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Analysis of students' digital literacy ability in the Spermatophyta course

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Abstract

The background of this research is that students are not fully able to apply digital literacy in the learning process in the Spermatophyta course. This is due to low knowledge and lack of student initiative to find out about applications to identify species or plants. This study aims to determine the digital literacy skills of Biology Education students at Medan State University in the Spermatophyta course. The population in this study were all students of the Biology Education Study Program, Medan State University, semester IV, totaling 142 students. The sample of this research is 105 students with random sampling technique. The research approach used in this study is a mixed method which combines quantitative and qualitative approaches. The type of research used is descriptive research. The research approach used is a mixed methods approach that combines quantitative and qualitative approaches. The research instrument used was a self-assessment questionnaire and semi-structured interviews. The results showed that digital literacy skills in Biology Education were in the very good category 81.30. Student abilities are very good in content creation, communication, collaboration, information but for critical thinking skills, evaluation and operational skills are good.

Abstrak. *Penelitian ini dilatarbelakangi oleh mahasiswa yang belum sepenuhnya mampu menerapkan literasi digital dalam proses pembelajaran pada mata kuliah Spermatophyta. Hal ini disebabkan rendahnya pengetahuan dan kurangnya inisiatif siswa untuk mencari tahu tentang aplikasi untuk mengidentifikasi spesies atau tumbuhan. Penelitian ini bertujuan untuk mengetahui kemampuan literasi digital mahasiswa Pendidikan Biologi Universitas Negeri Medan pada mata kuliah Spermatophyta. Populasi dalam penelitian ini adalah seluruh mahasiswa Program Studi Pendidikan Biologi Universitas Negeri Medan semester IV yang berjumlah 142 mahasiswa. Sampel penelitian ini berjumlah 105 mahasiswa dengan teknik random sampling. Pendekatan penelitian yang digunakan pada penelitian ini adalah pendekatan campuran (mixed method) yang menggabungkan pendekatan kuantitatif dan kualitatif. Jenis penelitian yang digunakan adalah penelitian deskriptif. Penelitian yang digunakan adalah survei laporan diri (self-assessment kuesioner) dan wawancara semi terstruktur. Hasil penelitian menunjukkan bahwa kemampuan literasi digital Pendidikan Biologi dalam kategori sangat baik 81,30. Kemampuan mahasiswa sangat baik dalam pembuatan konten, komunikasi, kolaborasi, informasi namun untuk kemampuan berpikir kritis, mengevaluasi dan keterampilan operasional tergolong baik.*

A. Introduction

Life in the 21st century requires a person to master various skills, such as in the fields of technology, information and communication. This is one of the reasons why education must be able to keep up with the times, so that students have sufficient competence to deal with various problems of world development (Khasanah & Herina, 2019).

A person's ability to use and utilize technology is also called digital literacy. Digital literacy not only trains students to read but also hones students' abilities to understand, use and critically evaluate any information found using technology or digital media that existed at the time (Glister, 1997).

Ministry of Education and Culture No. 22 of 2016 explains that educators are required to be able to utilize information and communication technology to increase the efficiency and effectiveness of learning. The lack of educators' abilities and skills in digital literacy will hinder the effectiveness and use of technology in schools. Therefore, human resources in tertiary institutions such as lecturers and teacher candidates need to have competence regarding the application of technology in learning both inside and outside the classroom (Arbianto et al., 2019).

However, if we look at Indonesia's geographical conditions, equality in accessing information is still very low, especially in coastal areas. As a student, searching for information on the internet and using digital technology is very common. However, digital literacy competence is not yet fully possessed. The importance of literacy also shows that the literacy process is not only about language but also the ability to solve problems and analyze the information obtained. If individuals already have these skills, survival will be much better (Sentoso et al., 2021).

Based on the "Status of Digital Literacy in Indonesia 2022" survey, the results show that 93% of students often use smartphones, 31% laptops and 10% computers using technology to support online learning (Kominfo, 2023). The digital literacy skills of prospective biology teachers need to be given more attention because it is in line with research by Kahar (2018) which states that the digital literacy abilities of prospective biology teacher students are still at a moderate level, so that in the future prospective biology teachers can be more competent in using digital technology in learning. The factor that causes this to happen is because there are still many prospective biology teacher students who still do not fully understand how to use technology. So, to prove this research, it is necessary to carry out more in-depth research regarding the digital literacy skills of prospective biology teachers.

Spermatophytes material really requires careful observation in their learning. Therefore, a competency is needed that can support learning through technology such as information to be used as a learning resource or medium to support Spermatophyta learning. This is because Spermatophyta is one of the courses whose learning activities discuss taxonomic theory, describing, identifying, classifying and studying the relationships of higher plants (Wisanti et al., 2012)

However, sometimes there are plants that are difficult to find in the surrounding environment, so they require these plants to be visualized directly using certain media, such as digital media to make them easier to understand. Visualization through learning media is one way that can be done to make the material look real (Dinata, 2013).

There are many applications available to support the plant identification process. However, based on the results of interviews conducted with 20 4th semester students, it is known that 60% of them still do not know in detail about applications that support Spermatophyta learning and 70% of students do not really understand the use of the digital applications. Even though State University of Medan Biology's students are familiar with technology, it does not necessarily mean that State University of Medan Biology's students are able to use their digital literacy skills optimally to identify plants. The lack of student initiative to find out about applications is one of the causes of students' low digital literacy skills. The amount of information whose truth cannot be confirmed without including a clear source of information is also a challenge for students (Hidayat et al., 2020). This is what causes students' literacy skills to be highly demanded.

Based on the survey results of Sumintono et al. (2012) it is stated that the digital literacy abilities of educators show different results in each region so that it can be said that there is a technological gap in various regions in Indonesia caused by uneven technology making educators less able to master digital literacy.

In addition, the facilities provided and learning time are also obstacles faced by educators in mastering technology skills. Apart from that, the lack of abilities and skills of students and educators in digital literacy will hinder the effectiveness of using technology in schools. Based on research conducted by Perdana et al. (2019) it is stated that students' digital literacy skills are still in the medium category, this shows that digital-based learning is still needed by students.

To find out how the actual digital literacy skills of Biology Education students at Medan State University in the Spermatophyta course, it is necessary to conduct a study entitled "Analysis of the Digital Literacy Capability of Biology Education Students at Medan State University in the Spermatophyta Course" with the aim of knowing the digital literacy abilities of Biology Education Students Medan State University in the Spermatophyta course.

B. Material and Method

This research was carried out at FMIPA UNIMED in the fourth semester Biology Education study program. The sample used in this research was 105 students using random sampling techniques. This research uses mixed descriptive methods. Data collection was carried out quantitatively using a questionnaire that had been summarized from six aspects of digital literacy that had been adopted from Eshet & Alkalai (2004), Van duerse (2009), Hague & Payton (2010), Littlejohn (2009) and Rizal (2019) and measured using the Guttman scale which was strengthened by semi-structured interviews which will later be explained qualitatively.

The score of the results of filling out the student questionnaire will be analyzed for each question item using Formula 1.

$$P = \frac{\Sigma}{N} x100\% \text{.....Formula 1}$$

Information:
P = Criteria given achieved
∑ = Total score obtained
N = Ideal total score

Once the score is known, the score is then interpreted so that it can be analyzed quantitatively on the level of students' digital literacy skills which can be seen in Table 1.

Table 1 Interpretation of digital literacy ability scores

No	Score	Criteria
1	0 – 20	No Good
2	21–40	Not Enough
3	41–60	Enough
4	61–80	Good
5	81–100	Very good

After that, the data was strengthened with qualitative descriptive analysis using interview instruments with data analysis stages, namely data reduction, data presentation, data triangulation and conclusion drawing.

C. Results and Discussion

Digital Literacy Skills of Biology Education Students at Medan State University in the Spermatophyta Course

The results of the analysis of students' digital literacy skills are included in the very good category with a score of 81.30 obtained from the average results of six aspects of digital literacy. The results of data analysis from six aspects of digital literacy skills of Medan State University Biology Education students in the Spermatophyta course can be seen in Figure 1.

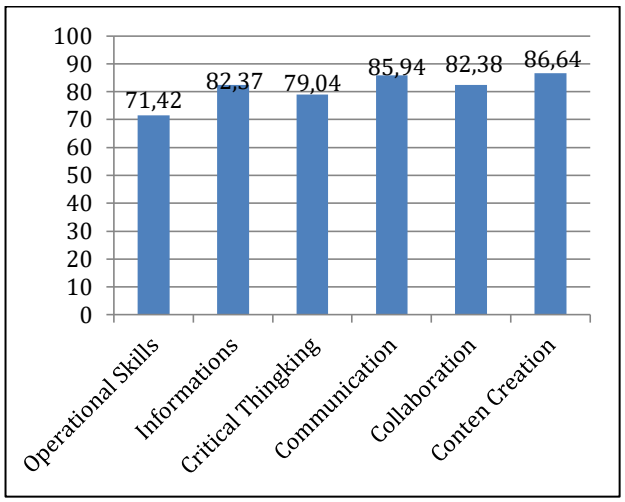

Figure 1
Students' Digital Literacy AbilityMedan State University Biology

Operational Skills

The results of the descriptive analysis of digital literacy ability data obtained from student questionnaires on the "Operational Skills" aspect can be seen in Table 2. Then the student interview results can be seen in Table 3.

Zoom meeting application with a percentage of 52.38%, then Google Meet with a percentage of 28.57% and Cisco webex with 19.04%. The use of zoom meeting as the application that is most widely used by students because lecturers use the application more often in the learning process (in blended learning learning) this results in students getting used to and understanding more about using zoom meetings compared to cisco webex and google meet.

From the results of questionnaires by State University of Medan, Biology Education, they are able to operate various digital applications to support Spermatophyta learning. Such as the ability to run and use various features in the application for learning purposes. The ability to use digital applications is very important for every student to make it easier to carry out digital-based learning through digital applications such as Zoom Meeting, Google Meet and Cisco Webex when students are studying online.

Table 2 Operational skills indicator

Indicator	Score
Able to operate digital media	100
Capable use the application to identify Spermatophyta plants	42.84
Average	**71.42 (Good)**

Table 3 Student answers to interviews about operational skills

Indicator	Student Answer
1	a) Students are already able to use platforms such as zoom meetings, Google meet, and Cisco webex in learning Spermatophyta. It's just that students are still constrained by network problems which are sometimes not good, making students sometimes less effective in using the platform in learning because the connection is sometimes lost. In addition there are also some students who are sometimes still confused in using the application so they still need direction from others. b) From the interviews that have been conducted, students stated that they were able to use various platforms that support lectures on spermatophyta courses. Of the three platforms that are usually used by students for online learning in the S permatophyta course, the highest percentage is used in zoom meetings. This happened because based on the results of interviews conducted by students, it was stated that the use of zoom meetings during learning was easier to use and understand compared to the Cisco Webex and Google Meet applications, thus making students more dominant in using zoom meetings during lectures. It's just that its use is sometimes constrained by limited time so that learning is sometimes less effective. In addition, there are also difficulties that hinder students from using zoom meetings, namely network problems that are not good enough to hinder the use of the application. c) Whereas using Google Meet is freer in terms of time because there are no restrictions on its use, it's just that Google Meet is more wasteful in using internet packages. Whereas on Cisco Webex apart from using wasteful internet packages, the network uses the internet for Cisco WebexIt also has to be really stable, otherwise learning will be hampered because it will be difficult for participants to connect in digital classes. This is what makes students prefer zoom meetings compared to Google Meet or Cisco Webex.
2	a) Most students are still incapable of using the application because students rarely or have never used it so they don't know how to use the application. In addition, there are also students who do not know about the existence of the application because of the lack of information that is known to students. Although the use of this application is very useful to help students identify plants, only a few students use it. Besides that, the use of this application which is not required in the Spermatophyta course makes students less initiative to use or find out about the application. b) The use of digital applications is also used in the Spermatophyta course, namely the PlantNet, PlantSnap, and Leafsnap applications which function to make it easier for students to identify plants whose species are unknown. c) Use of digital applications such as PlantNet, PlantSnap, and Leafsnap in the Spermatophyta course to identify higher plants are important for prospective biology teacher students to have, but based on the results of interviews that have been conducted only 45% of students are capable of using the application and 55% of other students state that they are unable to use the application.

The application used by students to identify Spermatophyta plants is the PlantNet application with a percentage of 31.42%, the Leafsnap application 4.76%. The low ability of students to use various digital applications to identify Spermatophyta plants is due to the lack of information found by students regarding the existence of the application, causing students to lack understanding in using the application because they feel unfamiliar with the application.

Students use more plantnet because plantnet is the most popular application compared to other applications. In addition, PlantNet is also an application with plant identification that contains the most plant identities in it so that it stores more plant information that you want to know because sometimes it is not available in other applications.

Meanwhile, the PlntSnap application has several weaknesses that prevent students from using it too much. This is because there are restrictions on use in identifying plants, namely only 5 photos taken per day, because then the application will be paid and no longer free. This is what makes students reluctant to use the PlantSnap application. Meanwhile, the Leafsnap application is very little used by students because the application only contains a few plant identities, so sometimes there are plants that are not identified because they are not in the application. Therefore, students rarely use it and prefer to use the PlantNet or Plantsnap applications.

PlantNet application made it very easy for students to find out plant species whose species were not yet known. As explained by Sugandi et al. (2020) The use of the PlantNet application really helps students to identify specific plants, especially during the adaptation period (new normal) as it is today and can be used in their own homes. According to Rifa'i et al. (2020), the PlantNet application is an application that can be used to identify and classify plants that have embedded iOS-based software or the Android Operating System.

Although these applications make it easier for students to identify plants whose species are unknown, this does not make students use these digital applications a lot. This is due to the lack of information obtained by students regarding these applications because it is also in accordance with student statements which state that there are still many students who do not know the existence of these applications so that students are unable to use them. Based on interviews, students also had difficulty entering the Zoom Meeting. As study by Anika (2021) that in using zoom meetings during lectures, students have difficulty entering zoom

meetings due to network constraints. This is because if you don't have a good network, students will automatically leave the zoom room.

Information

The results of the descriptive analysis of data on digital literacy abilities of Biology Education students obtained from student questionnaires on the "Information" aspect can be seen in Table 4. Then the student interview results can be seen in Table 5.

The source of journal searches most used by students to find information about the basic taxonomy of higher plants is Google Scholar with a percentage of 40%, then Researchgate with a percentage of 26.66%, and the lowest is LIPI.go. id with a percentage of 18.09%. Searching for digital-based information, students must be able to understand accurate websites that provide valid information sources so that later they can be used as literature sources by students to assist in doing coursework, making scientific work, and also adding insight and knowledge of lecture material that is poorly understood. This is in accordance with Purdi (2017) that the internet can be used as a learning medium for students to study independently, obtain information, and find information for lecture needs. This is in accordance with what was explained by Husain (2019) that Google Scholar is very trusted as a reference material for information, especially among students and provides facilities that facilitate searching for reference sources such as handouts, lecture modules, articles or scientific journals with text or with other formats.

Digital-based information is also used by students to be used as teaching materials to learn the key to determination in Spermatophyta plants. From the results of data analysis the ability of students to learn the key to determination is included in the very good category. This is in line with the results of the interviews which showed that 40% of students stated that the use of journals really helped students in understanding and studying the key to determining Spermatophyta plants. Students revealed that journals are one of the easiest sources of teaching materials to understand and understand. In addition, students also stated that journals were a source of relevant and accurate information to be used as teaching materials.

The most widely used source of information by students in studying the key to determining Spermatophyta plants is through various sources of information on the internet, namely through journals with a percentage of 43.80% then e-books with a percentage of 22.85 and the lowest is through Wikipedia sources with a percentage of 17.14%. According to Syarifta & Ardoni (2018), sometimes students do not understand which sources of information are good to use or not as learning resources.

The use of journals that are widely accessed by students as sources of literature or references to find information in learning is in line with research by Azwar & Rizka (2017) which states that the level of utilization of electronic journals as reference material by students is relatively high, this is because most students use electronic journals as reference sources, so that it can be said that students need accurate information from journals.

In addition to journals, students also use e-books as teaching materials to study the key to determination in spermatophyta plants. The most widely used source of e-books by students in understanding the plant nomenclature of Spermatophyta plants is through various e-book search sources, namely through Google Books with a percentage of 50.47% and the lowest is through scribed sources with a percentage of 32.38%.

In addition to the key determination of the use of information through e-books, it is also carried out to understand information about plant nomenclature. From the results of interviews conducted with Biology Education students, it was stated that 65% of students used e-books accessed through Google Books to serve as teaching materials to study and understand plant nomenclature and the other 35% used Scribed as a source for accessing e-books. From the interviews, it was found that students are more dominant in accessing e-books through Google Books because access is easier and more complete when compared to scribed. Apart from that, access to Google Books is also free or you can say it's free, unlike Scribed, which has to be paid if you want to download the e-book you want. Therefore, it makes the majority of students choose Google Books more than Scribed. Students also admitted that they found a lot of information from YouTube in the form of biology learning videos.

Table 4 Information indicator score

Indicator	Score
Able to look up taxonomy basic information higher plants through various journal search sites	84.76
Capablem studying the key to plant determination *Spermatophyta* through various information sources on the internet	83.79
Capableunderstand the plant nomenclature (Nomenclature) *of Spermatophyta* through *e-books*	82.85
Able to make a herbarium following work procedures through YouTube videos	78.09
Average	**82.37 (Very Good)**

Table 5 Student answer of interview about information

Indicator	Student Answer
1	a) To access and obtain relevant information and in accordance with material related to the basic taxonomy of higher plants, the majority of students search through various journal sites such as Google Scholar, Researchgate, and LIPI.go.id. It's just that of the three sites students' access more through Google Scholar. This is because students are easier and more accustomed to accessing Google Scholar than others. b) Spermatophyta course used to support the lecture process was included in the very good category. From the results of interviews conducted with fourth semester Biology Education students, it was shown that students were able to find information through various research journals to obtain information about the basics of higher plant taxonomy. Students stated that accessing journals through Google Scholar was easier and more complete than through researchgate or LIPI.go.id. Therefore, Google Scholar is a search source for journals with the highest percentage accessed by students. c) The results of the interviews which showed that 40% of students stated that the use of journals really helped students in understanding and studying the key to determining Spermatophyta plants . Students revealed that journals are one of the easiest sources of teaching materials to understand and understand. In addition, students also stated that journals were a source of relevant and accurate information to be used as teaching materials. d) The use of journals that are widely accessed by students as sources of literature or references to find information in learning.
2	a) To access and study information related to the key to plant determination, the majority of students search through various journal sites, e-books and Wikipedia. This shows that students are able to access or search for relevant information according to what is needed. It's just that to learn the key to determination, some students still have difficulty learning it because the information is quite difficult to find on the internet because not all information about higher plants is on the internet and even if there is, it is sometimes not very complete. b) Wikipedia could not be fully used as a source of teaching materials because the information contained on Wikipedia was unclear and not necessarily true. c) Nevertheless, sometimes students also have difficulties in learning the key to determining spermatophyta plants through various information presented on the internet. This is because information regarding the key to determination is quite difficult to find on the internet because not all information about higher plants is available on the internet and even if there is it is sometimes not very complete. So that is what makes it difficult for students to learn the key to determination in Spermatophyta plants .
3	a) Understand information about plant nomenclature. From the results of interviews conducted with Biology Education students, it was stated that 65% of students used e-books accessed through Google Books to serve as teaching materials to study and understand plant nomenclature and the other 35% used Scribed as a source for accessing e-books. From the results of the interviews it was found that students are more dominant in accessing e-books through Google Books because access is easier and more complete when compared to scribed. Apart from that, access to Google Books is also free or you can say it's free, unlike Scribed, which has to be paid if you want to download the e-book you want. Therefore, it makes the majority of students choose Google Books more than Scribed.
4	a) Students' digital literacy skills in the information aspect include students' ability to use or utilize biology learning videos found on YouTube regarding students' ability to make herbarium by following the work procedures for making them on YouTube. Based on the results of interviews conducted with fourth semester Biology Education students, it was shown that 85% of students were successful in making herbariums by looking at the work procedures presented on YouTube. Students stated that learning to make a herbarium which was carried out independently by viewing learning video tutorials on YouTube was easy to understand and follow so that students could easily follow it. b) Nevertheless, 15% of students stated that they were still unable to make a herbarium because they found it difficult to follow the work procedures shown in the video, which resulted in the herbarium failing so they had to repeat it again. This resulted in the making of a herbarium not being able to do it successfully in one try because it had to start again from the beginning. In addition, students also stated that the use of YouTube as a learning video is very wasteful for using internet quota so that sometimes students are lazy to use it.

This is in accordance with Jamridafrizal (2017) which states that in terms of the amount of information available, there has not been any electronic company that has beaten Google Books. So clearly Google Books can be used as an alternative source to get scientific information for free. In addition, Mujianto (2019) explained that YouTube is a teaching medium that is preferred by students because it cannot be denied that students more easily understand information in the form of knowledge through media related to information technology such as YouTube compared to conventional delivery. Most students are interested in things that are video-visual in nature compared to general methods such as conveying information that only comes from books. In contrast, Yusup et al. (2016) states that the weakness of using learning videos that are accessed online causes students to always be connected to the

internet, so it takes a long time and quite a lot of internet quota to access these videos.

Critical Thinking and Evaluation

The results of the descriptive analysis of digital literacy ability data obtained from student questionnaires on the aspect of "Critical Thinking and Evaluation" can be seen in Table 6. Then the student interview results can be seen in Table 7.

Critical thinking and evaluation are also aspects of digital literacy skills. From the results of data analysis on digital literacy skills obtained, it was found that students' abilities in critical thinking and evaluation were classified as good. This is because students are already able to think critically in evaluating information found on the internet to be used as a reference in making assignments in the Spermatophyta course.

Student already able to critically evaluate various journals that discuss about classification of Spermatophyta plants in the Gymnospermae subdivision, which will be determined as a reference for review in completing critical journal review assignments and also able to critically evaluate e-books regarding nomenclature in systematic botany to be used as a book to be compared in the Critical Book Report assignment.

The ability to think critically and evaluate is very important for students to have information that will be accessed or taken to be used as a source of information or even teaching materials. This is in accordance with the statement of Mantovanny et al. (2019) the use of the internet to access actual information and scientifically charged content must be accompanied by a critical attitude of students in sorting and evaluating information between accurate and inaccurate sources. Therefore, students need the ability to choose information critically so that they are not arbitrary in taking information that is not certain of its truth, for example, such as quotations on the internet, writings originating from anonymous blogs whose reference sources are unclear.

Table 6 Thinking critical and evaluation indicator

Indicator	Score
Ability evaluate journal on assignment Critical Journal Reviews	81.90
Ability evaluate e-books as task Critical Book Report	76.19
Average	**79.04 (Good)**

Table 7 Student answer of interview about evaluation

Indicator	Student Answer
1	a) The way students evaluate various information obtained from various journals, namely by viewing and reading the information first to see if it is in accordance with what is needed and then saving it to serve as a reference journal which will be reviewed as a CJR assignment. b) From the statements put forward by students it was found that 85% of students were able to evaluate information that would be used as a reference for review as a critical journal review (CJR) assignment. Students stated that before they took the journal that would be used as a reference, students first looked at the information by reading the information carefully and critically whether the information was in accordance with what was needed, namely regarding the classification of S permatophyta plants . If it is in accordance with what is needed then the student will save it to be used as a journal reference which will be reviewed as a CJR assignment. Students stated that they accessed journals that would be used as references in making assignments through various journal search sites such as Google Scholar, Researchgate, and LIPI.go.id. c) However, even 15% of students stated that sometimes to find journals that would be used as references in making CJR assignments, students only saw the titles that matched what was needed and did not read them first because they felt lazy and not interested in reading them so that sometimes there were journals that were less relevant to them. needed as a reference for critical journal review assignments .
2	a) In addition to evaluating journals, students are also required to be able to critically evaluate various e-books regarding nomenclature in systematic botany to be used as books that will be compared in critical book report (CBR) assignments. From the results of interviews conducted with students, it was shown that 80% of students were able to evaluate e-books found from various online book search sites such as Google Books or Scribed. b) Just like a journal, the way students evaluate e-books before determining that the e-book is relevant to what is needed is by first reading and seeing whether it is in accordance with what is needed, when the e-book is in accordance with what is needed then students take it to be used as a book to be compared in the CBR task. However, 20% of students stated that reading e-books was boring because there were many pages of e-books to be read, so that sometimes students only took e-books that they thought fit the title they would use for comparison in the CBR assignment. This makes the e-book that will be compared to fulfill the CBR task less relevant to what was previously set.

Communication

The results of the descriptive analysis of data on digital literacy abilities of Biology Education students obtained from student questionnaires on the "Communication" aspect can be seen in Table 8. Then the student interview results can be seen in Table 9.

Table 8 Communication indicator

Indicator	Score
Able to use the webcam application to communicate in presenting material	87,61
Able to explain phytographic material in digital classes	83.80
Able to answer tests in digital space	84.75
Average	**85.94 (Very good)**

Table 9 Student answer of interview about communication

Indicator		Student Answer
1	a)	Student statements which show 85% of students stated that students were able to carry out digital-based communication for lectures conducted using a webcam or video conferencing as inzoom meeting, google meet and cisco webex. Learning through video conferences such as zoom meetings, Google meet and Cisco Webex is very much needed in carrying out lectures online because in these applications we can communicate directly between students and lecturers, or other fellow students.
2	a)	Students were able to explain the material for classifying higher plants in digital classes through presentations using the webcam application (zoom meeting, cisco webex, google meet). In addition, 15% of students also stated that they had little difficulty communicating using the webcam application because they did not fully understand the application, such as how to insert PPT into a zoom meeting room or how to share learning videos with the digital class. So that it can be said that even though students are fully capable of participating in entering the digital space to conduct lectures, there are still some students who have not been able to distribute PPT or learning videos independently because they still need direction and guidance from lecturers or other students who are already able to do so.
3	a)	Students' digital literacy skills in the communication aspect can also be seen from their ability to answer each testwhich was given by the supporting lecturer during the Spermatophyta study in the digital space, either orally or in writing, namely through Google Forms or Sipda. Based on the results of the interviews that have been conducted, it shows that students are able to follow and understand the learning given by the supporting lecturers well. This can be seen from 35% of students who stated that students felt happy when answering each test given by the teaching lecturer directly during Spermatophyta learning because this could train students' abilities to master the material taught by the supporting lecturer. 40% of students stated that tests conducted through the Google form were easier and more relaxed because they did not have to be too hasty to answer them unlike oral tests which had to be answered on the spot. However, 25% of students stated that the tests carried out through Sipda were ineffective because sometimes Sipda experienced errors if too many students accessed it. In addition, the network needed to access Sipda must also be stable because otherwise it would be difficult and slow to access.

Communication is a process of conveying information from one person to another and communication skills are often an aspect that influences success in a relationship. With the communication aspect, it will increase activity in learning, especially in digital-based learning where digital-based communication skills are a person's ability to share information online and be able to interact so that it allows someone to be able to participate in the network (online).

The ability of students to present material for classifying higher plants in digital classes through presentations using the webcam application is very good with the highest percentage in the use of zoom meetings of 45.71%, then in Google meet with a percentage of 24.76% and the lowest in use of cisco webex with a percentage of 17.14%. The ability of students to answer each test given by the supporting lecturer during spermatophyta learning in digital space via Google form is 40.95%, orally 30.47% and through Sipda (LMS platform) 13.33%.

In accordance with research by Haqien & Rahman (2020) which states that using zoom meetings is considered practical and efficient for students. This is because by using zoom meetings communication between students and lecturers is easier than communicating in writing or through the learning management system (LMS) and Google classroom.

Collaboration

The results of the descriptive analysis of data on digital literacy abilities of Biology Education students obtained from student questionnaires on the "Collaboration" aspect can be seen in Table 10. Then the student interview results can be seen in Table 11.

Collaboration is one aspect that is included in the six aspects of digital literacy skills. The collaboration aspect is very important for students to have, especially when online learning is currently where the learning is carried out by students themselves, therefore students must be able to

interact with other students or with lecturers in the forums that have been provided. The purpose of this interaction is to make it easier for students when they have difficulty understanding the material (Zaini et al., 2020). Based on analysis of data, students are already able to discuss in completing Spermatophyta assignments given by supporting lecturers and are able to explain and associate ideas with other students in digital classes.

In line with what was proposed by Hapsari and Yonata (2014) that collaboration skills can train in exchanging ideas and information to find creative solutions and success in completing tasks depends heavily on the extent to which they interact with each other. Therefore, good collaboration skills must be owned by students to make it easier for students to understand learning that is not understood so that later it can be discussed with lecturers or other students or can be called collaborating. However, from the results of the data that have been analyzed, almost all students stated that they were able to carry out collaboration during online lectures.

Table 10 Collaboration indicator

Indicator	Score
Able to discuss the classification and characteristics of Spermatophyta in the digital space	80.95
Able to associate ideas in making poster project assignments	83.80
Average	**82.38 (Very Good)**

Table 11 Student answer of interview about collaboration

Indicator	Student Answer
1	a) Education students are already able to collaborate well in digital classes. This is in accordance with interviews that were conducted with students which showed that 80% of students were able to discuss classification material and the characteristics of Gymnosperm plants. However, 20% of students stated that there were still group members who were very difficult to discuss and even tended to be indifferent to assignments that would be discussed to be presented in digital classes.
2	a) A part from discussing in groups the ability of students to express opinions in digital classes is also included in students' digital literacy abilities in the collaboration aspect. Based on the results of interviews that have been conducted with Biology Education students, it shows that students are able to interact to discuss and express opinions regarding various learning materials that are not yet understood, in addition to fellow students, discussions are also always carried out with subject lecturers to discuss lecture assignments and material that is not yet understood. understood. In addition, discussions are also often carried out for fellow students from different groups after finishing presenting the material from their group assignments and these activities can run well. b) Students participate in the digital space by always attending lectures from start to finish. In addition, students are also always active in asking questions or expressing opinions regarding gymnosperm classification material that is not understood or is not in accordance with what students know. This shows that students are already able to express opinions in digital classes.
3	a) Students are fully able to discuss and provide ideas or ideas for making digital posers which will be used as student project assignments. This can be seen from each student giving each other their creative ideas to provide design ideas that will be used to make digital posters to make them look beautiful and attractive. b) In addition, the ability of students to provide ideas or ideas for making digital posters which are project assignments in groups is also included in the ability of students to collaborate. The results of the interviews showed that 85% of students were able to share ideas or ideas for making digital posters as project assignments. This can be seen from each student giving each other their creative ideas to provide design ideas that will be used to make digital posters to make them look beautiful and attractive. But 15% of students stated that they lacked understanding in giving ideas or ideas on how to design posters to make them look more attractive, so they only followed suggestions from other students who had already given their ideas and ideas. Even though discussions in groups or collaboration are very important in learning so that it is better and exchange ideas for better task results.

Content Creation

The results of the descriptive analysis of digital literacy abilities data of Biology Education students obtained from student questionnaires on the "Content Creation" aspect can be seen in Table 12. Then the student interview results can be seen in Table 13.

The ability of students to make digital-based learning videos regarding plant classification in the Gymnospermae subdivision in the Spermatophyta course is very good with a percentage of the use of the kinemaster application which is 42.85% and the use of the viva video application with a percentage of 28.57%, using the application canva 40%, the picArt application 22.85% and Adobe Photoshop 12.28%. Widiyono (2021) states that kinemaster is a full-featured and professional video editing application that supports multiple layers of video, audio, images, text, and effects equipped with various tools that enable teachers to create high-quality videos. This kinemaster application presents a display that is quite

simple, but has quite complex features that make it easier for students to understand. Adi (2020) states that canva is an application that is used to create freely and free of charge with attractive templates and images already provided so that it can be used freely and has more choices that are used to complement the writing on the poster. There are also students who are unable to make digital posters because they do not understand how to use applications to make digital posters.

Table 12 Content creation indicator

Indicator	Score
Producing digital based learning journals, posters and videos	73.28
Create electronic presentations with presentation software	100
Average	**86.64 (Very Good)**

Table 13 Student answer of interview about content creation

Indicator	Student Answer
1	a) From the results of data analysis on digital literacy skills obtained through student questionnaires, it was found that the results of students' abilities in creating content to support learning in the Spermatophyta course were classified as good. In line with the results of interviews that have been conducted with biology education students who have shown that they have been able to make learning videos regarding plant classification in the Gymnospermae subdivision in the spermatophyta course. 45% of students stated that they made learning videos through the kinemaster application and 35% of other students made them through the viva video application. Students use kinemaster more in making learning videos because students are more familiar with using the application. Besides that, according to students, the Kinemaster application is easier to use and the video quality is better. b) As many as 25% of students stated that they were unable to make learning videos regarding plant classification in the gymnosperm subdivision in the Spermatophyta course. This is because students do not understand how to use the application to make the learning video because some students have never tried to use it, so it makes students difficult and unable to make the learning video.
2	a) Most students are fully capable of making journals regarding the identification of S permatophyta plants which will be used as mini reset assignments, but there are also some students who do not yet understand how to make good journals according to journal making procedures. b) Making a journal also includes the ability of students to create content. Making journals regarding the identification of species and determining the families of higher plants that exist around the environment is used as a mini reset task in supporting the study of spermatophytes. Based on the results of the interviews that have been conducted, it shows that 75% of students are fully capable of making journals regarding the identification of spermatophyta plants which will be used as mini reset assignments, and 25% of students state that they do not understand how to make good journals according to journal making procedures. This is because students are not used to it or some have never made a journal before, which makes students confused and do not understand the procedure.
3	a) In addition, the ability of students to make digital posters can also be said to be in a good category, although there are some students who are less able to make them because there are still students who do not understand how to use applications to make digital posters. Digital posters are usually made to support learning and serve as student assignment projects to train students to be better able to create various useful content to support learning. The applications used by students to make digital posters are Canva, PicArt , and Adobe Photoshop. b) Based on interviews conducted, students prefer to use Canva as an application for making digital posters. This is because the Canva application is easier and more practical to use, complemented by attractive designs that can be used for free.
4	a) In addition, things that show that students' ability to create content can also be seen from student statements which state that students are able to make electronic presentations (PPT) well, it's just that what makes students difficult in making PPT is making PPT designs that are still ordinary and still use default design so it still looks less attractive. b) Students explain that the ability to make PPT is very important for students to have because PPT is a digital-based learning media that must be present in every meeting in every lesson. Students also stated that learning using PPT as presentation material really supports learning because PPT contains important learning points which are accompanied by pictures so that they can be easily understood. Therefore the ability to make digital-based learning media is highly recommended for every student teacher candidate, especially biology, which will be very helpful in the learning process and also useful when students later become teachers.

The ability of students to make digital-based presentations regarding various classifications of higher plants through various applications is included in the very good category with the highest percentage of ability in the use of power point applications (PPT) with a percentage of 57.14%, then in the prezi

application of 25.71% and on Google Slides with a percentage of 17.14%. In accordance with research by Sinta & Hera (2020) which explains that the use of Microsoft Power Point media as a learning medium in the teaching and learning process can facilitate the learning process, because besides being able to assist in the learning process Microsoft Power Point can also display images and videos which make it easier for students to understand learning.

The advantage of conducting this research is to see the extent of the abilities of Biology Education students at Medan State University in the Spermatophyta course. where this ability has a very important role in the application of learning that will be carried out later. Digital literacy itself is a learning resource that makes learning more effective. There are many benefits that can be gained when a biology education student is able to apply digital literacy in studying spermatophyta, including making it easier to understand what spermatophyta are like by accessing various information about spermatophyta.

Apart from that, students will also find it easier to see what the spermatophyta plant looks like by accessing various image references on the internet. This is because the learning activities in the Spermatophyta course require students to be able to see directly the plants that are the object of discussion. However, sometimes there are plants that are difficult to find in the surrounding environment, which requires these plants to be visualized directly using certain media, such as digital media, to make them easier to understand. Visualization through learning media is one way that can be used to make material appear real (Dinata, 2013).

From this research it can also be seen that the problem studied is able to answer all questions regarding the digital literacy abilities of Medan State University Biology Education students in the Spermatophyta subject. This proves that biology education students have very good abilities in applying digital literacy in studying Spermatophyta.

D. Conclusion

The digital literacy skills of Medan State University biology education students in the Spermatophyta course are very good. Judging from the six aspects of digital literacy skills, the aspects of operational skills as well as critical thinking and evaluation are included in the good category, which shows that students are able to use digital media and applications in learning. The aspects of information, communication, collaboration and content creation are also included in the very good category, students are able to master these aspects to support the learning process in the Spermatophyta course. The score obtained from research on the digital literacy skills of Medan State University Biology Education students in the Spermatophyta course was 81.30 (very good).

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RESEARCH DOCUMENTATION [*RESEARCH DOCUMENTATION*]

Figure 1. Charging questionnaire

Figure 2. Interview activity