

Digital Literacy Curriculum in Elementary School

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Abstract: *Advances in technology and information have an impact on the ease and abundance of various information resources that are obtained digitally and are not limited so that all levels of education need to adapt to technological advances including elementary schools in managing curriculum and learning. The purpose of this research is to find out how digital literacy is in elementary schools. The research method uses a systemic literature review by analyzing 15 relevant articles on digital literacy in elementary schools and 10 article about curriculum digital literacy. Research findings show that the digital literacy curriculum is carried out by integrating digital literacy in all areas of the school. In the implementation of learning, elementary school students still consider the teacher as the only source of information. Therefore, it is necessary to have a collaborative role between teachers, principals and parents in integrating digital literacy in learning and overcoming something unwanted. Digital literacy in elementary schools places more emphasis on media literacy in learning which has an impact on interactive and collaborative learning, one of which is video, stop-motion and social media. Indirectly digital literacy can improve student learning outcomes.*

Keywords: *Digital Literacy Curriculum, Elementary School, Media Literacy, Information Literacy*

Abstrak: Kemajuan Teknologi dan informasi berdampak pada mudah dan banyaknya berbagai sumber daya informasi yang diperoleh secara digital dan tidak terbatas sehingga segala level pendidikan perlu menyesuaikan dengan kemajuan teknologi termasuk Sekolah Dasar dalam mengelola kurikulum dan pembelajaran. Tujuan Penelitian ini adalah untuk mengetahui bagaimana Literasi Digital di Sekolah Dasar. Metode Penelitian menggunakan Sistemik Literatur Review dengan menganalisis 15 Artikel yang relevan mengenai Literasi Digital di Sekolah Dasar dan 10 Artikel mengenai Kurikulum Literasi Digital. Temuan Penelitian menunjukkan bahwa kurikulum literasi digital dilakukan dengan mengintegrasikan literasi digital dalam seluruh area di sekolah. Pada pelaksanaan pembelajaran siswa sekolah dasar masih menganggap guru sebagai satu-satunya sumber informasi. Maka dari itu perlu peran kolaboratif antara guru, kepala sekolah dan orangtua dalam mengintegrasikan literasi digital dalam pembelajaran dan mengatasi sesuatu yang tidak diinginkan. Literasi Digital di Sekolah Dasar lebih menekankan kepada Literasi Media dalam pembelajaran yang berdampak pada pembelajaran yang interaktif dan kolaboratif salah satunya dengan video, stop-motion dan sosial media. Secara tidak langsung Literasi Digital dapat meningkatkan hasil belajar siswa.

Kata Kunci: Kurikulum Literasi Digital, Sekolah Dasar, Literasi Media, Literasi Informasi

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INTRODUCTION

The industrial revolution 4.0, characterized by the rapid development of technology and information, impacts the ease and abundance of various information resources obtained digitally and is not limited. At this time, the generation is the millennial generation and generation z, which, indeed, all activities in their lives rely on technology. Moreover, the COVID-19 pandemic demands all aspects of life to utilize various educational technology tools. In modern times, education using technology is more popular and accepted (Yilmaz, 2015). In addition, digital technology today has become an inseparable part of the world of education (Benson & Kolsaker, 2015).

Klaus Schwab (2016) defined and considered the industrial revolution 4.0 as a technological breakthrough that has emerged in almost all areas of human life. This technological breakthrough is designed to make a better world by maximizing human well-being and adding quality to quantity to build a just world of education. The development of the world of education is related to the education for sustainable development (ESD) concerning the skills that must be possessed, associated with 21st-century skills; they are generally understood to include various competencies, covering critical thinking, problem-solving, creativity, metacognition, communication, digital and technological literacy, civic responsibility, and global awareness (Kim et al., 2019). To achieve 21st-century skills, digital literacy is one of the abilities that students and teachers must possess in developing the learning process.

In general, digital literacy developed by UNESCO in 2011 explained that digital literacy is an ability that does not only involve technology, information, and communication devices but also encompasses the ability to socialize, think critically, be creative, and communicate the material to become new information, which has meaning. Based on PISA results released by the Organization for Economic Cooperation and Development (OECD), students' literacy ability in Indonesia was 371. It was far below the mean of 487 (Jawa Pos, 2019). For the value of reading competence, Indonesia was ranked 72 out of 77 countries (Kompas, 2020). It indicates that literacy in Indonesia was still low and needs to be improved again in the learning process in the classroom. One of them is involving digital literacy in the learning process at all levels of education, including elementary schools.

Elementary school is the most basic level in Indonesia. In its implementation, students cannot be separated from the supervision of parents and teachers. An effective and fun learning process requires the cooperation of teachers and parents with a varied learning process to use, evaluate, and make new meaningful information (Astini, Ni Komang, 2020).

According to Paul Gilster (in Faloon, Garry, 2020), digital literacy is a set of skills to access the internet and find, manage, and edit digital information; join in communication, and otherwise engage with online information and communication networks. Digital literacy is also the ability to use and evaluate digital resources, tools, and services correctly and apply them to lifelong learning processes to become effective communication mastery skills (Bhatt, de Roock and Adams, 2015) for expression and social activities (Martin and Grudziecki, 2008), and solving life problems and schoolwork or lectures (Kenton and Blummer, 2010).

Furthermore, digital literacy competence demands 21st-century learning, which emphasizes activity, critical thinking, collaboration, and communication in the learning process, especially in the use of technology in learning. According to Ng (2012), there are three main dimensions in the core competence or multi-literacy in digital literacy. The first is related to technical capabilities, namely the operational mastery of technology. The second is associated with cognitive mastery, including information literacy skills, critical thinking (critical literacy), photo-visual, audio, gestural, spatial, and linguistics. Third, the social-emotional dimension includes social-emotional literacy. If the second and

third dimensions are combined, they are abstracted again; mastery of online etiquette and cyber safety literacy.

It is necessary to know the difference between digital literacy, media literacy, and information literacy. Information literacy is defined as a person's information skills, including information management skills and information application knowledge (Wen, J. R., & Shih, W. L., 2008; Bruce, 2000; Doyle, 1994). Meanwhile, media literacy is the ability to understand, analyze, evaluate, and create media messages. Media literacy training increases individuals' doubts about media content (Austin, Ew. et al., 2016). However, individuals with high media literacy lead to increased media quality because these individuals require more realistic messages of higher quality (Ulas, AH. et al., 2012).

Meanwhile, it is well known that Paul Gilster introduced digital literacy in 1997 in his book *Digital Literacy* (Shopova, 2014). Digital literacy is an individual's awareness, attitude, and ability to use digital tools and facilities appropriately 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, enabling constructive social action and reflecting on this process (Martin, 2006).

The urgency of digital literacy in life is very helpful, where humans can be sensitive in obtaining information and communication in everyday life. In addition, digital literacy plays an essential role in helping someone think creatively and innovatively to analyze critically and solve problems related to digital sensitivity. In addition, students who have good digital literacy will be able to select and sort information circulating on the internet because today's virtual world is increasingly filled with fake news, hate speech, radicalism, and fraudulent practices. Thus, students can be responsible for how to use technology to interact with the surrounding environment. As important as digital literacy is, according to Mayes and Flower, the development of digital literacy occurs gradually and needs to be started early and from the family, school, and community environment (Yuniawatika & Kurniawan, 2018). Besides, it is said that digital literacy is one of the primary solutions to assist students in obtaining valid and appropriate information according to their needs. The way to improve student literacy is to socialize how to access information and official websites, which can support the learning process in schools (Susilawati et al., 2021).

Based on the notion of digital literacy, information literacy, and media literacy, all three involve a combination of several literacy types: information technology literacy, information literacy, technological literacy, media literacy, and visual literacy, which have new roles that become increasingly vital with the emergence of the digital environment. Briefly, in determining the digital literacy concept, some experts define it as a connection between the skills and competencies needed to effectively use the internet and digital technology (Ala-Mutka, 2011).

In elementary school students, digital literacy is foreign. At this age, like elementary school students, teachers are used as only the primary source of information in seeking, exploring, and evaluating information. However, the COVID-19 pandemic requires teachers and elementary school students to recognize digital literacy as their source, tool, and learning material in online learning. Therefore, this study discusses the digital literacy curriculum at the elementary school level.

RESEARCH METHODS

This study used a systematic literature review, which is a replicable, scientific, and transparent process and aimed to minimize bias through a complete literature search of published and unpublished

studies and by providing an audit trail of the reviewer's decisions, procedures, and conclusions (Transfil et al., 2003). Clear eligibility criteria should be established before starting such a process. In the next stage, to avoid bias and research subjectivity, the sorting process is carried out through systemic review guidelines (Moher et al., 2009). Systematic literature review (systematic review) is a method part of a literature review study, which must go through the process of tracing, identifying, evaluating, and presenting all themes in the study to answer the questions in the problem formulations described previously (Kitchenham and Charters, 2007). The search was carried out online through the Google Scholar database, which was adjusted to the research limitations in this article, namely digital literacy in the education implementation in elementary schools and the digital literacy curriculum.

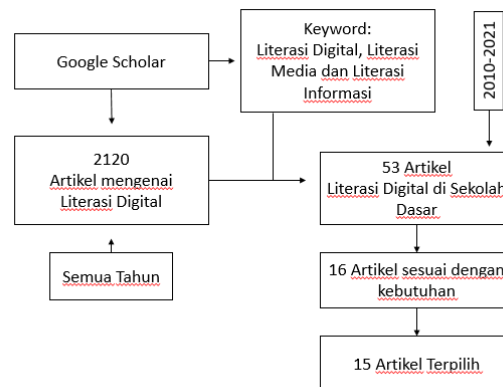


Figure 1. Study selection for systemic review

The eligibility criteria in this study were determined for a systematic review to select the correct part of the existing literature. According to Liberati et al. (2009), the criteria can be listed as follows: empirical study design, theoretical study, and year of publication between 2010-2021, language used in English and Indonesian, publication status of national and international articles, study type related to digital literacy for children or elementary education, and topics related to "digital literacy," "media literacy," "information literacy, and digital literacy curriculum, with Scopus Q1-Q3 criteria.

The search strategy and systematic review process were carried out on leading international journals from the Google Scholar website and had a Q1-Q3 country ranking index regarding international reviews, digital literacy, and digital literacy curriculum in general and specifically at the elementary school level. The selection process that the researchers carried out was, first, applying the process mentioned above for journal publications on Google Scholar records, which resulted in ten indexed journals. The authors then applied the keywords and found ten ranked journals Q1-Q3. As far as the exclusion criteria were concerned, the authors decided that specific notes were irrelevant after reading the articles themselves. The authors then excluded articles that failed to fit the stream of the research abstract and articles on digital literacy curriculum in general and specifically in elementary schools.

RESULTS AND DISCUSSION

Digital technology that continues to develop rapidly is crucial, resulting in changing educational patterns (Chang, Ching Sui., et al., 2011). Changes in teaching styles also require applying technology in learning at all levels, including elementary school (Batty, Chelsea, 2020). In elementary school

students, literacy skills or digital age literacy is an ability that must be programmed, including basic literacy, scientific literacy, economic literacy, digital literacy, information literacy, multicultural literacy, and global awareness (Nuroh, Ermawati Z. Vevy Liansari, 2017). The application of the digital literacy curriculum in the education implementation at all education levels and types is as table 1:

Table 1. Article Analysis

No	Article Title	Author	Year	Journal Name	Q	Curriculum
1	The five resources of critical digital literacy: a framework for curriculum integration	Juliet Hinrichsen and Antony Coombs	2013	Research in Learning Technology	Q2	Done with the development of a range of academic and practical skills that are not only essential but that inform effective engagement with digital
2	An Investigation of Digital Literacy Needs of Students	Klara Nelson Marcy Courier Gilbert W. Joseph	2011	Journal of Information Systems Education	Q3	By inclusion, a case can be made for additional topics to be included in the general curriculum for all students, such as ethics.
3	Reviewing Approaches and Perspectives on "Digital Literacy"	Julian Sefton-Green a, Helen Nixon a & Ola Erstad	2019	Pedagogies: An International Journal	Q3	Injecting to for all curriculum areas in school
4	Everyone learns from everyone	Renee Hobbs & Julie Coiro	2016	Journal of Adolescent & Adult Literacy	Q2	A flower model is a systematic approach to curriculum development.
5	Curriculum Development: Preservice Teachers' Perceptions of Design Thinking for Understanding Digital Literacy as a Curricular Framework	Shively, K., & Palilonis, J.	2018	Journal of Education	Q3	Design Thinking as a Model of Digital Literacy Curriculum
6	Rethinking Digital Literacy in Nordic School Curricula	Ola Berge	2017	Nordic Journal of Digital Literacy	Q2	As a core curriculum in Nordic
7	Exploring Digital Literacy Strategies for Students with Special Educational Needs in the Digital Age	Abdul Jalil Toha, et, all	2021	Turkish Journal of Computer and Mathematics Education	Q3	The curriculum combined with technology is an essential component of 21st-century learning
8	Teachers' Beliefs About	Sadaf, A.,	2017	Journal of	Q2	Digital Literacy is one of

	Integrating Digital Literacy into Classroom Practice: An Investigation Based on the Theory of Planned Behavior.	& Johnson		Digital Learning in Teacher Education		the goals of the technology curriculum; integrating digital literacy into the school curriculum
9	Building Digital Literacy Bridges: Connecting Cultures and Promoting Global Citizenship in Elementary Classrooms through School-Based Virtual Field Trips.	Delacruz, S	2018	TechTrends	Q1	Apply what is learned through a VFT (Virtual Field Trip) into other aspects of the curriculum.
10	From digital literacy to digital competence: the teacher digital competency (TDC) framework	Garry Fallon	2020	Educational Technology Research and Development	Q1	Integration, the following section introduces elements of a comprehensive framework that describes the integration of competencies related to curriculum and personal-ethics and personal-professional. The proposed framework is SAMR (Substitution, Augmentation, Modification, Redefinition) TPACK (Technological Pedagogical Content Knowledge).

Source: Processed by Authors

The article analysis revealed that in making digital literacy into the curriculum, it was done by incorporating digital literacy into all areas in the school or subject and making digital literacy, divided into two domains: media and technology, separate. In other learning, digital literacy is a medium that helps the learning process implementation in all major subjects and technology as a separate subject, namely ICT. The division of the two domains is vital and becomes an essential component in 21st-century learning.

In several articles, the process of developing a digital literacy curriculum as a model presented a digital literacy curriculum model, including the flowers model, by analyzing learning needs, identifying context analysis, determining resources and using media, implementing learning practices, assessment and evaluation, and ending with assigning tasks and activities. In addition, there was design thinking as a digital literacy curriculum model, relying on three iterative phases: empathy (by observing, engaging, and directing), ideas (exploring ideas), prototypes (by executing rapid prototyping to test experience, moving the prototype into the user's life, and designing by understanding and developing a concise problem statement).

In addition, several other models were offered, such as SAMR (substitution, augmentation, modification, redefinition). Basically, it is a descriptive framework that maps the use of different

educational technologies hierarchically against the level or stages of development from substitution (doing what is traditionally done digitally utilizing conventional resources) to redefinition (curriculum, pedagogy, and practice reimagined through digital technology). This SAMR has been widely adopted by the teacher and school educators as a pragmatic guide to mark the progress of ICT development as they work towards what is seen as the ideological position of redefining curriculum through technology (Geer et al., 2017; Hilton, 2016). Unlike SAMR, TPACK does not represent a hierarchy or gradual development but instead presents a holistic model that theorizes about the relationship between and contribution of technological, pedagogical, and content knowledge to technology use, focusing on effective curriculum learning. Of these several models, it is indeed adopted from the development of educational technology, and digital literacy and technology have a close relationship to be used as a model for curriculum development or learning in digital literacy.

Ben Amram, S., Aharony, N., & Bar Ilan, J. (2020) stated that digital literacy in elementary schools must be included in the learning process. Integrating digital literacy in elementary school students must start with the teacher. Embedding ICT and information skills in the actual teaching framework (preparing and operating online learning), role perception, and actual performance (personal motivation, school cultural organization, Ministry of Education responsibility) is a way to maximize the implementation of digital literacy in elementary schools. Besides, Ester Van Laar et al. (2017) described digital literacy as skills and critical thinking, part of 21st-century skills, consisting of four dimensions: creativity, critical thinking, problem-solving, and collaboration. The connection in the digital literacy implementation for elementary school students is on the personality and psychological aspects as determinants of the use of digital literacy for students.

Furthermore, Majlinda Gjelaj et al. (2020) explained that most parents said that children at elementary school age had been exposed to technology, where television is one of the technologies with the highest percentage of technology use for children, followed by smartphones, tablets, computers, and games as the least percentage among other technologies. One in eight teachers said a positive attitude from the impact of technology on children's development in developing psychomotor skills in applying technology-based games. Shahid et al. (2019) also emphasized that teachers must have digital literacy skills and transfer digital literacy skills to students in learning. Therefore, teachers in elementary schools must understand ICT in education, teaching, curriculum and assessment, management, administration, and professional learning. In the implementation of digital literacy integration in elementary schools, according to Kiugu, DK, Kibaara, DT, & Wachira, D. R (2019), the teacher is someone with an immense contribution to the implementation of digital literacy integration in schools; however, many teachers are not ready, and follow-up is required.

In the writings of Shahid et al. (2019), four competency standards were set regarding ICT competency standards for elementary school teachers, including:

No.	Competency Standards
1.	Participants are able to understand well the latest government policies regarding the use of ICT in education
2.	Participants are able to use ICT for making learning devices
3.	Participants are able to practice the use of the latest technology for learning in primary schools
4.	Participants are able to use ICT for teacher professional development

Figure 2. Competency Standards (Shahid et al., 2019)

Also, Shariman, Tenku (2012) explained that the digital literacy competence of elementary school teachers and students depends on English language skills and multimodal abilities in its implementation. However, there was a problem regarding the elementary school students' lack of patience in navigating the content in the paper. In addition, Majlinda Gjelaj et al. (2020), in their

research, found that digital literacy is contradictory and can have progressive and regressive impacts; therefore, the collaboration between teachers and parents is needed to ensure prospects, maximize benefits, and reduce the potential risks of using digital technology in early childhood education and primary schools.

To facilitate this ability, Wen, J. R., & Shih, W. L (2008) elucidated three main dimensions in digital literacy, especially in information literacy, seen from knowledge, skills, and attitudes used at the elementary school to university levels.

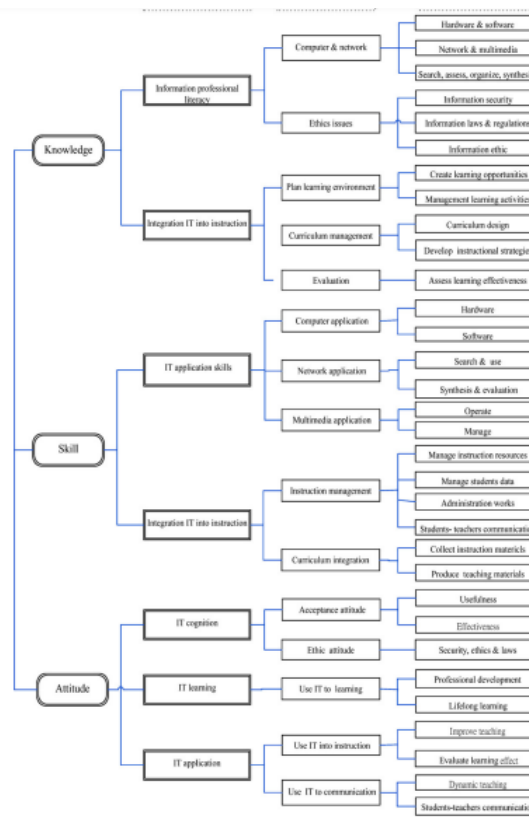


Figure 3. Digital Literacy Competence (Wen, J. R., & Shih, W. L., 2008)

Based on their research results, Wen, JR, & Shih, W. L (2008) disclosed that in classroom learning, both for teachers and students in primary schools, three levels (standards, main indicators, and secondary indicators) and three dimensions were identified (knowledge, skills, and attitudes). Distinguished from existing research that places too much emphasis on the knowledge and skills dimensions, this study found that the attitude dimension was the most powerful force for promoting digital literacy competence. In addition, Hsu, HP, Wenting, Z., & Hughes, JE (2019) conducted a study of 32 elementary school students with the results showing that a statistically significant increase with a moderate effect size existed in five areas of students' digital literacy practice: information management, collaboration, communication and sharing, creation, and evaluation and problem-solving.

Apart from instilling good skills, C. K Cheung and Wen Xu (2016) explained that in the digital literacy implementation, especially in media literacy, information literacy needs to cooperate between school principals and teachers in counteracting the negative impact of using media literacy in elementary school student learning. Aside from that, Nuroh, Ermawati Z. Vevy Liansari (2017) described that emergent literacy in school students has characteristics, such as literacy demonstrations, interactive collaboration between parents and children, based on daily needs minimally

taught but direct and contextual. These are also suggestions and limitations on how to teach literacy to elementary school students.

Then, how to teach digital literacy to elementary school students? According to Shariman, Tenku (2012), video is the most suitable medium in presenting academic content. In addition, developing digital literacy skills for elementary school students can be done by exploring motivation by accessing content according to special interests of various types, such as martial arts, online games, photo or video editing, or fashion and beauty, according to students' interests. C. K Cheung and Wen Xu (2016) also mentioned the right way to use literacy media for elementary school students, namely by involving the role of parents, such as making videos about characters that parents like. Through these activities, there will be a cultural evolution and effective use of media in finding and reflecting on their media consumption.

Moreover, Tem Sun, Koun et al. (2017) stated that stop motion is a technique that is able and easy to use by taking still images one by one with a digital camera installed on a mobile phone and making video clips. With stop motion, students increased their knowledge of stop-motion films. Analysis of the films produced by students also exposed that they had improved the media's ability to represent them, ideas, and communicate with others.

On the other hand, Van Den Beemt, A., Thurlings, M., & Willems, M (2019) asserted that social media is a literacy media in digital era learning as a complement to learning, which should not interfere with learning. However, there were still concerns about its use in the classroom. Therefore, it is necessary to cooperate between schools, teachers, and parents because social media, according to this article, could improve student learning outcomes, although indirectly.

In elementary school students, digital literacy relates to recognizing and verifying media content and sources. There is so much fake news that develops, so students must have the ability to identify them. Fake news categories are satirical, misleading, imposter, fabricated, falsely connected, or manipulated (De Jesus, I. Q., & Hubbard, J, 2020). Based on this statement, these skills need to be developed from an early age because they will affect their development until adulthood.

Although there are obstacles and challenges in implementing digital media literacy, children will receive and understand the messages obtained if appropriately used. Media helps process information for students when teachers can integrate it all. Regarding using media literacy in several studies, it was revealed that most teachers felt the need to have media literacy education, either as a mandatory or optional subject for elementary school students (Dominggo, H.A and Norifumi Mashiko, 2013).

In Batty, Chelsea's writing (2020), a study was conducted comparing one class with another for elementary school students who did not use digital literacy in its implementation. The results showed that digital literacy did not have a significant impact on its implementation. It was also a limitation in the study because it was carried out on a small scale. In addition, the implementation of digital literacy in elementary schools requires good collaboration between teachers, principals, students, and parents to maximize better learning.

The big question that arises is how to incorporate digital literacy into the curriculum? According to Hinrichsen, J., & Coombs, A. (2013), curriculum development that includes a digital literacy curriculum will involve the use of hardware and software but must also be recognized and made explicit in analytical and discursive practice. Syllabus content, assessment design, assessment criteria, and informal course specification documents have implications for training and validation panel membership. In this case, strategic integration at the institutional and departmental levels is vital. It also

applies to academic literacy because the idea of critical literacy is very much in line with the academic literacy concept. In addition, because digital literacy is characterized by liveliness and agility, concise content by highlighting knowledge points and skill points with the most concise content saves time and can improve learning efficiency; then, curriculum development that can be done is with a micro curriculum rooted in classroom reality (Chen, Gang, 2016). The micro curriculum is a relatively mature form of digital educational resources. It has the characteristics of convenient communication, low development and production technology, low cost, and easy integration with other forms of educational resources (Li, Liyuan, 2018).

In this study, the findings revealed that digital literacy in the learning implementation in elementary schools could be conducted by considering the students' psychological and personality aspects. Implementing digital literacy for elementary school students also needs a collaborative role between teachers, principals, and parents in warding off unwanted things when students carry out digital literacy in learning. Meanwhile, media and information literacy for elementary school students must involve the topics they are interested in and relate to their parents. Video, stop motion, and social media are literacy media that can be integrated into learning for elementary school students because they are more interactive and collaborative to be liked by many students. Regarding the obstacles and challenges in implementing digital literacy, if appropriately used, children will receive and understand the messages, and it is very helpful in processing information for students when teachers can integrate it all in learning.

CONCLUSIONS AND RECOMMENDATIONS

In the learning process implementation, the digital literacy curriculum is integrated by incorporating digital literacy into all areas of the schooling implementation. It is divided into primary domains, namely as media and technology. In addition, the development models are very diverse and usually adopted from the learning technology design. For elementary school students, digital literacy is carried out by involving collaborative roles between teachers, principals, and parents to minimize unwanted things. Digital literacy in elementary school students must also involve the role of the teacher as the primary source of students in learning. Thus, digital literacy can be maximized according to learning needs. Also, digital literacy in elementary schools focuses more on media literacy as a learning tool. Video, stop motion, and social media are media literacy that can make learning interactive and collaborative. Indirectly, digital literacy can improve student learning outcomes.

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