Investigating the Incorporation of Digital Literacy and 21st-Century Skills into Postgraduate Students' Learning Activities

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Abstract: Students in higher education institutions require digital literacy and 21st-century skills for their learning activities. Despite the reality of students born into digital technologies that have become increasingly integrated into learning activities, no studies have looked into the situation, particularly study in the context of postgraduate students. This study aims to determine the extent of Master of English Language Education (MELE) students' incorporation of digital literacy and 21st-century skills within their learning activities. This study was carried out using a survey research method. The sample consisted of 34 MELE students from Jakarta State University enrolled in various gap years (2019-2021) in the Master English Language Education department. The data were collected using 24 questionnaire items. The instruments were employed based on the International Society for Technology in Education (ISTE) Student Standard and disseminated using Google Form. The findings revealed that most MELE students had a high level of digital literacy and 21st-century skills. However, some students marked themselves as having low levels on it. Thus, the researchers recommended that the students enhance their engagement with technology, incorporate 21st-century skills, and develop digital literacy according to today's requirements for completing their learning goals.

INTRODUCTION

In recent years, the integration of technology, particularly information and communication technologies (ICT), has profoundly altered educational environments. Virtual learning environments, for example, have been developed, resulting in the rise of electronic or online learning. It may alternatively be characterized as "a web-based communication platform that lets learners access varied learning resources such as discussion boards, exams, material repositories, and document sharing systems without regard to location or time" (Mohammadyari & Singh, 2015). According to Khan, Web-based learning (WBL), Internet-

based training (IBT), and online learning (OL) are examples of electronic learning (e-learning) systems that eliminate time and location constraints (Liaw et al., 2007). Unlike traditional learning, which takes place in physical classrooms, e-learning systems allow learners to access information wherever and whenever they want, maximizing learning opportunities. All of these tasks are possible with digital tools. Students now have more opportunities to explore information that can be accessed from a variety of digital sources to facilitate their learning.

Since students were born in the new century, which represents the first generation to grow up with digital technology, today's students are known as digital natives (Prensky, 2001), meaning they were born into it and have lived their whole lives with it. As a result, employing standard techniques and instruments to teach them may cause complications in the learning or teaching process. From this perspective, postgraduate students should take a more crucial stance because they are digital natives and digitally literate. Hence, students should be keenly engaged in offering digital technologies and incorporating them into university curricula, particularly in the fields they intend to study.

In light of this context, this research aims to gain information on the extent of MELE students' digital literacy abilities and twenty-first-century skills. Despite the fact that a lot of studies have examined digital literacy and twenty-first-century skills separately, this study tries to present these two focuses integratedly. Baharuddin et al. (2016), in their research, emphasized students' understanding of digital literacy, which might lighten the load on knowledge-seeking strategies and new technology-based learning techniques. While Abdullateef (2021) stated that digital learning tools could foster 21st-century skills. However, the empirical research into the quality of digital literacy in the twenty-first century is relatively limited. In other words, despite the reality of students born into digital technologies that have become increasingly integrated into their lives and the necessity of students requiring twenty-first-century skills, no studies have examined the situation, especially in the context of postgraduate students in English Language Education programs. As a result, this research is thought to fill a vacuum in the literature by giving actual data. Furthermore, survey research exploring MELE students' competence toward digital literacy and twenty-first century skill was emerged. MELE students, on the other hand, are expected to be technologically literate. That is why determining the level of MELE students in terms of the competencies listed above is essential.

For that purpose, the researchers wanted to know the answers to the following questions: (1) to what extent do Master of English Language Education (MELE) students incorporate digital literacy into their learning activities? (2) to what extent do Master of English Language Education (MELE) students integrate 21st-century skills into their learning activities?

LITERATURE REVIEW

Digital Literacy

Digital literacy is not a novel approach for acquiring information and knowledge for students. A crucial component of digital literacy is the capacity to use technology to access the content (Baharuddin et al., 2016). Internet access is the logical starting point for digital literacy. Furthermore, incorporating internet sources into education has necessitated the development of a fundamental understanding of technology and a set of technological abilities. Digital literacy encompasses a wide range of literacies related to the use of digital technologies. It necessitates the ability to use technology in teaching-learning processes and obtain, generate, and share knowledge (Hamutoğlu et al., 2017; Ng, 2012). Digital literacy is described as "the capacity to analyze and utilize data in diverse forms," focusing on critical thinking rather than technological abilities (Chan et al., 2017). Digital literacy transcends technical competency abilities, such as the capacity to write, present, and communicate using a keyboard (Baharuddin et al., 2016). In education, digital literacy has gotten a lot of attention (Burnett & Merchant, 2013). Despite this, most studies in the literature have focused on scale development (Hamutoğlu et al., 2017), being digitally literate (Ustundag et al., 2017), or highlighting the necessity of being digitally literate. The phrase 'digital literacy' is currently defined as the technical knowledge and abilities required for those who desire to live a productive life, engage in lifelong learning activities, and contribute constructively to society (Çam & Kiyici, 2017).

21st-Century Skills

The Queensland Curriculum and Assessment Authority (2015) defined 21st-century skills as "high priority abilities and qualities thought to be the most important in assisting students and learners in living and working successfully in the twenty-first century." In addition, according to Johnson (2009), 21st-century skills encompass not only technology

literacy but also critical thinking, problem-solving, communication, and collaboration, all of which are important for success in both work and life.

According to Hixson et al. (2012), there are eight talents that every student in the twenty-first century should have. First, critical thinking skills refer to students' ability to examine complicated situations, research topics with no obvious answers, assess many points of view from information sources, and reach appropriate conclusions based on facts and rationale. Second, collaboration skills relate to students' ability to work collaboratively to solve issues or answer questions, work successfully and politely in groups to complete a common goal, and share responsibility for finishing a task. Third, communication skills refer to students' ability to organize their thoughts, facts, and discoveries and effectively communicate them via a range of media, including orally and in writing.

Fourth, creativity and innovation abilities refer to students' ability to discover and refine answers to complicated issues or tasks via synthesis and analysis and then merge or present what they have learned in new and innovative ways. Fifth, self-direction skills refer to students' ability to take charge of their own learning by picking topics to explore and methods for their learning and reviewing and responding to criticism of their work. Sixth, global connections refer to students' ability to comprehend global and geopolitical topics such as geography, culture, language, history, and literature from different nations. Seventh, local connections refer to students' ability to apply what they have learned to local contexts and community challenges. The last is that students should be able to use technology to learn and manage their learning and generate outputs using suitable information and communication technologies.

METHODOLOGY

Research Design

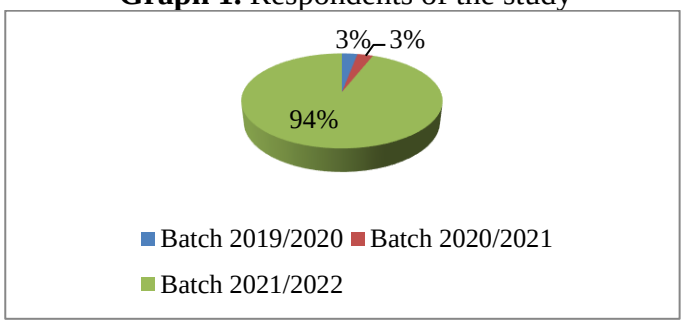
This study used standardized questionnaires to conduct a descriptive investigation. A survey method was employed in this research. In the study of social issues, Bairagi & Munot (2019) stated that descriptive research is often used. The fundamental objective is to investigate and precisely characterize the features of the circumstances, issues, events, services, organizations, or people being studied. This kind of investigation does not include any kind of control over the parameters or variables. The only thing it does is attempt to portray or interpret the past and/or present facts. In addition, according to Ponto (2015),

survey research has the primary purpose of obtaining information describing the characteristics of a large sample of individuals of interest relatively quickly. It can range from asking a few targeted questions of individuals to obtain information related to behaviors and preferences to a more rigorous study using multiple valid and reliable instruments. It inquires into specific habits and preferences by asking a few focused questions to people and maybe as thorough as more comprehensive research that uses numerous valid and reliable instruments. Mukherjee (2020) emphasized that the quality of data collected through a survey implies relevance, accuracy, adequacy, and (internal) consistency.

Respondents

The participants of this study were thirty-four postgraduate students, with a gender distribution of twenty-nine females and five males. They enrolled in the Master of English Language Education Department at the Faculty of Language and Art at the State University of Jakarta. This survey included students from the 2019 and 2020 academic years but mostly from the 2021 academic year. A total of thirty-two students from MELE batch 2021 participated in the survey, of which eleven students belonged to Class A, seven students were from Class B, and fourteen students were from Class C. One MELE student from each batch of 2019 and 2020 also participated. The study was undertaken in December 2021. Due to the current outbreak of COVID-19 viruses, the researchers could not conduct a real-time research investigation by meeting with respondents face-to-face. Along with this situation, the researchers shared online questionnaires in order to minimize the possibility of virus transmission.

Graph 1. Respondents of the study



Instruments, Procedures, and Data Analysis

In social research, questionnaires are used in conjunction with a variety of observational methods. In survey research, questionnaires and interviews are the most popular data gathering methods. Questionnaires may be self-administered or provided by a professional, individually or in groups, and include a sequence of items that matches the research objectives (Ponto, 2015). In this study, the respondents were given closed-ended questions to which they were to choose answers from a list provided by the researchers. The available replies were expressed as assertions of the level of agreement or disagreement. Likert-scale questionnaires are the most popular type of questionnaire (Beglar & Nemoto, 2014). In addition, according to Cohen et al. (2018), questionnaires provide respondents with the benefits of standardized and open replies to a constrained topic. They can be reliable, valid, and straightforward to complete. As a result, the researchers used a questionnaire as the instrument for obtaining data on the students' digital literacy and twenty-first-century skills levels.

The International Society for Technology in Education (ISTE) Standard for Student Questionnaires was used in the study (Hazaymeh, 2021). This ISTE-S Standard supported three primary standards for exploring students' digital literacy levels and three significant additional standards for determining the level to which they possess twenty-first-century skills. The four sorts of scalable statements were then assigned to each standard. The Likert scale was used to develop the questionnaires, then distributed using Google Forms. There were two main segments to the survey. The first segment consisted of 12 closed-ended statements derived from the three fundamental standards (each comprises four statements) to assess the respondents' digital literacy skills. The second segment aimed to gather data on MELE students' level of proficiency in twenty-first-century skills. Respondents were instructed to answer a survey on a Likert scale of 1 to 5, which portrayed the skill level, with 1 indicating low (L) and 5 indicating advance (A).

Four sorts of scalable statements are assigned to each standard in the questionnaires. The 12 questions on the digital literacy scale were divided into three sub-dimensions: research and information fluency (n = 20), digital citizenship (n = 20), and technology operations and concepts (n = 20). The digital literacy scale had a maximum score of 60 points. While the 21st century skills scale has 12 items and three sub-dimensions: creativity and innovation (n = 20), communication and collaboration (n = 20), and critical thinking, problem-solving, and

decision-making (n = 20). The twenty-first-century skills scale had a maximum score of 60 points as well. The survey was incorporated into a Google Spread Sheet to gather data electronically. The survey took about 10-15 minutes for respondents to complete and submit their answers. The information gathered was examined statistically by counting formulas in Ms.Excel 2010. The data was analyzed using the excel chart data series software application, and then qualitative interpretation was used. Data from the questionnaire were provided quantitatively because they depended on respondents' replies. Whereas data from the in-depth interview were presented qualitatively because they relied on respondents' responses.

FINDINGS

The goal of this study was to (1) determine the level of digital literacy and (2) determine the twenty-first-century skills level among MELE students. The standardized questionnaires were used in this study. Overall, MELE students scored at a high to advanced level for their competence, both in digital literacy and twenty-first-century skills. The next sections go through the findings in further detail.

Digital Literacy Level of MELE Students

The data were analyzed and provided based on the survey respondents' responses. After that, it was statistically examined, as seen in the graph below. The standard descriptions for the digital literacy scale are supplied in Table 1, while Graph 1 indicates the percentage number of respondents who voted for each sub-dimension.

Table 1. The standard descriptions for the digital literacy scale

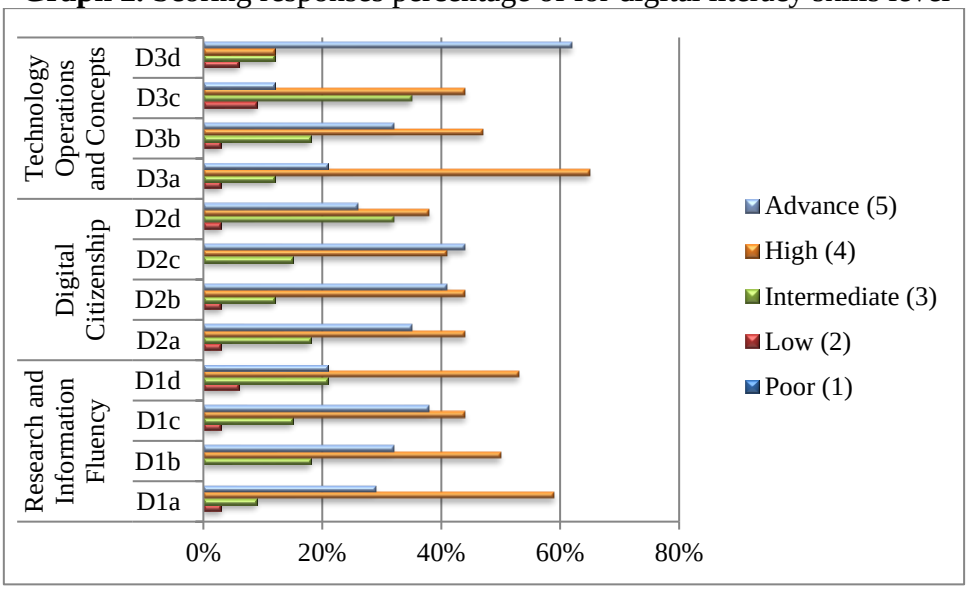
ISTE-S standards	Statements	Indicator
Research and Information Fluency	Utilizing digital technologies for planning ways to direct inquiry	D1a
	Utilizing digital technologies to seek, organize, analyze, appraise, synthesize, and utilize information from a range of sources and media in an ethical manner	D1b
	Utilizing digital tools to analyze and choose information sources and digital technologies depending on their suitability for certain tasks	D1c
	Utilizing digital technologies for data processing and reporting	D1d
Digital Citizenship	Utilizing technology to ensure the secure, legal, and accountable usage of data	D2a
	Promoting teamwork, education, and productivity through the use of suitable technology and a positive outlook.	D2b
	Utilizing tech to show lifetime learning commitment	D2c
	Utilizing proper technology for demonstrating digital citizenship leadership	D2d

Technology Operations and Concepts	Utilizing technology helps comprehend technological systems	D3a
	Utilizing technology aids in the selection and efficient use of applications	D3b
	Utilizing technology facilitates troubleshooting of systems and applications	D3c
	Utilizing technology helps transfer existing understanding to new tech	D3d

(Adapted from Ayyildiz & Hazaymeh, 2021)

Table 1 depicts a standard description for assessing MELE students' digital literacy skills. The first is research and information fluency, which includes four statements indicating various abilities. The second is digital citizenship, which includes four statements relating to the use of technology in digital citizenship. And the third is technology operation and concept, which includes four indicators that explain students' level of knowledge and use of technology. The graph below depicts the outcomes of the replies to the questionnaires that the researchers in this study have distributed.

Graph 2. Scoring responses percentage of for digital literacy skills level



Graph 2 demonstrates that the majority of respondents had a high level of digital literacy once it came to the ISTE Standards. The data indicate that the majority of respondents rated high level for most of the standards. In standard one, research and information fluency, MELE students applied themselves to high-level competency. They considered that they could use digital tools to create planned strategies to guide inquiry as well as to locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of

sources and media. Further, 50% of MELE students believed that they could incorporate digital tools to evaluate, select information sources, and maximize digital tools based on the appropriateness of specific tasks. They could also process data and report results with high skills. To sum up, according to the survey findings, MELE students had strong capacities in terms of research and information fluency standards.

However, the second standard in the frame of digital citizenship did not offer the same level of MELE students as depicted in standard one. In this case, they performed at an intermediate level as a representative of their average level of digital literacy skills. They were not confident enough to utilize appropriate technology to exhibit a positive attitude to support collaboration, learning, and productivity, as well as to exhibit leadership for digital citizenship. Even though 44% of them declared that they could use technology to practice safe, legal, and responsible use of information and demonstrate personal responsibility for lifelong learning at a high level. It is to say that students had a balanced ability in this second standard, in which typical students claimed that they had a high level of digital citizenship ability. While in the standard of technology operations and concepts, 62% of MELE students agreed that they had used technology to transfer current knowledge to learn new technologies effectively. At the same time, 65% of students admitted that using technology helped them acquire a full understanding of technology systems at an advanced level. It means that they have used to operating digital applications effectively and productively. The researchers concluded that students have a good level of understanding of operating technology and concepts.

Twenty-first Century Skills Level of MELE Students

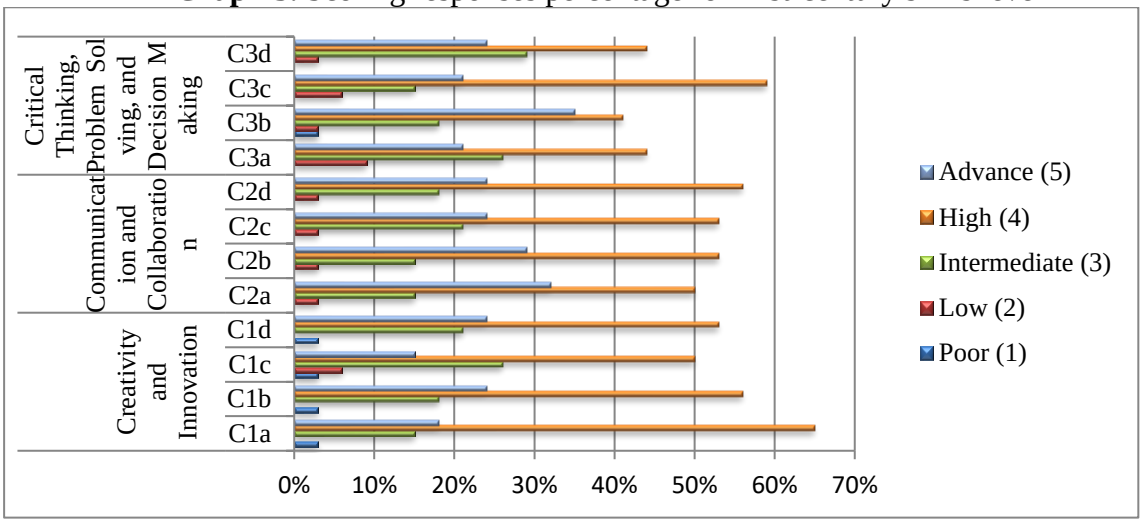
The second question of this study was to examine the level of MELE students' twenty-first-century skills. That is why respondents were requested to complete the second segment of the questionnaire, again on a Likert scale from 1 to 5, with 1 indicating the low level and 5 indicating the advanced level, as shown in Graph 3 below. But initially, the researchers provided a standard description for the 21st-century skills level in Table 2.

Table 2. The standard descriptions for the 21st-century skills scale

ISTE-S standards	Statements	Indicator
Creativity and Innovation	Utilizing technology to develop innovative concepts, items, or procedures	C1a
	Utilizing technology facilitates the production of creative works as a form of individual or collective expression.	C1b
	Utilizing technology to apply models and simulations to investigate complicated systems and challenges	C1c
	Using technology to recognize patterns and estimate potential outcomes	C1d
Communication and Collaboration	Utilizing a range of digital settings and media to communicate, cooperate, and publish with others through digital means	C2a
	Utilizing digital media to successfully convey ideas to numerous audiences through various media and forms.	C2b
	Utilizing digital media to foster cultural understanding and global consciousness by interacting with students from various cultures.	C2c
	Utilizing digital media to assist project teams in developing creative works or addressing issues	C2d
Critical Thinking, Problem-solving, and Decision-Making	Utilizing digital technologies and resources to find and define genuine issues and important questions for research	C3a
	Utilizing digital tools and resources to prepare, organize operations, create a solution or execute a project	C3b
	Utilizing digital tools and resources to collect and analyze data, create solutions, and/or make intelligent choices.	C3c
	Utilizing digital tools and resources to train various systems and varying viewpoints to discover potential options	C3d

(Adapted from Ayyildiz & Hazaymeh, 2021)

Graph 3. Scoring responses percentage for 21st-century skills level



As shown in Graph 3, MELE students demonstrated a high level of twenty-first-century skills across the board. They voted to a positive level on each standard. 65% of students

confirmed that they utilized technology to generate new ideas, products, or processes, and 56% of students used technology to assist in creating original works as a means of personal or group expression. These contributed to their creativity and innovation skills, which could encompass the skills needed in the twenty-first century.

At the second standard, communication and collaboration skills were also well-integrated for MELE students. They got a high grade on it. 53% of MELE students used digital media to communicate ideas effectively to multiple audiences using various media and formats at a high level. 56% of them worked on digital media projects to help project teams create original works or solve problems. However, 3% of MELE students admitted that they had a low level of proficiency in employing the entire indicator statements, which served in the context of communication and collaboration skills. It is to say that a few MELE students need to be encouraged to develop their self-confidence regarding this standard.

Sequently, for the third standard, MELE students marked themselves as highly proficient at using digital tools and resources to collect and analyze data, identify solutions, and make informed decisions. 35% of students used digital tools and resources to plan, manage activities, develop a solution, or complete a project at an advanced level. At the same time, 59% of them promoted their skills at a high level. In addition, 44% of students used digital tools and resources to identify and define authentic problems and significant questions for investigation and practice multiple processes and diverse perspectives to explore alternative solutions. It means that most MELE students had a high level of critical thinking, problem-solving, and decision-making skills.

DISCUSSION

Along with the findings above, equipping students with information and communication technology (ICT) and digital literacy skills is critical for their full participation and success in today's information-rich, technology-driven society, as global economies strive to retain productivity while embracing new developments (Kozma, 2011). Students must be able to analyze, evaluate, and retrieve information from computers and other technological devices, interact in social networks to generate and exchange knowledge, and use and create digital media (Catts & Lau, 2008). This skill has become quite fundamental and highly crucial for all students, particularly master's students, since, like it or not, students must incorporate this

skill into everyday learning and teaching activities. To put it another way, students must become more engaged with technology and refine their capacity and aptitude to use it.

Likewise, collaborative problem solving and creativity are the key skill area where boundaries have been pushed to MELE students. They should integrate the allure of the construct's cognitive, or problem-solving, elements with which significant progress has been achieved, bringing the issue of capturing the social processes brought to bear in a collaborative context closer and more tempting (von Davier et al. 2017). Postgraduate students must also have global citizenship skills, which encompass (1) decision-making, critical thinking, and problem-solving processes; (2) social processes, such as communication, which are crucial to addressing wicked situations; and (3) values and attitudes (Care & Kim, 2018). Moreover, MELE students should develop global citizenship. It may be defined as a feeling of collective identity and belonging to a global community, with the implication that people are linked to each other and their surroundings in different ways (UNESCO, 2014).

Students can obtain some benefits while integrating digital literacy and twenty-first-century skills. Students who are proficient in digital literacy can absorb information more quickly and easily due to today's technological technologies (Baharuddin et al., 2016). Later, students may improve their skills by attending the ICT class to acquire knowledge independently. Students may easily develop and offer themselves to the organization by possessing these skills. Moreover, the 21st century calls for specialized talents that will enable students to master every facet of life, from basic life skills to digital skills, in order to deal with the difficulties posed by the unpredictable prospects that the future will bring. Furthermore, 21st-century skills help students prosper in a globalized and continuously changing society (Rap, 2022). In a nutshell, both digital literacy and 21st-century skills offer advantages for the personal development of students, which enhances their competence in learning. Because of the multiple interaction platforms given by digital technology, it is feasible for 21st-century skills to strike the right balance between students' cognitive and soft skills (Abdullateef, 2021).

CONCLUSION

The current study looked at MELE students at the State University of Jakarta to determine their level of digital literacy and 21st-century skills. The study's findings revealed that MELE students were prepared to tackle the globalized world since their attainment of

needed 21st-century skills was high and their competency in digital literacy. Teaching and learning in the twenty-first century necessitate cooperation skills by enabling students to add functions, resolve problems, and use a variety of thinking techniques to attain academic success.

Furthermore, the study contributes to the literature on digital literacy and twenty-first-century skills by shedding light on the current state of MELE students, particularly those who enrolled in MELE classrooms between batch 2019 and batch 2021. More importantly, the study added to prior research and studies in terms of evaluating and measuring digital literacy and twenty-first-century skills, such as curriculum and syllabus in Indonesia, particularly in terms of assessing digital literacy and MELE students' 21st-century skills. A possible expansion of this study would be to look at digital literacy and the MELE lecturers' 21st-century skills. Furthermore, because the current study was conducted in the capital city of Indonesia, it may be beneficial to explore digital literacy and 21st-century skills among students in other regions of the country to see if the findings here reflect the overall position of Indonesian students.

LIMITATIONS AND STUDY FORWARD

This study does have some drawbacks. The tiny sample size limits the scope of this study. As a result, generalizability should be used carefully. This study merely focused on gaining information about the extent of MELE students' digital literacy abilities and twenty-first-century skills. To put it another way, this research aims to see how much MELE students utilize technology in their learning activities. However, MELE students do not always demonstrate their natural responses. Consequently, it is proposed that future researchers investigate this subject further through a more in-depth longitudinal study and a broader scope of education levels.

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