CHAPTER II
LITERATURE REVIEW

2.1 Pre-service teachers

2.1.1 Characteristics of pre-service teachers

According to Murti and Madya education in the 21st century certainly has different characteristics than before. In this century, education that ensures students have learning and innovation skills, skills in using media, information, and technology, being able to work, and having life skills is very important. Teachers must be literate about the times, both in terms of social and emotional development of children.

The challenges for teachers in the millennial era are leaden when compared to teachers in the previous era. Apart from having to master the scientific field being taught, teachers must also be able to understand technology and be creative and innovative individuals. The teacher, who is a role model for students, must also provide students with an understanding of the limitations of using technology, so that they are not wrong in using technology. Teachers must be more open to new ideas according to the times that are developing.

Budiati (2017) in her book also describes the main characteristics of the millennial generation as "increased use and familiarity with communication, media and digital technology. Because they were brought up by technological advances, the millennial generation has creative, informative, passionate and productive characteristics."

According to DeBard and Prensky (2019) to prepare for millennial generation education, its characteristics need to be considered first. In his study of around a thousand students from all 12 economic, social, intellectual classes and age backgrounds around the world, consistent facts were found about millennial characters. A number of typical millennial characteristics are: (a) they don't want to be taught; (b) want to be respected, trusted, so that their opinions are valued and taken into account; (c) follow his wishes, especially personal desires; (d) want to make, use tools while working; (e)

want to work in groups and projects (don't let lazy people just share names); (f) want to make decisions and control; (g) want to be connected in the network to express and share opinions, both in class and in the world; (h) want to cooperate and compete with each other; and (i) want education that is not only relevant, but also real. In addition, according to Andriyani (2019) the millennial generation has the following characteristics: First, they have big ambitions to be successful, so they are more optimistic in achieving their dreams. Second, have instant behavior and practical thinking. Third, children love freedom more. Therefore, with a character like this, children born in the millennial generation will tend to be more open in accepting technology as a means to meet their needs.

Ingvarson et al. explained that teachers who are considered to have good preparation generally refer to those who have acquired adequate knowledge of subject matter and student learning characteristics, as well as having good skills to assess student learning competence and plan effective class programs.

After knowing the characteristics of the millennial generation, pre-service teachers must have the readiness to become good and appropriate teachers. Readiness to teach is an important factor in teacher preparation which is important in the growth of pre-service teachers to become outstanding teachers.

2.2 Digital literacy

Etymologically, literacy comes from the Latin "*Litera*" which means the writing system that accompanies it. Literacy is a fundamental human right and the foundation for lifelong learning. While Digital according to KBII is related to numbers, numbering for certain calculation systems. The term digital comes from the Greek, namely "*Digitus*" which means the fingers or toes of a human hand or foot numbering 10. the value of 10 consists of 2 radixes, namely 1 and 0. This is the origin of the use of the term digital in the binary number system.

The term digital literacy was first proposed by Gilster (1997) that digital literacy is the ability to use information technology from digital devices effectively and efficiently in various contexts of everyday life. Bawden expands the understanding of digital literacy that comes xcswshgh literacy of computer devices and information. Computer literacy developed in the 1980s when microcomputers were widely used, not only in the business environment, but also in society. Meanwhile, information literacy spread widely in the 1990s when information became easier to compile, access, and disseminate through networked information technology. Martin formulates the definition of digital literacy as awareness, attitude, and individual ability to use digital tools and facilities appropriately to identify, access, manage, integrate, evaluate, analyze, and synthesize digital resources, construct new knowledge, create media expressions. and communicating with others, in the context of specific life situations, to enable constructive social action; and reflect on the process. Hague (2010) suggests that digital literacy is the ability to create and share in different circumstances and forms in order to collaborate and communicate more effectively, and understand how and when digital technology is used properly in creating this process. Thus, it can be concluded that the characteristics of digital literacy do not only refer to operating skills and using various information technology and communication technology devices (hardware and software platforms), but also to the process of "reading" and "understanding" the contents of technological devices and processes. "creating" and "writing" becomes a new knowledge.

Digital literacy refers to a range of competencies beyond the use of digital media, computers and Information and Communication Technology (ICT). Often understood to consist of (or have been combined with) a number of other forms of literacy such as computer literacy, internet literacy, media literacy, and information literacy. In addition, digital literacy can be interpreted as technical and intellectual skills in using the internet and computers in training social skills in the network and acting according

to a predetermined framework. Social problems that occur in society such as cyberbullying are also due to digital natives not having mastery over new literacy. This literacy includes data, technology and human literacy. This literacy relates to the human ability to read, analyze, conclude data and information obtained, understand how machines work, as well as skills in communicating, collaborating, thinking critically, creatively and innovatively.

2.1.2 Principles of digital literacy

The concept of digital literacy, in line with the terminology developed by UNESCO in 2011, cannot be separated from activities such as reading and writing, as well as computational thinking related to education. Therefore, digital literacy does not only involve the ability to use technology, information and communication devices, but also includes the ability to socialize, the ability to learn, behave and think critically, creatively, and inspire as digital competence. The basic principles of developing digital literacy include the following Understanding, Mutual Dependence, Social factors, Curation.

1) Understanding

   The first principle of digital literacy includes the ability to generate ideas implicitly and explicitly from the media.

2) Mutual Dependence

   Interdependence which is interpreted as how one form of media relates to another potentially, metaphorically, ideally, and literally.

3) Social factors

   Social factors as a form of giving separate messages from existing information. Who shares the information, to whom the information is provided, and through what media the information is provided can not only determine the long-term success of the media itself, but can also form an organic ecosystem for finding information,

sharing information, storing information, and ultimately reshaping the media itself.

4) Curation

This relates to storing information, such as the "save to read later" method on social media as a form of evaluating information and storing it so that it is more accessible and has long-term benefits.

Meanwhile, Nelson revealed that digital literacy is built on three principles: "skills and knowledge to use various digital media software applications and hardware devices; the ability to critically understand digital media content and applications; and the knowledge and capacity to create with digital technology.

2.1.3 Literacy Stages

In an e-book entitled Information Literacy written by Brian Ferguson explains that information literacy skills are essential to fully participate and contribute to the world in which we live. Because we live in an information society. A complete picture of Literacy should include five essential components: Basic Literacy, Library Literacy, Media Literacy, Technology Literacy and Visual Literacy.

1. Basic Literacy

   Basic literacy is the ability to listen, speak, read, write and count which is related to the analytical ability to calculate, perceive information, communicate, and describe information based on an understanding and personal conclusion.

2. Library Literacy

   Library literacy is providing an understanding of how to distinguish between fiction and non-fiction reading, utilizing reference collections and periodicals, understanding the Dewey Decimal System as a classification of catalog knowledge provided by the library and indexing it so that you have knowledge in understanding information when completing writing, writing, work or solving problems.

3. Media Literacy

   Media literacy is the ability to recognize different forms of media, such as print media, electronic media (radio, television), digital media (internet) and understand how they are intended to be used.

4. Technological Literacy

   Technological literacy is the ability to understand the completeness that follows technology, such as hardware and software, as well as ethics in using and utilizing technology.

5. Visual Literacy

   Visual literacy is an advanced level of understanding between media literacy and technology literacy, which develops learning abilities and needs by utilizing visual and audio-visual materials critically and with dignity. The interpretation of visual material really needs to be managed properly, because it contains a lot of manipulation and entertainment that needs to be filtered based on ethics and decency, be it visual in print, auditory, or digital form.

2.3 Readiness

Readiness, in a broader context, refers to the preparedness or ability of an individual, group, or organization to face and overcome specific challenges, changes, or situations. This concept is crucial in various aspects of life, including education, business, risk management, and personal development. John Dewey(1938) a renowned educational philosopher, argued that readiness involves the mental and emotional preparedness of an individual for learning. According to Dewey, effective learning occurs when individuals are actively ready to participate in the learning process. Jean Piaget (1970), a psychologist, stated that readiness is closely related to an individual's cognitive developmental stage. He believed that individuals need to reach a certain level of cognitive development before they are ready to understand specific concepts or tasks. Lev Vygotsky (1978), another influential psychologist, argued that individuals can achieve

higher levels of readiness through assistance and support from others in their social environment.

Readiness is a complex concept and can be interpreted in various ways depending on the context. The various theories and perspectives from the experts mentioned above provide a deeper understanding of how individuals or organizations can attain the readiness required to face changes or specific tasks.

Ertmer and Ottenbreit-Leftwich (2010) investigated teachers' readiness to adopt educational technology. They found that teachers' readiness to integrate technology into teaching is a key factor in the successful implementation of technology in the classroom.

2.4 learning application

learning application are software on mobile that enables you to learn on your portable devices. These apps, too, work on mobile phone’s operating system. learning application are designed to be engaging and enjoyable for students and teacher. Knowledge augmentation, tailored learning experiences, improved engagement, access to online study material, ease of communication, and, most significantly, remote access are all advantages of a learning app.

Learning applications can be used with various devices, using PCs, smartphones, laptops which can also be called M-learning. According to Kukulska-Hulme (2015: 75) Mobile Learning is the use of mobile technology for educational purposes. These mobile devices can provide different ways of learning, easy to find everywhere, as well as practical and pervasive.

In learning there are various kinds of learning applications that can be used at digital era to carry out learning activities namely

1. Online Learning : Google Classroom, Microsoft Teams, Moodle, Fedena, Edmodo, Schoology, PesonaEdu, Fisikanet Lipi, Rumah Belajar Kemdikbud Digital class, Laboratorium maya Rumah Belajar Kemdikbud, etc.
2. Games-based online learning : m-edukasi kemdikbud, learning games on playstore /app store, etc.

3. Language translation learning media : KBBI Online Kemdikbud, Google Translator, Bing Translator, Online dictionary, etc.
4. Social media Application: Whatsapp, Instagram, Youtube, Facebook, etc.
5. Applications for Making Visual Interactive Learning Media : Microsoft powerpoint, Google slide, Libre office, prezi, canva, powtoon, padlet, quizlet, flip grid, whiteboard Fi, etc.
6. Applications for Making Audio Visual Interactive Learning Media : kahoot, google classroom, Microsoft teams, LMS, quora, open study, lectora, unity, Camtasia, filmora, kine master, etc.

2.5 Previous Study

To conduct this research, there are previous studies that also discuss pre-service teacher digital literacy.

"Pre-service teachers' conceptions and competences on digital literacy in an EFL academic writing setting" by Salim nahban, PGRI Adi Buana University Surabaya, 2021. The study has identified the pre-service teachers'conceptions of digital literacy in academic writing context and revealed four themes of basic conception of digital literacy, competences related to digital literacy, awarness of the importance of digital literacy, and challenges of digital literacy. It was also shown that the conception of digital literacy was merely associated with the ability of using technology for writing. The study also set out to determine pre-service teachers' competences concerning the predominant dimensions of digital literacy including critical thinking, online safety skills, digital culture, collaboration and creativity, finding information, communication, and functional skills. In general, the finding suggests that despite lack of understanding of critical thinking and digital culture towards digital literacy, pre-service teachers performed the competencies of finding information, communication, and functional skills. Taken all together, these results suggest the space of the importance of teaching digital literacy in the academic writing. In addition, this research will serve as a base of future studies in developing digital literacy

framework in English language education particularly in English academic writing.

Second study with Title “Analysis of Digital Literacy Competence of Teachers in Implementing Online Learning During the Covid-19 Pandemic” by Rosmalah, Sidarah Apriani Rahman, Asradi , State University of Makassar, 2021. In this study, a survey was conducted to assess the level of digital literacy competence among teachers based on three levels: Basic, Medium, and Advanced.

Subsequently, a survey was conducted to assess the digital literacy competence of teachers at each level. The results of this survey were presented in the form of tables for each level. These tables include the questions posed to teachers and the percentage of teachers who answered "Yes" or "No" to each question.

Overall, this survey helps identify the level of digital literacy competence among teachers at various levels. The results indicate that most teachers have digital literacy skills at the Basic and Medium levels, while proficiency at the Advanced level is still limited. In the context of online learning, the use of digital applications and platforms plays a crucial role in enhancing teachers' digital literacy competence.

Next study is “Digital Literacy of Prospective Biology Teacher Students in Developing Audio-Visual Teaching Materials” by Sumiyati Sa’adah, Sri Maryanti, Meti Maspupah, Asrianty mas’ud, UIN Sunan Gunung Djati Bandung, 2020. This project involved creating educational videos to explain biology topics and utilized various digital tools and platforms. The analysis covers different aspects of digital literacy and how the students performed in terms of information processing, communication, collaboration, content creation, safety, and problem-solving.

The students were required to create explanatory videos using mini flipcharts as visual aids, record the explanations using video recording equipment, and then edit and enhance the videos using video editing software. The analysis discusses how well the students managed these tasks and how their skills align with digital literacy indicators. Here's a summary of the main points:

1).Information and Data Literacy: The students demonstrated good skills in gathering, evaluating, and organizing information from various sources, including Open Education Resources (OER). They used this information to create effective visual content for their educational videos. 2).Communication and Collaboration: The students displayed effective communication and collaboration skills by interacting with their instructors, coordinating with classmates on topic selection, and sharing their educational videos on YouTube. They engaged in remote collaboration and communication due to the pandemic restrictions. 3). Content Creation: The students were able to create educational videos using visual aids and explanations, but some struggled with editing and refining the videos for optimal quality. There was a focus on clarity of content and language usage, although improvements were needed in video and audio quality. 4).Safety: The students showed awareness of safety and security measures in their use of digital tools and platforms. They complied with remote learning policies during the pandemic and engaged in responsible online behavior. 5). Problem-Solving: The students demonstrated problem-solving skills by overcoming technical challenges, such as editing and uploading videos, managing copyrights and licenses on YouTube, and improving their YouTube channel's visibility and engagement.

Overall, the analysis suggests that the students possess a range of digital literacy skills but may need further development in specific areas, such as video editing and maximizing the quality of their content. The project appears to have challenged the students to explore and improve their technological skills while contributing to their development as future biology educators.