Analysis of preservice science teacher information literacy towards research skills

H Subekti1,a, A R Purnomo1, H Susilo2, Ibrohim3 and H Suwono3

1,2Department of Science, Universitas Negeri Surabaya, Indonesia
3Department of Biology, Universitas Negeri Malang, Indonesia

aEmail: hasansubekti@unesa.ac.id

Abstract. Information literacy is an important component for university students necessary to support personal development both in academic and real-life setting. This research aimed to analyze the drawing picture of information literacy ability among preservice science teacher in Universitas Negeri Surabaya related to research skills. Purposive sampling was used to determine the amount of participants, thereby involving 208 participants from class year 2014, 2015, and 2016. For gathering the data, the instruments being applied were questionnaire based information literacy test. The data then were analyzed in descriptive manner. The results indicated that the male students outperformed the female students by which they obtained 51.1% correct answer, 2% higher than the female students. Based on the duration of the study, the percentage of correct answers varies among students of class year 2014, 2015, and 2016; 56.2%, 45.1%, and 48.4% respectively. When looked at the average percentage of all students, however, most of items were scored in low category (below 50%) except for type of notification, strategy to accessing information, mastery of terminologies used in research and the essence of the copyright. To conclude, the literacy ability of preservice science teachers is still relatively low and the tendency of information literacy possessed by male students is relatively higher than female students.

1. Introduction
Science is the driving force behind the development of informed technology and communication that has changed the basis of life of humankind. In globalization era, most of human life is influenced by the development of science and technology [1]. Strong literacy abilities equip learners with the potential to grow and develop the individuals to be professionals such as scientists, thereby capable of facing more future challenges [2] or recognizable as challenges of the 21st century. It is indeed necessary to provide a good quality of graduates and thus able to compete with others globally. One indicates that such a point is relevant to mastering the use of technological development [3]. Therefore, it is urgent that higher education need to prioritize and accelerate the mastery of information technology and communication [4].

Educational institutions should provide students with appropriate information, authorize them to use their knowledge and skills to master the technology in order to deal with new cases in the future’ prepare students with self-thinking, and make decisions by developing skills and learning for a lifetime [5] (Hadi Suwono et al., 2017). In such, the nature of learning itself must be in line with the skills of literacy possessed by students higher education.

This 21st century challenge, for instance, brings about a fundamental change in human life [6]. The way people communicate, solve problem, do working, search for food and establish financial status provide rapid changes in placing the strategy of live. One of the solution offered is mastering the innovation and development through information technology [7]. In such a situation, science education can take part to prepare preservice science teacher for success in the 21st century [8]. In regards to these challenges, the main task of education is to educate learners to be able to prepare themselves for a successful life in a challenging 21st century when become professional. During the study, for example, preservice science teachers should look at the current issue in education and relate to the people’s needs in real life setting. Without wasting time to experiencing the problems themselves, they can access
information on the internet. To make sense of information they search for, they must relate one information and other information and think critically. Therefore, the ability of information literacy becomes the basis for preparing preservice science teachers when facing the challenges of the global age with the changing work patterns.

Information Literacy is one of the high-level intellectual skills required for academic, professional, and personal development and success [9]. One paradigm shifted towards a knowledge-based economy, educators and entrepreneurs has revealed the importance of learning that emphasizes information literacy in learners. Tracing the literacy of information in the classroom and providing the skills for independent inquiry are required in the internship activities and professional positions in marketing [10]. The use of technology strongly supports preservice science teachers in accessing information and communicating, thereby developing critical thinking, problem solving, communication, teamwork, creativity and adaptability to students.

Various definitions related to information literacy have been found in scholarly articles. According to The Association of Colleges and Research Libraries (ACRL) "Information literacy is the set of integrated abilities encompassing the reflective discovery of information, creating knowledge and participating ethically in communities of learning " [11]. Others argue that an investigation of digital literacy through a broader perspective of information literacy will yield more useful results. The theme of information literacy is (a) determining the nature and level of information needed, (2) accessing the necessary information, (3) using information effectively and efficiently; (4) providing ethical and legal information [12] and (5) evaluating critically information and resources by combining selected information into pre-existing knowledge and value systems [9]. In addition to this, information literacy skills are concerned with the ability to identify when information is needed, find the competence and skills, evaluate the use information in making informed decisions [13]. Associated with literacy information, the essential of literacy is divided into 10 indicators in this study, namely identifying information sources, recognizing the type of information, choosing how to access information over the internet, rediscovering information online, establishing criteria for assessing information from the internet, establishing criteria for assessing information from the book, using new information to plan and create results, communicating results or performance in writing, understanding the various ethical, legal and socio-economic issues surrounding information and information technology and acknowledging the use of the information resources.

Based on illustration above, this study then implement the need of mastery of information literacy to preservice science teachers because they act as the agent for rapid development over students, especially when they become inservice teacher. Thus, the objectives of the study are to: (1) analyze the literacy skill of preservice teacher information in terms of research skills, gender and time of study.

2. Research method
This research used quantitative approach in the form is survey research by attempting to describe quantitatively the trends, attitudes, or opinions of a particular population by examining a sample of such a population so that it can make conclusions about the characteristics, behavior, or attitude [14]. Participants involved comprised three different class fear of preservice sciemce teachers who took a course of Biotechnology. The total participants were 2018.

In accordance with data collection, this research utilized questionnaire which asked for literacy capabilities. The instrument is based on a review of the literature on standard literacy [11], literacy review [9] and assessment of skills related to the terms of the study [15]. It included source of information, type of information, access strategy update, devices accessing information via the internet, assess internet sources, assess the source of the book, running a written investigation, mastery of the term in this study; copyright issues, and bibliographies. All these questions are in the form of multiple choice.

Data collected from questionnaires and examinations were analyzed using the descriptive method. The data collected were disseminated and arranged in the table. Afterwards, they were presented in the form of percentage.
3. Results and discussion

3.1. Literacy Skills Students information relating to research.
The graph below shows ten indicators asking about research skills in preservice science teachers. The skills are fundamental for them because in the 21st century, preservice science teachers are demanded to have observation skills, especially how to access information and use it in written form. The score about their skills varies, but generally most of indicators below the expectation (below 50%).

![Figure 1](image_url)
The percentage of correct answers related literacy towards research skills.

Students' literacy skills as shown in figure 1 are mostly under 50% percent. These occurs due to the lack of awareness in using technological development that support to almost every aspect related to information processing and information delivery. This supports the issues in accordance with source of information, strategy to access information, the way to access information, internet as main source of information, book source, mastery of scientific article, and bibliographic writing since ebooks and journals are available on the internet. The lowest score is about source of information (23.2%). The information can be accessed using device such as laptop and mobile phone. However, the way preservice teachers use their gadgets is in another expection. They tend to practicing information just a little, whereas doing social media is much time taking over their daily activities. The highest score is mastery of terminologies. Such a score talks about the knowledge they possess during the learning process in the course of research in education. However, in practice they are still not aware to utilize their knowledge on the other aspects. For instance, book source has the score under 50% (34.5). The students' literacy skills on the theme of 4 shows the knowledge of carrying out relatively low written reviews (36.46%), they also seem to have weaknesses in the use of internet literacy (46.3%). Lack of knowledge these can potentially bring to plagiarism.

3.2. Association of gender and information literacy
Information literacy as the ability to search for, evaluate, and use the information required is not a new capability or skill that emerges in the information age [16]. Findings show that male students have the higher score than female students.
3.3. Association of educational (academic) differences and literacy test information

Skills literacy information is required in today’s information age. Access to information more quickly, accurately and easily is a necessity and a student, educator and almost in the life of modern society. Therefore, science and technology mastery immediately to be developed in the teaching of sufferers can continue to survive and even excel in global competition. However, the findings related to the higher level of the study did not show an increasing trend in academic level, the higher the student information literacy. In relation to this context, lecture activities in the Science Education Studies Program do not contribute to the improvement of information literacy skills.

Figure 2. Percentage of correct answers for information literacy skills by gender.

Figure 3. Percentage of correct answers to information literacy skills based on time of study.

Literacy information, which is a literary translation, briefly defines the sense of information or information literacy. The mastery of information literacy is seen as broader, the real information
empowering information society as an important literacy in the learning process to become part of the education program [16]. Technology is an exploration medium that has an important role in the education world [17]. The basic issue is the use of scientific information held by students to solve problems in everyday life and produce useful scientific resources [18].

The students' literacy skills on the theme 1 show the relatively low source of information (equal to 47.69%) and the relatively low information types (52.99%). To determine what information literacy and digital simultaneously predict online retrieval strategies, structural regression models are formed and analyzed. This model has been confirmed that information and retrieval [12]. Ada There are two important things to consider in terms of resources and intellectually and physically and how to find information in the source [16]. Ability to recognize the type of competence information that is urgent and must have a prospective educator.

Students' literacy skills analysis on two themes showed that the skills of information access strategy were quite high (85.78%) and knowledge of information accessing the device over the Internet was relatively low (58.78%). The availability of information on the internet has tremendous influence and greatly influences everything we do [19]. Accessing and analyzing information is also an essential component of learning for students. This activity is done when a student has been taught. In finding references related to the required information, students have begun working to find information in vain. This is an opportunity to hone students' ability to synthesize and disseminate new information and knowledge.

Students' literacy skills on theme 3, most students answer the questions about the variables (85.46%) and evaluated the source of the book (45.46%). Referring to data, it can be assumed that the students have a theory of theoretical assessment of the internet, they have no practical skills in applying these criteria. Undergraduate education is undergoing a shift from traditional knowledge for a learning approach [20]. by analyzing existing literature at a higher level, identifying and employing theoretical mapping techniques, mind planning and related information techniques for the native research support. Students' literacy skills on the theme of 4 students showed that knowledge to carry out written research was relatively low (36.46%). They also have weaknesses related to the term mastery in this study (46.61%). The core of this change is the recognition that the undergraduate education program must aim to develop independent students who become effective lifelong learning practitioners. Successful study as a graduate student or as a lifelong student requires students to learn good information literacy skills [20].

Students' literacy skills on 5 very low percentage themes show weaknesses on copyright issues (40.14%), and in bibliography identification meanings (17.01%). A very low percentage is also recorded using a special bibliographic style to execute a list of references and references in the text (36.46%). Referring to the Minister of Education Regulation 17 of 2010 said: "Plagiarism is a deliberate or deliberate act to obtain or seek a scientific work from others recognized as scientific papers, without declaring sources correctly and adequately [21]. Lack of knowledge about the use of ethical and informational law brings plagiarism risk.

4. Conclusion
Based on the results of the first exposure, the following conclusions are obtained. (1) students' literacy skills related to research were low with a percentage score of 55.21%; (2) findings indicate that those with literacy scores are more likely to be female students than girls; and (3) the findings show a tendency that higher academic levels, student literacy scores do not show a higher trend. In other words, lecture activities in the Science Education Program do not contribute to the improvement of information literacy skills. Moreover, this information literacy program should not only be developed based on research needs but also needs to be socialized and used in student learning and research activities.

Acknowledgement


References

[1] Putra M I S, Widodo, W and Jatmiko B 2016 J. Pendidik IPA Indones. 5 83
[2] Daria O, Carle, J. E. B.-A. a. J. L. K. (2017). Agriculture to Zoology. Information Literacy in the Life Sciences Vol 1, Ed L Lawrence (Kidlington: Glyn Jones)
[3] Kanematsu H and Barry D M 2016). STEM and ICT Education in Intelligent Environments (London: Spinger)
[4] Adams R, Martin S and Boom K 2018 J. Clean. Prod. 171 434
[5] Suwono H, Mahmudah A and Maulidiah L 2017 KnE Soc. Sci. 1 269
[6] Azwar, M. (2011). Kemampuan Mahasiswa dalam Menelusuri dan Mengevaluasi Informasi Berbasis Internet : Studi kasus mahasiswa JIP UIN Syarfihidayatullah, Jakarta Angkatan 2007 http://repository.uinjkt.ac.id/dspace/handle/123456789/32606 [accessed 12 February 2018]
[7] Samani M 2017 The Role of Education In Cultivating Character of Professional Leaders In 21st Century Indonesian Navy Academy Surabaya-Indonesia
[8] Suwono H Rizkita L and Susilo H 2015 J. Ilmu. Pendidik. 21 136
[9] Shao X and Purpur G 2016 J. Acad. Librariansh., 42 670
[10] Schroeter C and Higgins L M 2015 J. Adv. Market. Educat. 23 1
[11] ACRL B 2016 Framework for Information Literacy for Higher Education. http://acrl.ala.org/framework/ [accessed 11 February 2018]
[12] Çoklar A N, Yaman N D and Yurdakul I K 2017 Comput. Hum. Behav. 70 1
[13] Ukachi 2015 New Lib. World 116 578
[14] Creswell J W 2014 Research Design : Qualitative, Quantitative and Mixed Methods Approaches (London: SAGE Publications)
[15] Schaub G, Cadena C, Bravender P and Kierkus, C 2016 Coll. Res. Libr. 78 1
[16] Hasugian J 2008 J. Stud. Perpust. Informasi, 4 34
[17] Rante P, Sudarto and Ihsan N 2013 Pengembangan Multimedia Pembelajaran Fisika Berbasis Audio-Video Eksperimen Listrik Dinamis di SMP. J. Pendidik IPA Indonesia. 2 203
[18] Fakhriyah F, Masfuah S, Roysa M, Rusilowati A and Rahayu E S 2017 J. Pendidik. IPA Indone. 6 81
[19] Kuden J, Braund-Allen J and Carle D 2017 Agriculture to Zoology. Information Literacy in the Life Sciences (Cambridge: Chandos Publishing)
[20] Shanahan M C 2007 Radiogr. 13 187
[21] Nuh M 2010 Pencegahan dan Penanggulangan Plagiat di Perguruan Tinggi (Jakarta:Depdikbud)