Available online at www.elixirpublishers.com (Elixir International Journal)

Educational Technology

Elixir Edu. Tech. 70 (2014) 24226-24229

ISSN: 2229-712X

Investigation Analysis of Information Literacy of Science and Engineering Undergraduates

Ting-ting Liu and Hai-bin Sun

College of Physics and Electronic Engineering, Taishan University, Tai'an, Shandong, 271021, China.

ARTICLE INFO

Article history:

Received: 1 March 2014;

Received in revised form:

25 April 2014;

Accepted: 14 May 2014;

Keywords

Information literacy,

Questionnaire,

Undergraduates,

Competency.

ABSTRACT

Information literacy is an essential competence for the contemporary information society. An information literate person knows why and how to use information for achieving the purposes, and act ethically. In order to further understand the information literacy of undergraduates and establish the base for the practice strategy promoting undergraduates' information literacy, the self-made "Questionnaire of Undergraduates' Information Literacy" is used in the study. The quantitative responses were analyzed by SPSS. The Cronbach's reliability coefficient of the scale was 0.875. In light of the results of the analysis, the undergraduates' level of information literacy is on the intermediate. The ability of undergraduates to find, seek, assess and use information effectively is fairly good. During the processing of learning, information literate undergraduates should improve the efficiency in the way handle information.

Introduction

Information literacy (IL) played an important role in personal, economic, social and cultural development and asserted the need for governments and others to support "vigorous investment in information literacy and lifelong learning strategies" to create public value and enable the development of the information society.[1] The term of "information literacy" was first defined by Paul Zurkowski, the president of the Information Industry Association, who used it in his proposal to the National Commission on Library and Information Science in 1974. In the proposal, Zurkowski described information literate individuals as those who are "trained in the application of information resources to their work" and campaigned for a national program to teach the necessary skills, which would eventually yield an information literate population a decade later.[2]

Information literacy is no longer just a library issue nowadays. Information literacy is now widely recognized as an essential competence for effective participation in the rapidly development information society.

There will also be people who have fallen through higher education. Information literacy is of keen importance to all students in campus. So it will be useful for undergraduates to be able to transfer their information literacy capability to their private life. Acquiring information literacy skills at higher education is required by the fact that lifelong learning has become a must and the information widely used in teaching, learning, training and research activities is steadily growing in electronic environments. [3]

Definition of information literacy

Information literacy has been perceived in a variety of ways. The concept of information literacy has been promoted by library and information professionals for several decades.

American Library Association (ALA) defined information literacy is "a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information".[4]

The Prague Declaration 2003 stated information literacy encompasses knowledge of one's information concerns and needs, and the ability to identify, locate, evaluate, organize and effectively create, use and communicate information to address issues or problems at hand; it is a prerequisite for participating effectively in the information society, and is part of the basic human right of life long learning. Information Literacy is a concern to all sectors of society and should be tailored by each to its specific needs and context. [5]

The Alexandria Proclamation on Information Literacy and Lifelong Learning defined information literacy as "comprises the competencies to recognize information needs and to locate, evaluate, apply and create information within cultural and social contexts. It empowers people in all walks of life to seek, evaluate, use and create information effectively to achieve their personal, social, occupational and educational goals".[6]

The Association of College and Research Libraries (ACRL), a division of the ALA, has been active in promoting information literacy, published information literacy competency standards and guidelines for best practice in instructional efforts (ACRL, 2003). [7], [8] The Information Literacy Competency Standards for Higher Education articulated five standards which are divided into 22 performance indicators.

Information literacy is now gaining increasingly national attention in China. Librarians in China defined information 1iteracy as "the comprehensive ability of individual to recognize when information is needed and to locate, evaluate and use effectively the needed information. The information literacy competency standards are the base of information literacy education". [9]

These definitions imply information literacy includes several skills or competencies. We think that an information literate undergraduate is to

- Have sensitive conscious of information resources.
- Determine the extent of needed information.
- Access the needed information effectively and efficiently.
- Evaluate information and its sources critically.

Tele:

E-mail addresses: lttphd@163.com

- Use information ethically and legally.
- Organize communicate and share information effectively.

Method

In order to further understand the information literacy of undergraduates and establish the base for the practice strategy promoting undergraduate students' information literacy purposely, the self-made "Questionnaire of Undergraduates' Information Literacy" is used in the study. The questionnaire design is mainly started from the definition of information literacy, and consists of 27 questions. Four of the items reflect information knowledge; seven of items reflect information ethic, while 16 of items reflect information competency. The questionnaire has both positive and negative items.

The survey was implemented in Taishan University, and the questionnaire survey didn't note the names of investigated objects. The sample consists of freshman, sophomore, junior and senior undergraduates who major in physics, optics, communication engineering, electrical science, materials chemistry, biological science and biological technology.

Questionnaires were distributed and collected by lecturers within teaching sessions, which gave the high response rate. In 360 questionnaires, all of them are returned, and 344 (males=197, females=147) of them are effective, and the efficiency rate is 95.5%.

Responses to the survey items were coded; and responses were graded in terms of a Likert five-point scale (1 = very poor, 2 = poor, 3 = adequate, 4 = good and 5 = excellent). In order to obtain an accurate score reflecting information literacy in a single direction, we reversed the score of negative items so that all of the individual item scores lie on the same scale with regard to direction. In reverse scoring, the 5 becomes 1, 4 becomes 2, 3 stays the same, 2 becomes 4 and 1 becomes 5. The quantitative responses were compiled and analyzed using the Statistical Package for the Social Science (SPSS 13.0) for Windows computer software. The Cronbach's reliability coefficient for this 27-item scale was found to be 0.875.

Results of the questionnaire survey

In this section, the data collected using the questionnaire are analyzed.

The average of the responses the all undergraduate gave to the items is 91.76, see Table 1. Table 2 gave the item means; it shows that the average score of the undergraduates is centered on the "adequate" option.

Table 1 Descriptive Statistics of IL Scale

Mean	Variance	Std. Deviation	N of Items
91.76	134.421	11.594	27

Table 2 Summary Item Statistics of IL Scale

	Mean	Min	Max	Variance
Item Means	3.398	2.200	4.811	.634
Item Variances	.785	.369	1.321	.064
Inter-Item Correlations	.203	-.275	.794	.062

Table 3 showed that undergraduates know well how to use information ethically and legally, but they are not good enough at computer literacy (such as make webpage, assembly computer, use software or computer language related to own subject, use databases). Ability of undergraduates to use word processing packages is not good enough.

Table 4 showed the results for 27 items. The column "Corrected Item-Total Correlation" showed us the correlation between a particular item and the sum of the rest of the items. This tells us how well a particular item "goes with" the rest of the items. In table Ⅳ, the best item appears to be item "Access needed information effectively and efficiently", with an item-total correlation of r = 0.690. The last column "Cronbach's Alpha if item deleted" counts what the Cronbach's alpha would be if we got rid of a particular item. For example, at the line "Word processing", the number is 0.866. That means the Cronbach's alpha of this scale would drop from 0.875 to 0.866 if we got rid of that item.

Further analyses of bivariate relationships between gender and total sum were carried out as indicated in Table 5. Table 5 displays the Spearman's correlation and the two-tailed probability for correlation coefficient. As we seen from Table Ⅴ, the correlation is significant at the level of $p<0.05$ and negative. It can be seen that there is significant difference between the information literacy levels in total in terms of the genders. The levels of male undergraduates were more successful in information literacy than female undergraduates; it could be because female undergraduates are generally more hesitant about using new technologies.

Conclusion

As seen in the study, reliable and valid questionnaires will enable higher educator to determine their students' information literacy level. In the light of the results of the analysis, the undergraduates' level of information literacy is on the intermediate. The ability of undergraduates to find, seek, assess and use information effectively is fairly good. The undergraduates know well how to use information ethically and legally; but they are not good enough at computer literacy, such as make webpage, assembly computer, use software or computer language related to own subject, use databases. The information literacy levels between total genders have significant difference. The levels of male undergraduates were more successful in information literacy than female undergraduates.

An information literate person is one who knows why and how to use information for achieving the purposes throughout his/her lifetime, and act ethically by not plagiarizing another's work when presenting the research to an audience. [10] Information literacy is an essential competence for the contemporary information society. Its contribution in higher education is widely recognized. [5] Higher educator should contribute to greater achievement of undergraduates' information knowledge, information competency and information ethics. Information literate undergraduates should improve the efficiency in the way handle information in the course of learning and daily life.

Acknowledgment

The research is supported by the Shandong Province Education Science Eleventh Five-Year Planning Project (2010GG042).

References

F. W. Horton. Information literacy and information management: A 21st century paradigm partnership. International Journal of Information Management, 2006, 26(8):263–266.

P.G. Zurkowski. The information service environment relationships and priorities. Washington D.C.: National Commission on Libraries and Information Sciences, 1974, No. 5, ED100391.

Ömür Sadiolu, Nigar pek, Meral Taner Derman. Determining the information literacy skills of teacher candidates for the sustainability of quality in education. Procedia Social and Behavioral Sciences, 2009,vol. 1, issue 1:1455–1459.

ALA. Presidential committee on information literacy: final report.
http://www.ala.org/ala/mgrps/divs/acrl/publications/whitepapers/presidential.cfm, retrieved March, 2009.

Table 3. The results of item statistics of IL scale

	Mean	Std. Deviation
Word processing	3.23	.886
Spreadsheet processing	3.05	.897
Microsoft PPT processing	2.76	.963
Use Windows operating system	3.20	1.004
Obtain information by search engines	3.56	1.006
Webpage making	2.20	.982
Use software or computer language related to own subject	2.37	1.033
Knowledge of literature retrieval	2.77	1.116
Assembly computer	2.23	1.149
Concern with information related to own subject	3.06	.799
Determine information appropriate to the chosen topic	3.23	.736
Access needed information effectively and efficiently	3.22	.768
Evaluate information	3.38	.813
Organize and store information	3.28	.842
Communicate and share information	3.48	.798
Use information in critical thinking and problem solving	3.32	.811
Use search strategies efficiently	3.00	.908
Frequency on the internet	3.29	.899
Read specialized books and periodicals	2.77	.793
Use databases	2.41	.920
Attacked by hackers	4.55	.768
Login others computer illegal	4.77	.677
Skim harmful network information	4.61	.767
Spread harmful information	4.81	.608
Divination by Internet	4.69	.679
Use pirated software	4.04	1.140
Plagiarize others article or book	4.45	.860

Table 4. The results of item-total statistics

	Scale Mean if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Word processing	88.53	.616	.866
Spreadsheet processing	88.71	.568	.867
Microsoft PPT processing	89.00	.597	.866
Use Windows operating system	88.56	.618	.865
Obtain information by search engines	88.20	.558	.867
Webpage making	89.56	.514	.868
Use software or computer language related to own subject	89.39	.653	.864
Knowledge of literature retrieval	88.99	.640	.864
Assembly computer	89.53	.380	.873
Concern with information related to own subject	88.70	.572	.867
Determine information appropriate to the chosen topic	88.53	.599	.867
Access needed information effectively and efficiently	88.54	.690	.865
Evaluate information	88.38	.621	.866
Organize information	88.48	.599	.866
Communicate and share information	88.28	.403	.871
Use information in critical thinking and problem solving	88.44	.483	.869
Use search strategies efficiently	88.76	.579	.866
Frequency on the internet	88.47	.217	.876
Read specialized books and periodicals	88.99	.446	.870
Use databases	89.34	.496	.869
Attacked by hackers	87.21	-.069	.881
Login others computer illegal	86.99	.086	.877
Skim harmful network information	87.15	.148	.877
Spread harmful information	86.95	.201	.875
Divination by Internet	87.07	.137	.877
Use pirated software	87.71	-.032	.886
Plagiarize others article or book	87.31	.132	.878

Table 5. Spearman's correlation of gender and total of IL

		gender	total
gender	Correlation Coefficient	1.000	-.153(**)
	Sig. (2-tailed)	.	.012
total	Correlation Coefficient	-.153(**)	1.000
	Sig. (2-tailed)	.012	.

Sheila Corrall. Information literacy strategy development in higher education: An exploratory study. International Journal of Information Management, 2008, 28(2):26–37.
Heidi L.M. Jacobs. Information literacy and reflective pedagogical praxis. The Journal of Academic Librarianship, 2008 34, (3): 256–262.
ACRL. Information literacy competency standards for higher education. http://www.ala.org/ala/acrl/acrlstandards/information literacy competency.htm, retrieved July 29, 2008.
ACRL. Characteristic of programs of information literacy that illustrate best practices: A guideline. http://www.ala.org ala/acrl/ acrlstandards/characteristics.htm, retrieved July 29, 2008.
Zeng Xiaomu, Sun Ping, Wang Mengli, Du Weichun. The development of information literacy competency standards for higher education in Beijing. Journal of Academic Libraries, 2006(6):64-67.
Education and Manpower Bureau of Hong Kong. Information Literacy Framework for Hong Kong Students. http://www.edb.gov.hk/FileManager/EN/Content_1619/il_eng.pdf, retrieved June 20, 2012.