Instrument Development for Information Literacy Assessment through Analysis and Synthesis Skills in Post Covid Higher Education

Ana Irhandayaningsih [1,*]

[1] Department of Library Science, Faculty of Humanities, Diponegoro University, Semarang - Indonesia

Abstract. Information literacy is a collection of skills in accessing, analyzing, and utilizing information. These skills become very important in a life that is flooded with information in print and digital form. Information literacy skills have also become an integral part in schools and education, but information literacy is still abstract so it is difficult to measure. This study aims to interpret the reference standards contained in the Framework for Information Literacy for Higher Education by the Association of College and Research Libraries (ACRL) and develop instruments to measure information literacy skills, as well as validate instruments. This instrument aims to assess the ability to analyze and synthesize abstract scientific writings, through the criteria, namely (i) selection of information sources, (ii) selection of topics, (iii) evaluation of topics, and (iv) citation skills. The instrument validation uses action research methods involving 120 undergraduate students consisting of first year students and final year students.

1 Introduction

However, global communication processes have led to the emergence of new education models, mainly due to the development of information and communication technologies (ICT). Although teaching was previously focused on teacher guidance and student learning, educational models now focus more on active learning. A change in the roles of the actors involved in the teaching-learning processes has been forced by this situation [1], [2]. The student no longer can be a very passive subject that memorizes the studies material. However, the students must have a collection of skills and abilities that coherently enable information. The terms of information literacy, based on a collection of competencies and skills, some general and others unique to each discipline, are connected to the skills that students need to learn in the best possible conditions on their own. The European Higher Education Region (EHEA), which seeks to harmonize and establish integration between European university studies, proposes a shift in higher education philosophy in order to emphasize the professional management of learning resources over the mere accumulation of knowledge [3],[4],[5]. The Tuning1 project was created to achieve these objectives, focusing on educational frameworks and the content of studies. A collection of 30 competencies, known as transversal or generic competencies, were defined by the project. Over recent years, the topic of competency and skills-based education has become increasingly relevant in Information Science2. It has led to a research line known as information literacy, which focuses on competencies in using information (search, organization, processing, representation, and management). While

several concepts of information literacy3 have been put forward, one of the most cogent ones is that advanced by Webber and Johnston4: "Information literacy is the adoption of proprietary information behavior to define information needs, leading to the wise and ethical use of information in society, through whatever channel or medium." The assessment and evaluation of knowledge literacy skills have been discussed in a variety of research studies.

From a theoretical point of view, it must be recognized that very few information literacy competencies are explicitly taught at universities [2], [6]. However, two main curriculum courses (Document Abstracting and Indexing and Abstracting Techniques) are included in the Spanish Library and Information Science degree, directly linked to two of the core information competencies in international information literacy standards: interpretation and synthesis of information. Technological advances have not necessarily reduced the need for abstracting; in fact, the opposite is true: the growth of the Internet has created a growing need for a variety of ways of filtering information, the pièce de résistance of which is abstracting. As a result, these courses have become actual laboratory circumstances in which action research is used to explore aspects relevant to knowledge literacy [6], [7].

The experience of teaching these subjects has enabled us to observe students' abilities in these competencies and the learning processes involved. The main objective of this research is to observe and measure the level of students' competencies using action-research methodology by specifying the necessary stages in abstracting processes and observing the extent to which the curricular development of these subjects affects the skills of the students. Competencies are defined by the OECD (Organization for E*conomic Co-o*peration and Development) as the ability to satisfy individual or social requirements or to carry out an activity or task [8]. The benefit of this demand-based, external or functional approach is that it exposes individuals' personal or social demands. The generic competencies needed by higher education students have been addressed by many education-related institutions and can be outlined according to the Alvin- EEES project: searching and evaluating information, understanding the information, and communicating the information; the competencies directly linked to our study goals are those known as "competencies in information literacy" and refer to information search, organization, processing, representation, and legal and ethical use.

This research focuses on knowledge processing and synthesis of all the competencies covered by the INFOLIT International Standards (ACRL, AASL, AECT, SCONUL, CAUL, and ANZIIL). The abstracting method requires the collection of relevant information and the recognition of the textual structure of the original document, provided that effective learning should actively and deliberately combine the new and prior knowledge of the person. The abstract organizes the information collected and produces new knowledge in the subsequent representation process [9], [10]. Metacognitive research has shown that the ability to recognize and recall the key concepts is one of the bases for reading comprehension and one of the instruments to distinguish between "good reader" and "poor reader." The ACRL emphasizes that literate students can summarize and extract information and can read the text and pick key ideas, express the concepts using another word, and capture the details of the information.

Writing abstracts process needs competencies in information summarization and textual representations of original texts. The factual content in the original text is captured through the appropriate abstracting process. The abstracting process is competencies in information understanding on the original text, combined with basic knowledge of the abstract and its learning objectives. The abstract results from objective information in the original document and the subjective point with a certain level of knowledge and personal.

In this process of learning through abstracting, there are two critical moments in which we assume an acceptable level of understanding of the original text. First, the collection of information content and, secondly, the structuring of that content for subsequent inclusion in the abstract recipient's knowledge base. The selection goal is to maintain only the necessary details using contraction, reduction, and condensation strategies. In both the selection and the structuring of the original material, the only assistance that can be provided takes the form of suggestions and advice that will allow the task to be carried out more effectively.

2 Material and Method

This research was based on the action research methodology that produces evidence to support the theory, build an analytical understanding, and create new knowledge. A comprehensive, critical and systematic approach is needed, and the participant researchers are highly challenging. This research area belongs to action-research methodology and is specifically an experimental study with an explanatory purpose: a study or experiment was proposed on a set of students consisting of a detailed written specification of the stages and processes involved in document abstracting; experimental data were collected in the classroom and analyzed to complete the study. This knowledge led us to prioritize the goals of learning for these kinds of literacy skills and information. Instrument in this research is based on students' abilities in of the abstracting, using the following steps:

- Identification of the structure of the text, the main topic and the intention of the author.
- Choosing the most significant phrases.
- Generalizing the sentence preferred.
- Creating content schema.
- Using graphics and image appropriately.
- Compiling and abstracting

We have compiled a list of skills in abstracting processes, and the following were the skills selected:

- Comprehension: the main subject matter and intent of the speaker and the recognition of essential sentences and keywords have been detected. • Comprehension:
- Analysis: identified text structure, keyword selection and key phrases.
- Synthesis: identified in the stage of general ization and the abstract writing.
- Information organization and structuring: the diagrams, phrase selection, and visual organization are detected.
- Expression: the way the abstract is written is analyzed.

3 Results

This research designed an assessment model for information literacy, consisting of several steps. The first step is the evaluation of abstract texts to measure how the student is familiar with the topic of text and terminology. The answers were measured to the following extent: Very familiar, well-known, moderately familiar, unknown. The second step is to identify the text topic and the intention of the author. Only students with more significant experience in knowledge analysis were needed to complete this level. The third step is to identify the overall text structure. The fourth step is to identify the critical phrase that performs as 'markers.' Table 1 shows the assessment model in this research.

Table 1 shows the assement model in this research.

Indicators in Assement Model
I. General reading of text
Mark unknown words
Identify the subject dealt with and the author’s intention
Identify the general structure of the text
II. Second reading
Underline text markers

Select the most important sentences
III. Information structuring
Generalize the important sentences
Group important sentences together
Graphic / visual schema of text
IV. Information representation
Generalize the important sentences
Group important sentences together
Graphic / visual schema of text
IV. Information representation
Identify keywords and organize them (their relation to each other) in a map or similar figure
V. Expression
Write up the abstract

In the abstract writing process, the procedures are consist of picking the main phrases. This stage allowed us to realize the superficial significance and thus reduce the text to be worked on. Render selected phrases generalized [10], [11]. The goal of this stage was to see how the students rewrote the most relevant sentences chosen in the previous stage, making them more coherent and meaningful for the abstractor. Only students in the final course were required for this portion.

Selected and generalized phrases group. This stage aims to reveal students ' ability to associate and put the sentences they have chosen and generalized in smaller groups. Only final-course students needed this stage. Graphical schema planning. During this phase, we observed the type of scheme used by the students and their ability to structure data. Extract and graphically arrange keywords in a concept map [12], [13]. The representation by keywords of a text indicates the abstractor's ability to grasp and interpret and, to some degree, to synthesize and to express. Rather than using controlled vocabulary, we opted for free choice. Finally, a conceptual plan of the relations between the keywords was also called for by students. Thus, we were able to see the visual organization style and the relationship between selected keywords (whether the word selection was proper or not). Abstract writing. This final stage was primarily analyzed from the perspective of speech and synthesis.

4 Conclusion

The transversal nature of information skills means they can be appreciated in any learning process and, in general, in any aspect of life. Knowledge about how capable students are in these skills is essential if they are to be improved, if weaknesses and strong points are to be detected, and corrective measures adopted. However, if abstract preparation is to be undertaken appropriately, various stages and skills are required in a set of abilities. We cannot see which competencies and abilities need to be strengthened if we focus only on the abstract as the final result, ignoring the stages necessary in its creation.

References

1. Shao, X., & Purpur, G. (2016). Effects of information literacy skills on student writing

and course performance. The Journal of Academic Librarianship Volume 42 No 3 : **670-678**.

2. Hafizan, E. M. S., & Halim, L. (2010). Development and validation of a test of integrated science process skills. Procedia - Social and Behavioral Sciences, Volume 9 : **142-146**

3. Kruea-In, N., & Thongperm, O. (2014). Teaching of science process skills in thai contexts: Status, supports and obstacles. Procedia - Social and Behavioral Sciences, Volume141 : **1324-1329**

4. Mutlu, M., & Temiz, B. K. (2013). Science process skills of students having field dependent and field independent cognitive styles. Educational Research and Reviews, Volume 8 No 11 : **766 -776**

5. Schroeter, C., & Higgins, L. M. (2015). The impact of guided vs. self-directed instruction on students' information literacy skills. Journal for Advancement of Marketing Education, Volume 23 No 1 : **1-10**

6. Zeidan, A. H., & Jayosi, M. R. (2014). Science process skills and attitudes toward science among palestinian secondary school students. World Journal of Education, Volume 5 No 1 : **13-24**.

7. Zeitoun, S., & Hajo, Z. (2015). Investigating the science process skills in cycle 3 national science textbooks in Lebanon. American Journal of Educational Research, Volume 3 No 3 : **268-275**

8. Nichols Hess, A. N. (2014). Online and face-to-face library instruction: assessing the impact on upper-level sociology undergraduates. Behavioral and Social Sciences Librarian, Volume 3 : **132–147**

9. Silk, K. J., Perrault, E. K., Ladenson, S., & Nazione, S. A. (2015). The effectiveness of online versus in-person library instruction on finding empirical communication research. The Journal of Academic Librarianship Volume 41 : **149–154**

10. Weightman, A. L., Farnell, D. J. J., Morris, D., Strange, H., & Hallam, G. (2017). A systematic review of informationliteracy programs in higher education: Effects of face-to-face, online, and blended formats on student skills and views. Evidence Based Library and Information Practice Volume 12 No 3 : **20-55**

11. Gorman, E. F., & Staley, C. (2018). Mortal or moodle? A comparison of in-person vs. online information literacy instruction. Journal of Library and Information Services in Distance Learning : **219-236**

12. M. Pavlovski and I. Dunder (2015). Information literacy assessment at the University of Zagreb: an undergraduate students' perspective," in Proceedings of 2015 38th International Convention on Information and Communication Technology, Electronics and Microelectronics, : **695–699**

13. S. Webber and B. Johnston (2000). Conceptions of information literacy: new perspectives and implications. Journal of Information Science, vol. 26, no. 6 : **381–397**