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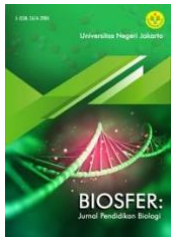

Information literacy profile of biology education students in different batch

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ABSTRACT

Information literacy is one of the basic skills that students must have in today's digital era. This research was conducted to analyze the information literacy profile of students in different batch years. This quantitative study compared three groups of data based on the student year. The research population was all biology education students at UIN Walisongo Semarang. The research sample was determined using a stratified random sampling technique to obtain 94 students divided into three grades. The data were obtained using the information literacy test instrument and analyzed using the ANOVA test. Information literacy indicators consist of identifying information, accessing information, evaluating information, using information effectively, and understanding the ethics of using information. The study results show that students in all classes have information literacy skills in the sufficient category, but significant differences exist between batch years. The lowest information literacy ability was in first-year students, followed by second-year students, and the highest in third-year students. The study results indicate the need to increase students' information literacy.

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INTRODUCTION

The development of technology has affected various fields of life, including education. Education standards in the 21st century are solutive, creative, collaborative, media, and information (Lanning, 2014). Learning is no longer only centered on the teacher, especially at the tertiary level. Students are required to be able to study independently. Learning resources are essential in supporting independent learning. Advances in technology have made learning resources very diverse, ranging from electronic books, websites, and online journals, to social media. Students can get information from anywhere and anytime, especially supported by the Internet (Armstrong & Brunskill, 2017). However, not all information is following the context of student learning. Students need to have the ability to sort and process information.

Information literacy is finding, evaluating, and using information efficiently and effectively according to needs (Lanning, 2012). Students are said to have information literacy when they can determine information needs, access the information needed effectively and efficiently, evaluate the information obtained, use the information to achieve goals, and understand the limits on the use of data (legality and ethics) (Association of College and Research Libraries (ACRL), 2000). Apart from education, information literacy is also beneficial for the social, career, and even personal fields in carrying out one's life (UNESCO, 2022). Information literacy trains independence and lifelong learning (Kozikoglu & Onur, 2019; Lanning, 2014; Tachie-Donkor & Ezema, 2023).

Apart from assisting students in obtaining the correct information, information literacy skills can also help students identify false information (hoaxes). Study Jones-Jang et al. (2021) show that information literacy significantly increases the probability of identifying fake news compared to media, communication, and digital literacy. The high level of misinformation online is mainly due to the ability of individuals to recognize false information and the behavior of sharing information without verification (Khan & Idris, 2019). Information literacy skills are related to high-level skills (Robinson & McDonald, 2014). In science learning, including biology, which is closely related to experimental activities (Hodson, 2014), to be able to communicate the findings, students must be able to understand scientific literature. Understanding scientific literature is based on finding and validating information summarized in the information literacy skills (Lantz, 2016). Peciuliauskiene et al. (2022) states that educators need to develop adequate information literacy for students and ensure a positive experience with the search and evaluation of information obtained. Information literacy developed in students will create greater responsibility for their own learning so that students can become creative, efficient, and analytical learners and thinkers (Mulla, 2014). The importance of information literacy for students, especially biology education students, makes us need to analyze the extent of student information literacy as a form of evaluation of learning in tertiary institutions.

METHODS

Research Design

This research is a quantitative study to determine differences in students' information literacy abilities in different batch years. Furthermore, each indicator was analyzed to determine the differences in the information literacy ability of students in each batch. Grouping data based on indicators can facilitate data analysis and interpretation (Leedy & Ormrod, 2018).

Population and Samples

The research population is all biology education students at UIN Walisongo Semarang, of which there are 390 students. A stratified random sampling technique was used in determining the research sample because the study population consisted of different batches (Leedy & Ormrod, 2018) to obtain 94 biology education students divided into three clusters with the following descriptions.

Table 1.
Research Sample

No	Batch	Number of Students
1.	First-year	24
2.	Second year	33
3.	Third year	37
	Amount	94

Instrument

The research data was taken using the test method with the research instrument in the form of an information literacy test consisting of 28 multiple-choice questions. Questions on the information literacy test are related to biology education in general. The information literacy test used in the research was developed from the proprietary information literacy indicator *Association of College and Research Libraries* (ACRL) (2000) combined with Boh Podgornik et al. (2016) Information Literacy Test (ILT) for Higher Education. Information literacy indicators consist of identifying information, accessing information, evaluating information, using information effectively, and understanding the ethics of using information. Previous test instruments were developed by Adi (2017) that have been declared valid and reliable. The instrument was again tested for validity before being used in this study using Rasch test, and valid results are obtained. The distribution of questions based on information literacy indicators is presented in Table 2.

Tabel 2.
Information Literacy Question Instrument

No	Indicator	Number of Question	Example of Question
1.	Identifying Information	1, 2, 3, 4, 6, 7, 10	Choose the search keywords that best represent the main concept in a paper entitled "What are the health risks associated with therapeutic drug use for hyperactive students?". a. Therapeutic drugs, health risks, hyperactivity. b. Therapeutic drugs, health risks, students. c. Therapeutic drugs, hyperactivity, students. d. Medication, hyperactivity, therapy.
2.	Accessing Information	5, 8, 9, 11, 12, 13, 14, 15, 16	An important feature that indicates the quality of a scientific paper? a. Available in top university libraries b. Indexed by ERIC, DOAJ, or GOOGLE SCHOLAR c. Already Reviewed by experts d. Written by renowned university lecturers
3.	Evaluating Information	17, 18, 19, 20	When you find quality, indexed journal articles, which is the most effective method for finding related journal articles? a. Ask a librarian at the University b. Ask your lecturer c. View a list of references from that journal article d. Search the library catalog with the keyword author name
4.	Using Information Effectively	21, 22, 23, 24	When you browse the internet, you come across a research article on animal cloning techniques, namely Dolly Sheep. When you are going to teach a Biotechnology topic, you think about giving the material to your students. Which strategy works best to deliver the material to your students? a. Provide a full and complete copy of the article b. Provide a copy of the section of the article that contains important information without changing it c. Write it down in bullet points and present it in front of the class d. Create a short handout/summary of the article and copy it for your students
5.	Understanding The Ethics of Using Information	25, 26, 27, 28	You will use ideas from others in writing research papers, all you need to do is.... a. Using other people's ideas is unethical b. You not using the words of the owner of the idea exactly c. You write down citation data in the reference list d. You Receive permission from the idea owner

Procedure

Data collection is carried out at the end of the even semester so that respondents of each batch have completed their batch year. The respondent were biology education students of UIN Walisongo Semarang in three different batches, namely the first, second, and third years. Fourth-year students did not become research samples because some had completed their studies. Each batch consists of 3 classes which are then randomly taken one sample class because each class has equal academic ability and has taken the same courses. Information literacy tests are conducted offline simultaneously in different batches. Students need about 30-40 minutes to complete the information literacy test.

Data Analysis Techniques

The research data analyzed by the ANOVA statistical test to find out the difference in student information literacy between batches. The results by indicator then categorized into five categories, namely very strong (81-100), strong (61-80), sufficient (41-60), weak (21-40), and very weak (0-20) based on the category of information literacy level belonging to Mardani & Silalahi (2021). The information literacy categories of each generation were compared in each indicator for further analysis.

RESULT AND DISCUSSION

Comparison of Information Literacy in Different Batch

The research results were analyzed descriptively first to find out the categories of student information literacy. The descriptive analysis was carried out by calculating the average of all aspects of digital literacy for each generation. A descriptive description of the data is shown in Figure 1.

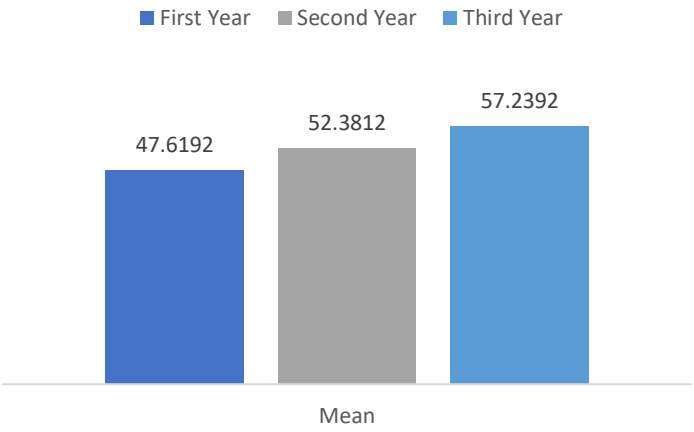

Figure 1. Comparison of Average Student Information Literacy for Each Batch

Based on Figure 1, third-year students have the highest level of information literacy skills, followed by the second batch and the lowest in the first batch. The study results were then analyzed statistically to determine differences in students' information literacy abilities in different batch years. Statistical analysis used the ANOVA test with the results in Table 3.

Table 3.
ANOVA Test Results

Analysis	Significance Value
Levene Homogeneity Test	0.270
Kolmogorov-Smirnov Normality Test	0.234
ANOVA test	0.000

Table 3 shows that the research data is homogeneous and generally distributed so that it can be continued with parametric hypothesis testing. The results of the ANOVA parametric test show significant differences in students' information literacy abilities in different batches.

Students' information literacy abilities differ significantly in each class, as seen from the average comparison and the ANOVA hypothesis test. Significant differences in information literacy in each batch

year sequentially from the smallest cohort indicate an increase in student information literacy in each year of study (Boh Podgornik et al., 2016). Even so, students' information literacy abilities in each generation are still in the sufficient category. Students often cannot navigate information and critically evaluate findings (Agosto, 2018), affecting their information literacy skills.

Higher education emphasizes the independence of students in obtaining knowledge according to their developmental age (Gow & Kember, 1990). Most first-year students have little experience with information literacy due to a lack of research experience during their school days (Douglas & Rabinowitz, 2016; Smith et al., 2013). First-year students are still learning in mastering the concept of information literacy, especially those related to finding and evaluating scientific literature (Lantz, 2016), so that the information literacy ability of first-year students is lower than that of students in the years above.

In the first year, students only receive basic courses, in contrast to second-year students who start doing a lot of practicums. Students are required to have information literacy skills to be able to compile practicum reports (Lantz, 2016). The habit of using information can affect the information literacy of students (Tachie-Donkor & Ezema, 2023), so that second-year students have better information literacy skills than first-year students.

In the third year, students begin to focus on compiling their final project reports. If previously students processed information in groups in practicum activities, in the preparation of the final project students processed information individually. Student need to find information to enable them to access the information needed (Tachie-Donkor & Ezema, 2023). Direct independent practice can strengthen students' information literacy. Students who have the capacity to search and retrieve information can find the right information to achieve their academic goals (Miraj et al., 2021), as well as their information literacy skills (Asemi et al., 2011; Nikou & Aavakare, 2021). Students become frequent visitors to the library to complete their final project. The role of libraries is known to be very large in mastering student information literacy (De Paor & Heravi, 2020), so that third-year students have the highest information literacy skills compared to first and second-year students. Differences in student characteristics and ages affect how to practice information literacy (Aharony & Gazit, 2019).

Analysis of Information Literacy Level in Each Indicator

The analysis is then continued with the identification of each indicator of information literacy in each batch. Analysis of each batch's information literacy indicator shows the following results.

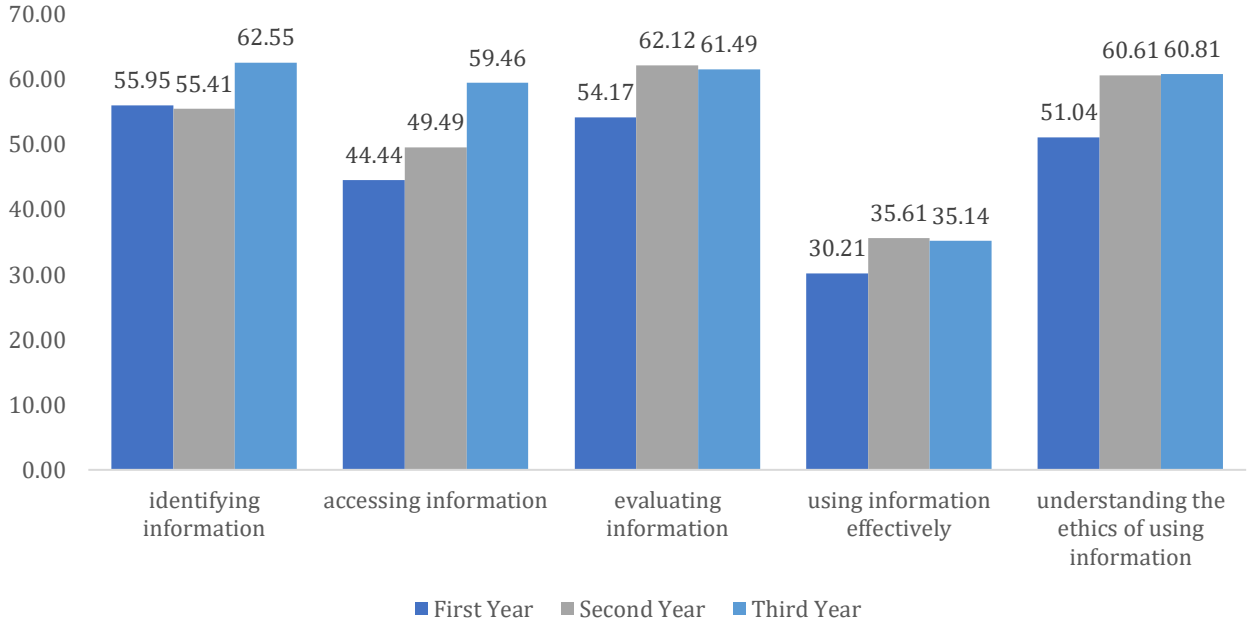

Figure 2. Comparison of Average Student Information Literacy Indicators for Each Batch

Based on Figure 2, it is known that there are variations in the acquisition of information literacy scores between batches in each indicator. The indicators identify the highest information on third-year students in the strong category, while the first and second years fall into the sufficient category. The

highest indicator of accessing information was for third-year students, but all generations were included in the sufficient category. The indicator evaluates the information of second-year students in the strong category, followed by the third year in the same category, and the first year in the sufficient category. The indicator of using effective information is the indicator with the lowest score, where all batches fall into the weak category. The indicator of understanding the ethics of using information for all students is in the sufficient category.

The first indicator is identifying information; third-year students have higher criteria than first and second years. Obtaining information from valid sources is influenced by age and level of education (Olaimat et al., 2020). Technological advances make information easy to spread, resulting in invalid and even false information (Silverman, 2015). Communities, especially students, experience significant difficulties in identifying information (Auberry, 2018), not even caring about the reliability of the information (Dmitru, 2020). Third-year students generally use a lot of references in preparing their research proposals. Experience related to information literacy contextually can influence students' skills in information retrieval (Fuselier et al., 2017).

The second indicator is accessing information; all-year student batches have a sufficient ability category for accessing information. The ability to access information is influenced by facilities to access valid information sources. Social networks and information ecology will impact receiving information (Scheufele & Krause, 2019). Academic libraries should ideally be able to provide a variety of valid sources of information (Durodolu & Ibenne, 2020) to support student information literacy (Tachie-Donkor & Ezema, 2023). Computer proficiency also affects students' information literacy beliefs (Atikuzzaman & Ahmed, 2023), especially in accessing information.

The indicator evaluates the information lowest in the first year in the sufficient category and the second and third years in the strong category. Observation result Auberry (2018) indicated that students felt they knew how to evaluate reference sources but did not know what to look for. Students only understand the facts from the information obtained without the effort to expand or apply it in learning (Rose-Wiles et al., 2017). Students must have an active role rather than just replicating information (Smith et al., 2013). The role-playing method of a librarian can be an alternative to training the ability to disburse and evaluate information (Rieh et al., 2022).

The lowest indicator is the indicator of information use. Students of all generations have a weak category on indicators of using information effectively. Learning should facilitate the use of information in the form of using technology and assignment frameworks in learning to optimize student information literacy (Ishimura & Fitzgibbons, 2023). Peer assistance in learning has proven effective in increasing student information literacy (Curtis, 2016). In addition, to get optimal results related to the ability to use information, students need to be skilled in evaluating and selecting information beforehand (Valle Santos & Mayoral, 2018).

The indicator of understanding the ethics of using information, even though all generations are in the same category, namely sufficient, the first-year students have a significant difference in scores. First-year students have a lower understanding of the ethics of using information than second and third-year students. First-year students are usually just introduced to information literacy through searching and evaluating scientific literature (Lantz, 2016). Introducing information literacy from an early age is necessary for developing student information literacy in stages during their studies (Tsunekage et al., 2020).

The implications of this research can reveal the information literacy profile of students in each class, where students are still in the sufficient category, so students must need training and support to improve their information literacy in each batch year. Several ways to develop students' information literacy skills are by providing instruction or training from the library (Purnell et al., 2020), integrating information literacy into the learning management system (Auberry, 2018), and using worksheets (Musgrove et al., 2018), the use of supporting learning methods such as Flipped Classroom (Gómez-García et al., 2020), provision of particular information literacy sessions (Liu, 2021), to the role-playing method as a librarian (Rieh et al., 2022). The development of information literacy can improve the ability to research, write, and even student achievement indexes (Tsunekage et al., 2020).

CONCLUSION

The conclusion that can be obtained from this study is that the information literacy skills of students in all classes are still in the sufficient category and there are significant differences between

batch. The lowest information literacy ability was in first-year students, followed by second-year students, and the highest in third-year students. Analysis of each indicator shows that most indicators have a sufficient category. Even indicators of effective use of information have a weak category for all batches; only indicators for identifying information (third-year students) and evaluating information (second and third-year students) have a strong category. The study results indicate the need to increase students' information literacy.

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