economy. For practicality purposes befitting a preliminary study, samples of population are limited to final year students from various faculties at four public and two private universities in the Klang Valley of Malaysia.

Due to the lengthy nature of the study, we divide the report into three parts. The first part of the study focuses on those skills that can be measured through respondents' actual performance reflecting their ability to: *access, identify, retrieve, search, evaluate, organise, and select suitable sources and certain information for specific purposes*. Findings on these skills competency have been reported in the A-LIEP conference (Szarina et al., 2006a). The second part of the study measuring respondents' competency in *recognizing and identifying various information components and its sources* has likewise been reported in another conference (Szarina, et al., 2006b). The third part of IL skills reported here pertains to '*ethics in information use*'.

4. Literature Review

(a) The Significance of Information Literacy

Many countries in the developed and developing parts of the world have recognised the importance of "information literacy" (IL) skills among their citizens and have implemented programs to inculcate the IL competencies and skills among students at all levels. In the US, the National Forum on Information Literacy, established in 1989, and

the Institute for Information Literacy, established in 1998, have been instrumental in formulating IL Standards for school and higher education sectors. IL developments have also taken place in Canada, China, Japan, Mexico, Namibia, New Zealand, Singapore, and South Africa. (Bundy, 2002). In Europe, many European countries have implemented similar programs as seen in the Memorandum on Lifelong Learning (IFLA 2001): *“Europe has moved towards a knowledge-based society and economy. More than ever before, access to up-to-date information and knowledge, together with the motivation and skills to use these resources intelligently on behalf of oneself and the community as a whole, are becoming the key to strengthening Europe’s competitiveness and improving the employability and adaptability of the workforce...Hence, learning how to learn, to adapt to change, and to make sense of vast information flows are now generic skills that everyone should acquire.”* The OECD’s Educational Policy Analysis (OECD, 2001) stated: *“The knowledge economy is based on the production and use of information and knowledge. The ability to produce and use information effectively is thus a vital source of skills for many individuals”*. The world-wide and keen interest in IL among educators, governments, and librarians has been reflected in a vast amount of literature and research on the subject at all levels of education.

(b) Information Literacy in Higher Education

Research on information literacy among students in higher education has been carried out since the 1980s using quantitative methodologies, mostly on university students in the US. Major studies are such as those carried out by Kunkel, Weaver and Cook (1996) and Maughan (2001). The former surveyed 245 undergraduates of Kent State University regional campus to assess the basic skills of incoming undergraduates and how students’ characteristics affect these skills. The latter surveyed graduating students at the University of California at Berkeley in the departments of political science, history, sociology and philosophy. Other studies using survey methods are conducted by Brown (1999) at Oklahoma University among physical science graduate students; Nero’s study (1999) among graduating teachers at four Pennsylvania State System of Higher Education universities; Case-Smith and Powel’s survey (2003) among graduates of the occupational therapy program of the Ohio State University.

Another approach to IL research using qualitative methodology has been rare. One such study by Hepworth (1999) examined students at Nanyang Technological University in Singapore. The methods included a combination of qualitative techniques, such as task analysis, talk through and observation which were applied while students conducted their research project. Another study by Mohd Sharif and Zainab (2004) among undergraduates at the Faculty of Computer Science and Information Technology, University of Malaya, used students’ diary and interviews as instruments for data collection.

(c) Information Literacy Studies in Malaysia

In Malaysia, university libraries have been conducting, in one way or others via courses under the umbrella of IL (Che Norma Bahri 2004; Chan Sai Noi 2003; Juhana Salim 2000). These courses can be categorised as:

1. Orientation for all new undergraduates/post graduates,
2. Optional Information skills programmes for final year undergraduates,
3. Specialised information skills programmes such as use of databases, Internet searching skills,
4. Compulsory Information literacy / skills courses which are accorded academic credits,
5. Information literacy course accorded credits at the same level as other electives under Co-curriculum.

At the completion of most programmes, students' feedbacks are collected through an evaluation form. Only the courses conducted to earn some credits are evaluated from the students' ability to perform certain tasks through tests, work sheets, and final examinations.

Serious attempts to find out IL competency at the university level can be seen in two doctoral research conducted at the University of Malaya among students of Faculty of Information Technology and Computer Science (Mohd Sharif 2006, NorEdzan 2006). However these two studies confine their investigation to students of only one faculty, and at one university.

Considering the amount of research done overseas and in Malaysia, it appears that no one study has come up with a matrix or an integrated index to be used as indicators of competency level in information literacy that can be applied in higher education at the national level in Malaysia. The latest comprehensive review by Mohd Sharif, N. Edzan and Zainab (2005) emphasizes the need for a standardised tool to measure the effectiveness of IL courses in Malaysian universities as well as a national standard to measure competency levels that can indicate basic, intermediate or advanced standing of students in tertiary education. Hence, the present study is considered timely in addressing the issues related to IL competency measurement in higher education in Malaysia.

5. Methodology

This study is an exploratory survey research, using questionnaire as an instrument to test students' various IL knowledge and skills. The criteria used to assess students' IL competency levels according to '*beginning, intermediate, and advanced*' have been modified from those developed by the team at the New Jersey City University (Bulaong, Hoch, and Matthews, 2003). Bulaong identified assessment criteria for four levels of IL competency, namely: novice, developing, proficient, and accomplished, used for American students in the US context.

The research instrument for this study is a specially-designed questionnaire derived from selected dimensions of IL conceptual framework. The questionnaire contains both open and closed-ended self-administered items to test students' knowledge and ability in performing the selected skills, namely: access, identify, retrieve, search, evaluate, organise, and select suitable sources and certain information for specific purposes, and use information with awareness of its ethical and legal aspect. Each answer was assigned scores for the purpose of computing competency levels, namely: 0=wrong answer, 1=beginner, 2=intermediate, 3=advanced.

The sample population is convenient sample, not representing the whole university population in Malaysia, but is large enough to allow us to have sufficient data to achieve the objectives of the study and to test the robustness of the instrument before it is used nationwide. Furthermore, the sample comes from diverse background which allows comparative analysis across various characteristics to be carried out. Data analysis using SPSS version 12.0 reveals the number of students at each level of IL competency. Cross tabulations were done to detect the relationship between competency levels and respondents' background as well as their information-related habits.

6. Respondents' Profiles

The respondents comprise 1,118 students from the final year of four public (UM, UPM, UKM, UiTM) and two private (Uniten and HELP Institute) universities in the Klang Valley of Malaysia. They are from various faculties grouped under three main fields, namely: Science and Technology, Social Science and Humanities, and Business, Finance and Management. The majority of respondents (71.1%) are female while 28.9% are male.

7. Results of Data Analysis

In this part of the study, IL skill focuses on students' ethics in information use. The level of competency was measured by students' ability to answer 13 item statements organized into 3 main groups:

1. types of information use that require users to acknowledge the sources,
2. activities that are considered plagiarism, and
3. types of information that are considered copyrighted.

For the purpose of determining the competency levels, each answer is allocated a score. Scores between 0-9 are beginners, 10-12 are intermediates, and 13 scores (all correct answers) are advanced.

Although 1,118 students responded to the survey, only 1,100 responses are usable for data input and analysis. Results of the analysis include the overall competency, scores for each aspect of information ethics and cross-tabulation of competency data against various characteristics, namely: information-related activities, the nature of academic assignments, the type of information skills courses attended, and other demographic variables.

(a) Overall Competency on Ethics in Information Use

The overall results of the competency on ethics in information use presented in Figure 1 reveal that majority of the respondents fall under the beginner level (43.4%), followed by the intermediate level (38.0%), and advanced level (18.6%). Hence, the overall competency level of the respondents is very low reflecting the amount of their knowledge on referencing, plagiarism and copyright.

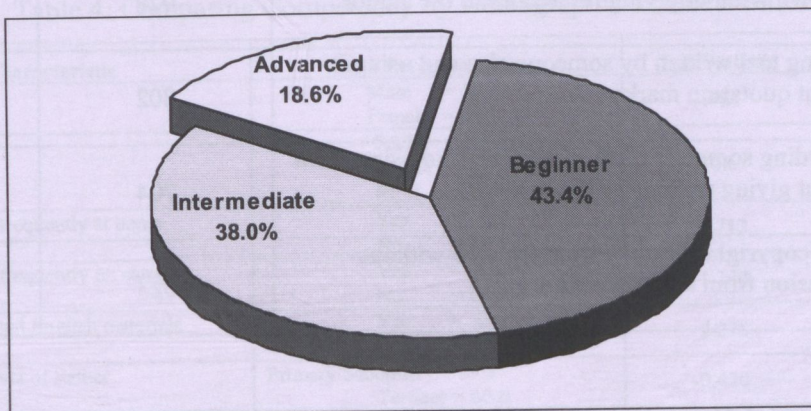


Figure 1: Overall Competency - Ethics in Information Use

In order to identify the specific nature of students' knowledge on ethical use of information, we further examine the data from Table 1, 2, and 3.

(b) Students' Knowledge on Referencing and Citation

Table 1 shows the number of respondents who know which actions require them to acknowledge the article and the author in their reference list.

Table 1: Knowing When to Acknowledge Information Sources

Which actions require you to acknowledge the sources of information?	Correct response	Percentage (%)
1. When I quote one sentence from an article	890	81.1
2. When I copy a whole paragraph from an article	732	66.7
3. When I write it over in my own words	550	50.1

The majority (81.1%) know that they have to acknowledge the source when they quote one sentence from the article. More than half (66.7%) know that they have to acknowledge when they copy a whole paragraph from an article. About half (50.1%) of the respondents know how to acknowledge when they write it over in their own words.

(c) Students' Knowledge on Plagiarism

It can be seen that most students can identify actions that are considered plagiarism as shown in Table 2. The majority (84.9%) know that using phrases and sentences of others as if they were their own without giving references to the original author is plagiarism. The majority (73.6%) also know that copying text written by someone else and using it without quotation marks is plagiarism. More than half (64.6%) know that rewording someone else's statement and using them without giving references to the author is plagiarism. Slightly more than half (57.2%) know that using copyrighted image from the web without permission from the authors/ creators is also an act of plagiarism.

Table 2: Respondents' Knowledge on Plagiarism

Which of the followings are examples of plagiarism?	Correct response	Percentage (%)
1. Using phrases and sentences of others as if they were your own without giving references to the author	928	84.9
2. Copying text written by someone else and using it without quotation marks	802	73.6
3. Rewording someone else's statements and using them without giving references to the author	704	64.6
4. Using copyrighted image from the web without permission from authors/creators	623	57.2

(d) Students' Knowledge on Copyrighted Information

The numbers of respondents with knowledge on copyrighted materials are summarized in Table 3. It is apparent that most students lack knowledge about intellectual property as can be seen from their low scores, in comparison to higher scores under the previous two tables.

Table 3: Respondents' Knowledge on Copyrighted Materials

Copyright is a form of legal protection applicable to published and unpublished works. Which of the followings are copyrighted?	Correct response	Percentage (%)
1. The theme song from the movie "Lord of The Rings"	762	69.8
2. A set of questionnaire used in a research report	648	59.3
3. Datuk Seri Abdullah Ahmad Badawi's budget speech	495	45.4
4. Siti Nurhaliza's Pictures from her official website	490	45.0
5. David Beckham's Pictures from Sports Illustrated magazine	459	42.0
6. Letters written by Tuanku Abdul Rahman to his wife	395	36.2

About two-third (69.8%) of the respondents know that the theme song from the movie "Lord of the Rings" are copyrighted. Slightly more than half (59.3%) know that a set of questionnaire used in a research report are copyrighted. Less than half of the respondents could identify copyrighted works: Dato' Seri Abdullah Ahmad Badawi's budget speech (45.4%), Siti Nurhaliza's pictures from her official website (45%), David Beckham's pictures scanned from *Sports Illustrated* magazine (42%), and letter written by Tunku Abdul Rahman to his wife (36.2%). In order to examine further the relationship between competency data and other variables, non-parametric tests were done, of which the results are shown in tables 4 to 11.

(e) Comparing Competency by Socio-Demographic Characteristics

Table 4 demonstrates the relationship between competency and certain demographic characteristics of students. Significant differences between the higher and lower levels are seen in the following groups: students from Business, Finance and Management obtain higher competency than their counterparts from Social Science, or Science and Technology; those who read English materials have a higher competency than those who read other languages; those who started using the Internet at primary school have higher competency than those who started the Internet in secondary and tertiary education.

Table 4: Comparing Competency by Demographic Characteristics

Characteristic	Mean Percentage Score	Test Statistic	p-value
1. Gender	Male = 58.7 Female = 62.2	-0.985	0.325
2. Field of Study	S&T = 57.1 SS&H = 59.9 BFM = 62.1	10.6	0.00**
3. Use English frequently at home	Yes = 60.2 No = 59.2	-1.712	0.477
4. Use English frequently on campus	Yes = 60.4 No = 60.0	-1.340	0.180
5. Frequently read English materials	Yes = 60.1 No = 57.5	-2.275	0.023*
6. Education level of Father	Primary/Secondary = 59.1 Tertiary = 60.6	-0.420	0.156
7. Education level of Mother	Primary/Secondary = 59.1 Tertiary = 60.9	-1.266	0.206
8. Own a computer	Yes = 59.4 No = 60.1	-0.421	0.674
9. started using the internet	Primary school = 60.4 Secondary = 59.9 Tertiary = 56.9	3.160	0.043*

* Significant difference at the 0.05 level of significance

** Significant difference at the 0.01 level of significance

(i) Comparing Competency by University

Table 9 shows that on the average, respondents from private universities (IPTS) and Universiti Malaya (UM) have a slightly higher competency than those from Universiti Teknologi MARA (UiTM), Universiti Putra Malaysia (UPM) and UKM. This is confirmed by the non-parametric test (Kruskall-Wallis) used to determine whether significant differences in competency scores exist among the universities.

Table 9: Comparing Competency Scores by University

University	Mean Score	Median Score	Standard Deviation	Kruskall-Wallis Test		
				Mean Rank	Test Statistic	p-value
1. IPTS	61.8	61.5	16.78	598.08	13.401	0.009*
2. UM	60.3	63.3	12.49	556.70		
3. UiTM	59.8	53.9	16.45	560.09		
4. UPM	59.0	61.5	14.97	535.08		
5. UKM	57.0	53.9	16.45	489.96		

* Significant difference at the 0.05 level of significance

9. Discussion

Several main points from the findings deserve mentioning here. Data from Table 1 and 2 demonstrate that the majority of respondents (more than 50%) are able to identify 7 situations considered as ethical use of information, namely: when to acknowledge sources of information used and which actions are considered ‘plagiarism’. Their weakness appears to be the lack of knowledge on intellectual property as shown in Table 3. More than 50% of students are not aware of various types of copyrighted information. It is suggested that the IL program for university students emphasize this important aspect of ethics in information use. In addition, if we consider the ethical use of information as a critical competency among university graduates, we should aim at raising overall students’ scores to 90-100 %.

Other salient points from findings are the significant differences in the following variables:

- Respondents from Business, Finance & Management disciplines perform better than those from Social Sciences & Humanities, and Science and Technology.
- Those who frequently read English materials show higher competency than those who frequently read non-English materials.
- Those who started using the Internet in primary school show higher competency than those who started using the Internet in secondary and tertiary education.
- Those who use the Internet to check latest news and those who join the e-groups/user groups show higher competency than those who use the Internet for other activities.
- Those who use the library to borrow books, search academic materials, read academic journals or to study, show higher competency than those who use the library for other purposes, and
- Those who have written assignments in essay format.

As far as information skills programs are concerned, respondents who obtain better scores are those who have attended either the library orientation for new students, or a voluntary information skill course for new students, or a compulsory information skills course in the first year or final year.

The above findings should be useful for university administrators, in particular library instructors and faculty members who are in charge of designing and implementing

information skills programs for students. Evidences are that the Information Skills programs attended by students either on a compulsory or voluntary basis have positive relationship on their IL competency. In addition, written assignments in essay format should be encouraged as this type of academic work has contributed to IL competency. The fact that students in Business / Finance / Management have shown better scores than their counterparts in other disciplines could be due to the fact that their assignments are mostly essay-type. Such work compels them to learn about referencing and citations more than students who are required to do merely lab work, scientific experiments, or project work without written essays. We should examine further the teaching and learning practices among Business /Finance / Management faculties so as to identify factors that have contributed positively to IL competency in their students.

Another note-worthy finding is that students who frequently read English materials show higher competency level than those who read in Bahasa Malaysia, or Chinese, or Tamil. This confirms the ongoing debate in Malaysia about the necessity for students' mastery of the English language.

The final conclusion that should be highlighted is that information literacy competency, English competency, Business / Economics / Management background, and private universities are found present together. Future research with systematic sample of the entire student population in Malaysian universities needs to be done to confirm these findings.

Limitations of the Study

1. The above findings are limited to respondents in the final year of four public and two private universities in the Klang Valley of Malaysia. Therefore they cannot be generalized to the whole population of university students in Malaysia.
2. Not all dimensions of Information Literacy are measured in the study. It is very time consuming and impractical to try to do so. Therefore the study has only focused on the abilities and knowledge which are expressed in measurable behaviors, namely: access, identify, select, evaluate, and use information.
3. As mentioned in the aim of the study, the instruments for IL measurement need to be further refined before final use.

References

- American Library Association, Association College and Research Libraries. 2004. *Information Literacy Competency Standards For Higher Education*. Chicago: ALA. Available at: <http://www.ala.org/acrl/acrlstandards/informationliteracycompetency.htm>.
- Brown, C and L. R Krumholz. 2002. Integrating information literacy into the science curriculum. *College and Research Libraries*, Vol. 63, no.2: 111-123
- Brown, Cecelia M. 1999. Information Literacy of Physical Science Graduate Students in the Information Age. *College & Research Libraries*, Vol.60, no.5: 426-438.
- Bruce, C. S. and P.C. Candy. 2000. *Information Literacy around the world: advances in programs and research*. Wagga Wagga, NSW : Charles Sturt University.
- Bruce, C. S. 2002. *Information literacy as a catalyst for educational changeprepared for UNESCO, and the National Forum on Information Literacy*. Available at: <http://www.nclis.gov.libinter/infolitconf&meet/papers/>
- Bulaong, G., Hoch, H.and R. Matthews. 2003. Information Literacy Scoring Rubric. In *Information Literacy Competency Standards for Higher Education*. Chicago: ACRL. Available at: <http://www.ala.org/acrl/acrlstandards/informationliteracycompetency.htm>

- Bundy, A. 2002. *Growing the community of the informed: information literacy- a global issue*. Available at : <http://www.unisa.edu.au/papers/>
- Case-Smith, Jane and Carol A Powell. 2003. Information literacy skills of Occupational Therapy graduates: a survey of learning outcomes. *Journal of the Medical Library Association*. Vol. 91, no.4 :468-477
- Chan Sai Noi. 2003. Making information literacy a compulsory subject for undergraduates: the experience of the University of Malaya. Paper presented at the 69th. World Library and Information Congress, August 2003, Berlin, Germany.
- Che Norma Bahri. 2004. Program literasi maklumat di perpustakaan akademik : satu tinjauan kaedah dan pencapaian. Paper presented at *Seminar Kebangsaan Perpustakaan di Malaysia*, May 2004 at Langkawi, Malaysia
- Corral, S. and H Hathaway,. editors. 2000. Seven Pillars of Wisdom? Good Practice in Information Literacy Skills Development. *Proceedings of the Conference held at the University of Warwick*, 6-7 June. London, Society for College, National and University Libraries (SCONUL)
- Correia, A.M.R. 2002. *Information literacy for an active and effective citizenship*. Available at: <http://www.nclis.gov.libinter/infolitconf&meet/papers/>
- Fowler, Claras. 2000. What have we done? TILT's Impact on our instruction program. *Reference Services Review*, Vol. 28, no.4 : 15-20.
- Hepworth, Mark. 1999. A study of undergraduate information literacy and skills: the inclusion of information literacy and skills in the undergraduate curriculum. Paper presented at the *65th IFLA Council and General Conference, August 1995*, Bangkok, Thailand.
- International Federation of Library Associations(IFLA). 2004. *Round Table on User Education*. The Hague, IFLA. Available at: <http://www.ifla.org.VII/s42/>
- Juhana Salim. 2000. Program literasi maklumat di IPT dalam era digital. Presented at *Seminar Perpustakaan dan Pustakawan : satu anjakan paradigma*, August 2000, Kuala Lumpur, Malaysia.
- Kunkel, Lilith R., Susan Weaver, and Kim N. Cook. 1996. What do they know? An Assessment of undergraduate library skills. *The Journal of Academic Librarianship*, Vol. 22 : 430-434
- Maughan, Davitt Patricia. 2001. Assessing Information Literacy among Undergraduates: A discussion of the literature at the University of California – Berkeley. *College & Research Libraries*. Vol. 62, no.1:71-82
- Mohd Sharif Mohd Saad and A. N. Zainab. 2004. The Internet as a Resource for Final Year Project. Paper presented at the *Conference on Information Literacy- Information, Learning, Innovation: Delivering Global Knowledge, October 2004*, Brunei Darulsalam.
- Mohd Sharif Mohd Saad, N.N. Edzan and A.N. Zainab. 2005. Assessing learning outcomes of information literacy programmes: Malaysian academic libraries. Paper presented at the *International Conference on Libraries: Towards a Knowledge Society*, November 2005, Penang, Malaysia
- Mohd Sharif Mohd Saad 2006. *Information literacy and information seeking behaviour among students undertaking their final year projects*. PhD. Research in progress, Universiti Malaya.
- Nero, R. Lut 1999. *An assessment of information literacy among graduating teacher education majors of four Pennsylvania State System of Higher Education (SSHE) universities*. PhD Thesis. University of Pittsburgh.
- Nor Edzan Haji Che Nasir 2006. *Modeling an information literacy programme for undergraduates: a soft systems methodology approach*. PhD. Research in progress, Universiti Malaya.

- Organisation for Economic Co-operation and Development. 2001. *Educational policy analysis*. OECD Publishing, Centre for Educational Research and Innovation.
- Szarina Abdullah, Norliya Ahmad Kassim, Rasimah Aripin, Mohd Sharif Mohd Saad and Nor Rashimahwati Tarmuchi. 2006a. Developing Information Literacy Measures for Higher Education. *Proceedings of the Asia-Pacific Conference on Library & Information Education & Practice, 3-6 April 2006*. Nanyang Technological University, Singapore
- Szarina Abdullah, Nor Rashimahwati Tarmuchi, Norliya Ahmad Kassim, Rasimah Aripin, and Mohd Sharif Mohd Saad. 2006b. Measuring information literacy competency in higher education. *Proceedings of the International Conference on Information Literacy, 14-15 June 2006*, Kuala Lumpur, Malaysia.