Digital literacy competency indicator for Indonesian high vocational education needs

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Article Info	ABSTRACT
	In the face of the COVID-19 pandemic, education in Indonesia has shifted from face-to-face learning to online learning via the internet and digital technology. Therefore, digital literacy is a skill needed by vocational students and teachers today. This study aimed to identify and analyze digital literacy competency indicators to improve the quality of learning in high vocational education. This research employed a systematic review method, especially a qualitative meta-ethnographic approach, by reviewing various studies related to digital literacy competencies from various journal articles and conferences to then carry out the synthesis process. Meta-ethnography as part of the systematic review method integrates data across studies to obtain new theories and concepts with a deeper and more thorough understanding. The results showed four competency factors and 28 indicators to improve digital literacy competence. This research can be the basis of creating a digital literacy assessment model for high vocational education in Indonesia.

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1. INTRODUCTION

During the COVID-19 pandemic, vocational secondary education (*Sekolah Menengah Kejuruan*/SMK) facing the industrial revolution 4.0 needs to be prepared to face and anticipate various impacts that will arise in the future. The development of digital literacy assessment models becomes one of the answers. The implementation of digital literacy in the vocational secondary education learning process is an effort to realize the generation of intelligent and characterful Indonesians in the form of school literacy movements. This digital literacy assessment model can measure how understanding and capturing learners' information improve their competence and performance [1].

Vocational secondary education/vocational education is one of the objects that must be prepared as much as possible to deal with it. One of the efforts that can be done is to assimilate technology literacy into the learning process. Until now, the learning process in vocational secondary education (SMK) in Indonesia still has low digital literacy [2]. This is because information and communication technology (ICT) subjects in schools are also not optimal in improving digital literacy. The regulation of the minister of education and culture (*Permendikbud*) Number 37 of 2016 on the implementation of ICT learning focuses more on the ability of learners in operating technological and internet devices rather than the ability to analyze and process information obtained online.

This is indicated by learners' low ability to understand several indicators (model assessment) of the integration of digital literacy with teaching and assignment of subjects in a form of a learning model that can be applied. According to Rahayu and Mayasari [2], understanding of digital literacy needs to be measured when teachers design and apply pedagogical approaches to encourage the development of digital literacy to learners [2]. Therefore, it takes awareness, attitudes, and the ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, build new knowledge, create media expressions, and communicate with others, in the context of specific life situations, to enable constructive social action and to reflect on the self-known as digital literacy. Students who are part of the digital community must have digital literacy behavior (digital literacy). Digital literacy is a 21st century skill required for students. Digital literacy according to Tham *et al*. is the ability to understand and use information from various digital sources [3]. Digital literacy is not a form of technology, but rather the ability or knowledge to understand technology, related to access to information.

Because of its abstract form or form of understanding, technical analysis of digital literacy is studied based on the skills possessed to obtain digital literacy. According to Bawden, digital literacy consists of four main components, namely the ability of basic digital literacy (underpinning), background knowledge, the main competence of digital literacy (central competencies), and information attitudes and perspectives [4].

In addition, Kenton and Blummer [5] also stated that digital literacy is not about how to use software or operate digital devices, but also includes other more complex abilities such as cognitive, motor, sociological, and emotional abilities. Saxena *et al*. [6] research illustrates Indian dental students' desire to embrace the digital revolution in dentistry education, which could provide a chance for educators and policymakers to change educational techniques and so increase students' current learning methodologies.

Through the above understandings, it can be said that the characteristics of digital literacy do not only refer to the skills of using technological, information, and communication devices including hardware and software. However, digital literacy also requires the process of acquiring, reading, understanding, and creating knowledge. Shariman *et al*. [7] findings demonstrated that students' digital literacy abilities were influenced by several factors, including their English language competency and the design of multimodal forms in digital content. To summarize, educators can develop solutions to the stated problem by analyzing students' digital literacy competence and finding impediments that prevent them from achieving these skills.

Techataweewaa and Prasertsin [8] stated that digitally literate pupils must have skills in operation, thinking, teamwork, and awareness. Technical competency in the successful use of technology is referred to as operation skills. Students must display thinking skills, including a high level of analytical thinking, to possess operation skills. Students with strong thinking skills have a better comprehension of technology and a more positive attitude toward it. Many digital literacy models focus on technical and cognitive abilities in the use of ICT and digital data. Digital literacy includes not just the ability to operate software and digital gadgets, but also social ethics. Digital literacy has evolved in tandem with rapid technological advancements. As a result, considering rapid technological developments, the implementation of digital literacy in academic life might boost students' long-term learning.

This study aims to identify and analyze the competency indicators of Indonesia vocational student's digital literacy. The results of this study can improve digital literacy competencies for learners and teachers in the school environment to have a critical attitude in responding to information in consuming digital media. Digital literacy competence can be achieved by continuous training methods to overcome the mass in the digital era. Basic skills become an aspect that teachers and learners must own. Advanced expertise is also needed to interpret every information obtained from digital media [9].

2.   RESEARCH METHOD

This research was a systematic literature review using the meta-ethnography method. Meta-ethnography as part of the systematic review method integrates data across studies to obtain new theories and concepts with a deeper and more thorough understanding [10]. The meta-ethnographic approach has iterative analytical techniques. The results of preliminary study research will be interpreted to produce a new understanding through iterative cross-thematic analysis so that between extraction and analysis is not sequential linear. The meta ethnographic approach introduced by Noblit and Hare [11] in 1988 has seven steps: Preparation, determining relevant studies, reading and reviewing studies, determining relationships between studies, translating studies with each other, synthesis of translational results, and expression of synthesis [12].

2.1. Preparation

This study aimed to identify indicators of digital literacy competence for vocational schools in Indonesia using a qualitative approach to meta-ethnography. The research question of this study: What are the indicators of digital literacy competence for vocational schools in Indonesia?

2.2. Determining relevant studies

Relevant studies to this research are any research that can answer current research questions. The articles reviewed in this study were published in journals or conferences indexed by Scopus, IEEE Explore, and SINTA. In addition, there are also other sources involved to deepen the results of the research.

2.3. Reading and reviewing studies

In the Noblit and Hare study [11], it is stated that several key concepts can emerge from existing studies using meta-ethnography [12]. This study only focused on a key concept that is an indicator of digital literacy competence. At this stage, the researchers read repeatedly and reviewed 16 existing studies. Researchers gave and marked key concepts (metaphors) by obtaining 28 key concepts (competent indicators) obtained from the entirety of 16 existing studies, as shown in Table 1.

Table 1. Internal consistency reliability of biology test

No	Indicator competency	Study
1	Browsing and searching	[3], [13]
2	Evaluating data	[1], [7]
3	Managing data	[13], [14]
4	Filtering data and information	[12]
5	Interacting through digital technology	[12]
6	Sharing through digital technology	[1], [7], [13]
7	Ability to use technology	[6], [14], [15]
8	Understanding personal security	[13], [14], [16]
9	Critical thinking in processing information	[14], [16]
10	Understand device security	[6], [16]
11	Ability to communicate	[14]
12	Ethics in technology	[1], [3], [8]
13	Understanding hoaxes	[16]
14	Developing digital content	[6], [7]
15	Solving technical problems	[1], [6], [17]
16	General knowledge and functional skills	[6], [13]
17	Information processing and management	[7], [17]
18	Programming	[3], [18]
19	Balance attitude toward technology	[1], [3]
20	Understanding and awareness about ICT roles	[19], [20]
21	Creativity	[1], [13]
22	Analysis data and information	[7], [21]
23	Teamwork	[8]
24	Legal literacy	[14]
25	Interpreting information and digital content	[7]
26	Upload and download files/apps to the internet	[16]
27	Able to store information and content data in digital media	[14]
28	Able to backup or store data in several places	[14]

At this stage, the researchers also compared concepts that come to the surface across studies. It can be said that the concepts of existing studies can be directly compared. It turns out that many concepts are similar to each other thus all related studies or relations are assumed in the form of reciprocation [12].

2.4. Translating studies with each other

As suggested by Noblit and Hare [11] that in practice some steps in meta-ethnography can overlap and run parallel [22]. Therefore, the fifth (translation) and sixth stages (synthesis) can be done simultaneously in this study. Researchers also continue to consider the explanation of each digital literacy competency study, especially related to its indicator.

2.5. Synthesis of translational results and expression of synthesis

The entire dimensions presented in Table 1 are of the same degree; none is more important or less important. All dimensions are equal [12]. In this process, competency indicators broke down based on four Competency Factors and 12 Competency Sub-Indicators. The four Competency Factors are Operation Skills, Thinking Skills, Collaboration Skills, and Awareness Skills [8].

3. RESULTS AND DISCUSSION

Using meta-ethnography, the study found 28 competency indicators on digital literacy for vocational students from 16 related studies. Then, the 28 digital literacy competency indicators are divided into 4 competency factors, namely operation skills, thinking skills, collaboration skills, and awareness skills. The Digital literacy competency factors and indicators can be seen in Table 2.

Table 2. Digital literacy competency factors and indicators

No		Digital literacy indicator
1	Operation skills	Browsing and searching
		Evaluating data
		Managing data
		Filtering data and information
		Ability to use technology
		Solving technical problems
		Programming
		Upload and download files/apps to the internet
		Able to store information and content data in digital media
		Able to backup or store data in several places
2	Thinking skills	General knowledge and functional skills
		Information processing and management
		Critical thinking in processing information
		Interpreting information and digital content
		Developing digital content
		Creativity
		Analysis data and information
3	Collaboration skills	Teamwork
		Interacting through digital technology
		Sharing through digital technology
		Ability to communicate
4	Awareness skills	Ethics in Technology
		Understanding hoaxes
		Balance Attitude toward technology
		Understanding and awareness about ICT roles
		Legal literacy
		Understanding personal security
		Understand device security

3.1. Operation skill

This skill is related to the skill of mastering tools related to information technology or digital sources. Operation skills consist of 10 competency indicators. Browsing and searching, evaluating data, managing data, filtering data and information, ability to use technology, solving the technical problem, programming, upload and download files/apps to the internet, able to store information and content data in digital media, able to backup or store data in several places. The ability to use technology such as operating computers, mobile devices, internet access, livelihood machines, and so on becomes one's main capital in obtaining digital literacy.

Another ability that is also needed is the operation of livelihood engines or search engines. This livelihood machine is a computer program that is used to search for uploaded information. In finding information from digital sources, the ability to use search engines is important [7]. The most famous search engine is Google. Google becomes the most used livelihood engine in Indonesia and even the world. By inputting keywords related to the information to be searched, Google's algorithm will bring us to articles or websites that contain that information.

Related to the search for information through digital sources, it requires the ability to evaluate, managing and filter data and information found on the Internet. It also requires general knowledge about new media. The term new media is used to distinguish from old media or traditional media that existed first. This is related to the development of technology that transforms the platform of media to be all digital [21]. Therefore, users should have the ability to upload, store, and backup information and data to digital media.

3.2. Thinking skills

Thinking skills emphasize interpreting, analyzing, and sharpening critical thinking when dealing with digital information and content. This component also focuses on the ability to collect information [23]. This ability is related to how to think carefully about how to search for information and use sources selectively.

Thinking skills has seven competency indicators, which are general knowledge and functional skills, Information processing and management, critical thinking in processing information, interpreting information and digital content, developing digital content, creativity, also analysis data and information

The development of digitalization changes the trends that occur both in business and learning activities. Of course, this requires people to further add to their insights. Therefore, digital literacy should cover interpreting information and digital content and developing digital content skills [24].

To improve digital literacy, there needs to be government efforts to improve internet access, especially for rural areas and lower middle-class communities. On the other hand, information, and communication technology (ICT) learning content can be revised to be more relevant to today's demands that require the ability to evaluate information obtained from digital sources. In addition, the habit of critical thinking must be developed from school to become a responsible digital society.

The creativity component is related to how we think and build and share knowledge in various ideas by utilizing digital technology. In this case, creativity is called encompassing; i) Product creation or output in various formats and models by utilizing digital technology; ii) Creative and imaginative thinking skills include planning, knitting content [25].

3.4. Collaboration skill

The collaboration component is based on the nature of digital technology itself. Collaboration skill has four competency indicators which are teamwork, interacting through digital technology, sharing through digital technology, and ability to communicate. Digital technology provides opportunities to work together in teams. Digital technology also opens the participatory process which then opens support for collaboration.

This component emphasizes individual participation in the process of dialogue, discussion, and building on other ideas to create understanding. For example, the ability to participate in a digital space, being able to explain and negotiate ideas with others in the group. Being someone who is digitally literate means being a person who can communicate through the medium of digital technology. Effective communication and digital literacy are closely shared with the ability to share thoughts, ideas, and understanding [26]. In addition, it can understand the audience (so that the quality of its content estimates the needs of the audience and its impact).

3.5. Awareness skills

Awareness skills related to non-technical skills like ethics, law, and self-guard. Awareness skills related to non-technical skills like ethics, law, and self-guard. Awareness skills have seven competency indicators which are ethics in technology, understanding hoaxes, balance attitude toward technology, understanding, and awareness about ICT roles, legal literacy, understanding personal security, and understanding device security.

Because of many information and data from the web, students or teachers need analysis and evaluation to determine the accuracy of the information. Therefore, they should be aware of the existence of ethics, plagiarism, and fake websites. In addition, students and teachers must also understand computer malpractice laws, copyright laws, and privacy laws in their studies and working lives. Digital ethics is the ability of individuals to realize, exemplify. Adapt, rationalize, consider, and develop digital ethical governance in everyday life.

Legal literacy is the ability of individuals to know, understand, and comply with laws and regulations related to the use and access of digital technology. Every digital media platform generally has security rules and protection laws for users [27]. The rule of law as a set of legal norms becomes legal protection for users of digital services. Therefore, it is necessary to be careful in utilizing digital devices or services. Understanding personal and device security is the ability of individuals to recognize, collaborate, implement, analyze, weigh, increase awareness of personal data protection, and digital security in everyday life [14].

4.   CONCLUSION

Digital literacy is a skill needed by vocational students and teachers today. This study aimed to identify and analyze digital literacy competency indicators to improve the quality of learning in high vocational education. This research was conducted with a systematic review method, especially a qualitative meta-ethnographic approach, by reviewing various studies related to digital literacy competencies from various journal articles and conferences to then carry out the synthesis process. The results showed 4 competency factors and 28 indicators to improve digital literacy competence.

The first competency factor is operation skills which is related to the skill of mastering tools or tools related to information technology or digital sources. The second is thinking skills emphasize interpreting, analyzing, and sharpening critical thinking when dealing with digital information and content. The third is

the collaboration component is based on the nature of digital technology itself. Digital technology provides opportunities to work together in teams. The fourth is awareness skills which focuses on the existence of ethics, law, plagiarism, and fake websites. Future researches are needed to validate the competency indicators with some experts and can be the basis of creating a digital literacy assessment model for high vocational education in Indonesia.

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