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# The perceptions of high school teachers and students towards digital interest and literacy

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ABSTRACT

The increased application of information and communication technology (ICT) in society promotes its use in education to align instructional content with students' interests and future working lives. To achieve this, the human resources within education institutions must possess the ability to utilize technology and understand the students' capabilities. This descriptive study was conducted to establish the profile of students' and teachers' interests and perceived digital literacy abilities in high schools and their equivalents. An online questionnaire was used to collect data from West Java, West Kalimantan, and Jakarta high schools. The gathered data were processed with a simple quantitative technique. The data analysis collected by the questionnaire indicates that the respondents have a relatively high perception of digital literacy levels (encompassing operational, information, communication, strategic, and creative abilities), with some relatively low aspects, such as expressing opinions and creating things with ICT. Furthermore, it was also found that respondents exhibit a strong interest in using digital devices for learning, with video games, video processing programs, and graphic design software occupying the three least used digital media in schools but most desired by the respondents for integration.



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## INTRODUCTION

The use of electronic devices is increasingly prevalent in society. School-age children, especially those residing in urban areas, are accustomed to using gadgets such as smartphones and computers daily. This necessitates the continuous effort of the government and educational institutions to promote the use of Information and Communication Technology (ICT) (Kaware & Sain, 2015; Sarkar, 2012; Setiawan, 2018) in education as learning media and materials for both instructional and research purposes (Budiman, 2017; Dewi & Hilman, 2019; Fu, 2013; Jamun, 2018; Lestari, 2018; Reddy et al., 2020; Tondeur et al., 2018). Technology integration can also align learning materials with students' everyday lives and real-world professional contexts. The majority of students' interests and hobbies are already technology-oriented, so this can help them prepare for

future careers and global competition (Bhattacharjee & Deb, 2016; Fu, 2013; Hermawan et al., 2018; Hernandez, 2017; Juliff, 2005; Kinematsu & Barry, 2016; Lowther et al., 2008).

Several examples of ICT utilization in some schools in Indonesia for instructional purposes include videos shared on platforms like YouTube, electronic books, and teleconferencing software such as Google Classroom and Zoom (Fu, 2013; Lestari, 2018; Nahdi & Jatisunda, 2020; Reddy et al., 2020). While acknowledging the progress achieved in the Indonesian education system through these measures, the integration of ICT not only requires the availability of equipment in the relevant institutions but also demands the adaptation of the learning process to students' abilities and the skills of human resources to effectively employ said equipment (Akarawang et al., 2015; Lim et al., 2015; Rivalina, 2015; Tondeur et al., 2017; Vitanova et al., 2015; Widaryanto & Sulfemi, 2016). Presently, these skills are understood as digital literacy.

The term digital literacy is commonly used to describe an individual's ability to search and comprehend information from digital sources or media, such as the internet through computers or similar devices, and to utilize that information to develop or produce something (American Library Association (ALA), n.d.; Paul & Glister, 1997; Spante et al., 2018). Organizations and researchers like The Association for College and Research Libraries (ACRL), van Deursen, and Hague and Payton have outlined various digital literacy skills categories. These generally include the ability to comprehend the controls of the internet and computers, operate devices, find information using devices, understand information from devices, communicate with others through devices, utilize devices and acquire information for specific purposes, and create content using devices (Hague & Payton, 2010; Iordache et al., 2017; Kurnianingsih et al., 2017; van Deursen et al., 2016; van Deursen & van Dijk, 2014; van Laar et al., 2017). Because the application of ICT in the learning process often encounters issues such as the lack of skills among students and educators (Aka, 2017; Akarawang et al., 2015; Fu, 2013; Rivalina, 2015), these digital literacy skills are essential for both students and educators to utilize digital devices effectively.

Several studies have been conducted in educational institutions in Indonesia regarding digital literacy. For instance, Kurnianingsih et al. (2017) conducted training to enhance digital literacy among school librarians and teachers in Central Jakarta. Hermawan et al. (2018) gathered information on the implementation of ICT in Indonesian education from 2004 to 2017. Khasanah & Herina (2019) analyzed a digital learning program in a junior high school. Asari et al. (2019) conducted media literacy training for students and teachers in a school. Nahdi & Jatisunda (2020) analyzed digital literacy among elementary teacher education students. Lastly, Dinata (2021) analyzed digital literacy among mathematics education students.

This article addresses a research topic similar to some of the studies mentioned above by examining perceived levels of digital literacy among senior high school students and teachers. However, it focuses more on students' and teachers' interests and capabilities. The study aims to analyze the perceptions of teachers and students regarding their aptitude in using digital devices and media and to investigate the types of devices and media most commonly used by students, as well as teachers' familiarity with these tools. This objective is driven by research indicating that students' interest in learning positively impacts academic performance (Cheung, 2018; Harackiewicz et al., 2016; Jamilah & Isnani, 2017; Skinner et al., 2008; Su & Cheng, 2015), which aligns with educational philosophers such as Rousseau, Pestalozzi, and Dewey (Dewey, 2009; Ornstein et al., 2011), who suggest that education should be tailored to students' interests and readiness.

This research makes education and learning more engaging for students and teachers by finding a middle ground between both parties' interests and readiness to utilize digital devices in the learning process. Additionally, this study can serve as a foundation and comparison for conducting direct assessments of digital literacy skills. This research is contributed to teachers and students so they can choose the most appropriate digital literacy to use in learning.

## METHOD

This descriptive research is aimed at depicting the profile of digital literacy interests and capabilities among students and teachers in senior high schools and their equivalents (Marshall, 2005; McCombes, 2019; Mishra et al., 2019; Polit & Beck, 2004; Taherdoost, 2016; Yaddanapudi

& Yaddanapudi, 2019). Data were collected through a questionnaire (Lavrakas, 2008; Marshall, 2005; Polit & Beck, 2004; Taherdoost, 2016; Yaddanapudi & Yaddanapudi, 2019) administered via Google Forms and distributed online from December 24 to December 30, 2022. The research subjects were teachers and students who responded to the online questionnaire. A total of 19 students and 29 teachers from senior high schools (*sekolah menengah atas/SMA*) and vocational schools (*sekolah menengah kejuruan/SMK*) located in West Java (Bandung City, Bekasi Regency, Subang Regency, Sumedang Regency, and Tasikmalaya Regency), West Kalimantan (Sambas Regency), and North Jakarta were included in the study. Subsequently, the collected data were analyzed using a simple quantitative technique to provide a descriptive overview of the study's focus on respondents' digital literacy skills and interests.

The questionnaire completed by the research subjects consists of statement items based on domains collected (with modifications) from books and research on types of skills within digital literacy (Eshet (2004); Hague & Payton (2010); Jenkins et al., (2006); Nahdi & Jatisunda, (2020); van Deursen et al., (2016); van Deursen & van Dijk, (2014); van Laar et al., (2017). These types encompass operational skills, information skills, communication skills, strategic skills, and creative skills.

Operational skills depict the respondents' ability to operate digital media, represented in this study by computer/laptop (item 1), smartphone (item 2), internet (item 3), and various types of applications/media/software like text processors, web browsers, and social networking sites (item 4). Information skills pertain to the ability to process information on digital media, represented in this study by the ability to search for desired information or content through the internet (item 5), select valid and valuable information from the internet (item 6), identify false information on the internet (item 7), and analyze information acquired from any digital source (item 8). Communication skills reflect the capability of sending and receiving messages through digital media, represented in this study by the ability to convey an idea to others on the internet (item 9), receive others' opinions on the internet (item 10), and comprehend the ethical aspects of communication with others on the internet (item 11). Strategic skills involve using digital media for specific purposes, indirectly represented in this study by the habitual level of internet and digital device usage in daily life (item 12), using digital devices for hobbies (item 13), and using digital devices for part-time work (item 14). Lastly, creative skills encompass the ability to create content digitally and upload it to digital media, represented in this study by uploading text content on the internet (item 15), creating digital images (item 16), creating and editing videos (item 17), and software development (item 18).

These eighteen main statement items are accompanied by several demographic items (email address, school origin, and status as a student or teacher) and several statement items related to digital media already used in school learning (item 19), students' and teachers' desires for increased or reduced digital media usage (item 20), and the desired digital media for learning (item 21). Respondents answered most statement items by selecting four response options on a Likert scale (Clark & Watson, 2019; Jebb et al., 2021; van Deursen et al., 2016): strongly disagree, disagree, agree, and strongly agree.

After collecting responses through the questionnaire, the data were processed by calculating the average score for each statement item, with the options "strongly disagree" valued at 0 points, "disagree" valued at 1, "agree" valued at 2, and "strongly agree" valued at 3. An exception applies to statement item number 4 (in the "operational skills" category)—Respondents who chose 0–3 media or software received 0 points, those who chose 4–7 received 1 point, those who chose 8–11 received 2 points, and those who chose 12–14 or more received 3 points, which can be counted by using Formula 1. The interpretation of Formula 1 is $\bar{x}$ means average score, $\sum x$ is the total score of all respondents, and $n$ means the number of respondents

$$\bar{x} = \frac{\sum x}{n} \quad (1)$$

The digital literacy skill assessment categorization is divided into three levels based on average scores: high, moderate, and low. The aspects of digital literacy skills represented by statement items with average scores ranging from 0 to 1 ($0 \leq x \leq 1$) are categorized as low, average scores above 1 to 2 ($1 < x \leq 2$) are categorized as moderate, and average scores above 2 to 3 ($2 < x \leq 3$) are

categorized as high. This categorization is a slight modification of the standard Likert scale categorization. Compared to directly calculating the number or percentage of responses for each answer option, reducing the number of categories simplifies the majority of positive (agree and strongly agree) and negative (strongly disagree and disagree) responses while emphasizing statement items with responses that are not significantly different between positive and negative categories as "moderate" (DiStefano et al., 2021). A similar categorization approach was used in the study by Dinata (2021).

## RESULTS AND DISCUSSION

### Results

#### *Operational Skills*

In this chapter, the data from the online questionnaire distributed to the respondents are shown. Students' and teachers' responses to the statement items representing the five primary skills are shown first, followed by the last three statement items from the "School Learning" section.

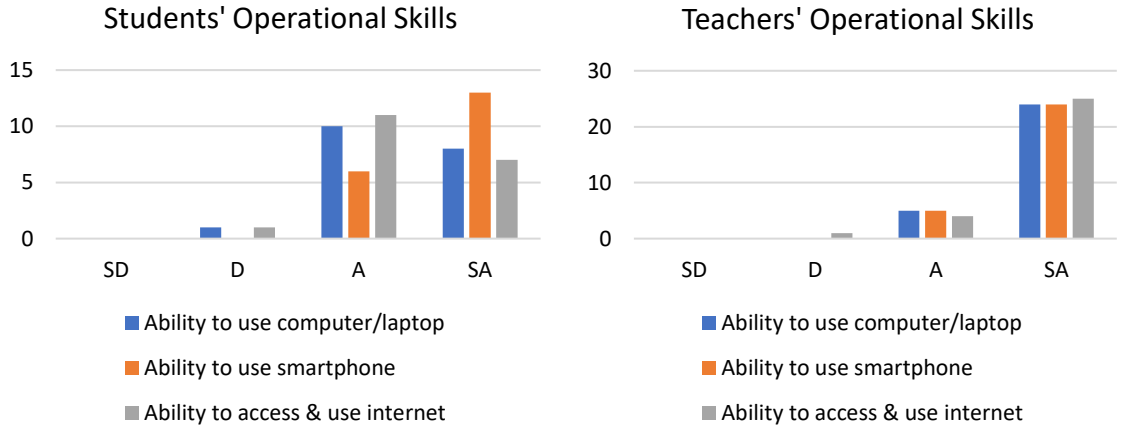


Figure 1. Responses for the Operational Skills Category

In Figure 1, the operational skills category, the respondents' answers indicate that most students feel they have good abilities in using computers/laptops and the internet and excellent abilities in using smartphones. Meanwhile, teachers' responses show that most teachers can use computers/laptops, smartphones, and the Internet. From the responses to the first three statement items, students have an average score of 2.4 for their ability to use computers/laptops, 2.7 for their ability to use smartphones, and 2.3 for their ability to access and use the internet. On the other hand, teachers have average scores of 2.8, 2.8, and 2.9 for these respective abilities, all of which fall within the high digital literacy skill category.

The fourth statement item found that student respondents displayed varying software usage skills. Students had an average score of 1.2 (moderate category), with the majority being able to use only 1 to 2 types of software. In contrast, responses from teachers showed an average number of software types used per person that was higher than that of students, at 1.7, but still within the moderate category, similar to student respondents. It can be shown in Figure 2.

In Figure 2, regarding the most and least mastered types of software, messaging tools (such as email, WhatsApp, and LINE) were the most commonly used type among respondents (17 students (89.5%) and 25 teachers (86.2%)). In contrast, programming software and sites (such as Visual Studio Code, Notepad++, and Github) were the least used type (0 students and five teachers (17.2%)).

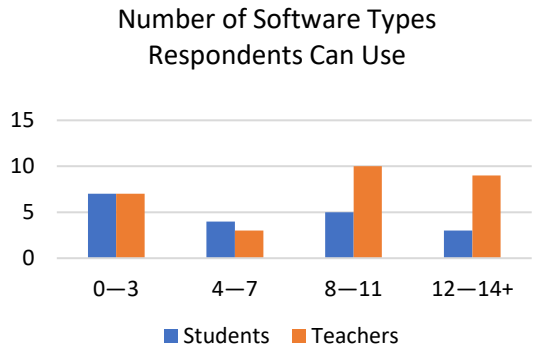


Figure 2. Responses for the Number of Types of Software that the Respondents can Use

***Information Skills***

In the information skills category, the student respondents' answers indicate that most have good abilities in searching for information or content, selecting valid and valuable information, recognizing false information, and analyzing information from the internet and digital sources, as drawn in Figure 3.

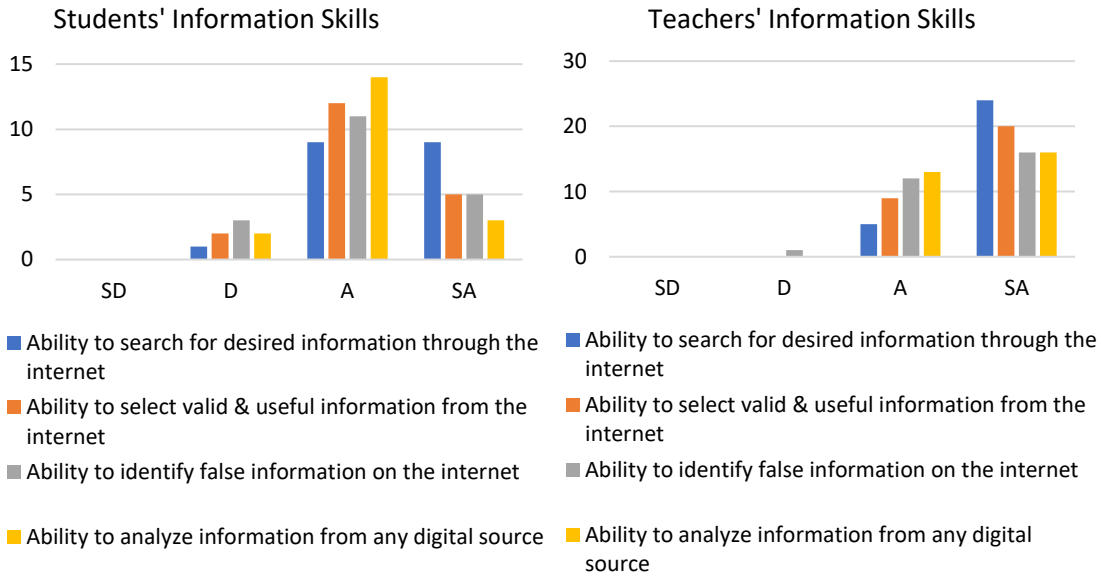


Figure 3. Responses for the Information Skills Category

Meanwhile, looking at Figure 3, teachers' responses show that most teachers feel they have excellent abilities in these four activities. From the responses to the four statement items in the category, students have average scores of 2.4, 2.2, 2.1, and 2.1, respectively. In contrast, the teachers have average scores of 2.8, 2.7, 2.5, and 2.6, all falling within the high category.

***Communication Skills***

The respondent's answers to the statement items in the communication skills category indicate that most students feel they can convey ideas to others, receive others' opinions, and understand communication ethics on the internet. However, four respondents feel their ability to convey ideas through the Internet is lacking. Meanwhile, teachers' responses show that most teachers have excellent abilities in all three abilities, with only one respondent feeling their ability to convey ideas through the internet is lacking, as shown in Figure 4.

From the responses to the three statement items, students have average scores of 1.9 for the first item in Figure 4, falling within the moderate category, followed by 2.1 and 2.4 for the second

and third items, falling within the high category. As in the previous categories, teachers have higher average scores of 2.6, 2.6, and 2.7, all falling within the high category.

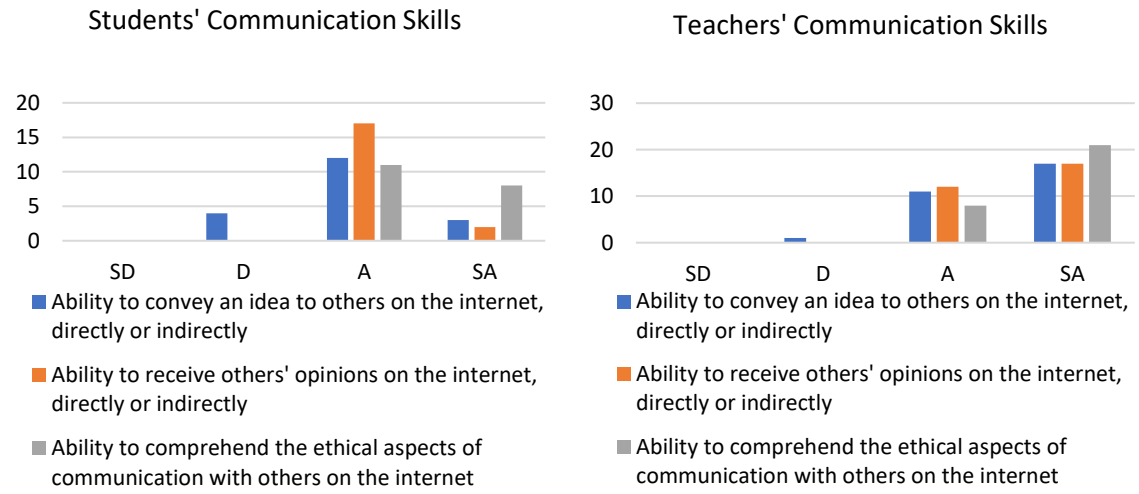


Figure 4. Responses for the Communication Skills Category

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***Strategic Skills***

In the strategic skills category, most student respondents use the internet and digital devices in their daily lives and for hobbies. However, many respondents do not use digital devices to fulfill their hobbies. Responses from teachers are more varied compared to their responses in previous categories. Most teachers use the internet and digital devices daily and for hobbies. While most teachers also use digital devices for side jobs, the number is still not as high as those who use them daily and for hobbies. The result of strategic skills can be shown in Figure 5.

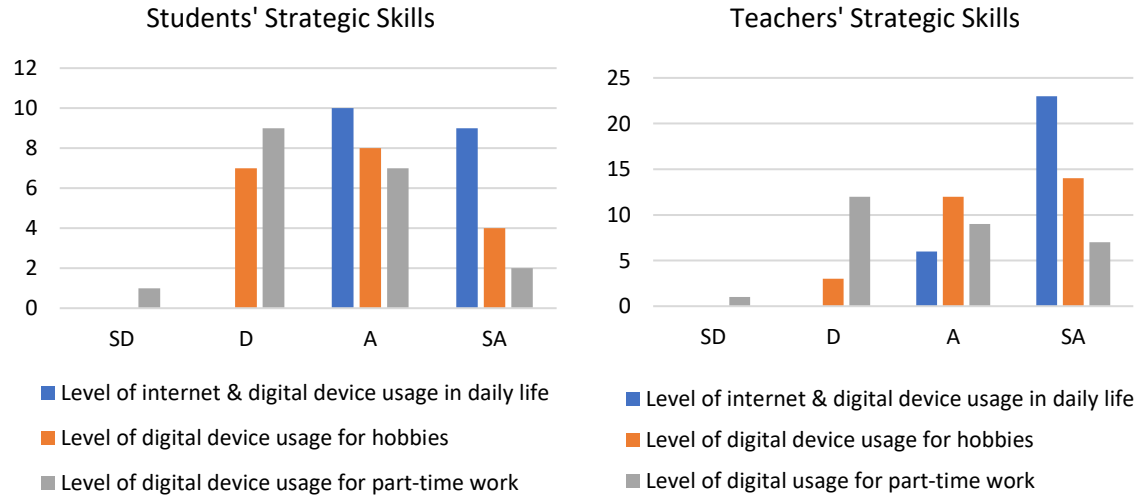


Figure 5. Responses for the Strategic Skills Category

From the responses to the three respective statement items in Figure 5, students have an average score of 2.5, falling within the high category, followed by 1.8 and 1.5, falling within the moderate category. On the other hand, teachers have higher average scores of 2.8 and 2.4, falling within the high category, followed by 1.8, falling within the moderate category.

***Creative Skills***

In the creative skills category, it was found that the majority of student respondents can create textual content on the internet (such as blogs, fiction, and research articles), create or design digital

image content (such as internet memes, artworks, and posters), and create and edit videos. For the last statement item, respondents are almost evenly divided between students who can develop software and those who cannot. In Figure 6, many respondents still feel they lack the mentioned skills in these statement items. Compared to student respondents, teacher respondents have a larger ratio of individuals who can create textual, image, and video content. However, it was also found from the responses that most teachers feel they cannot create software.

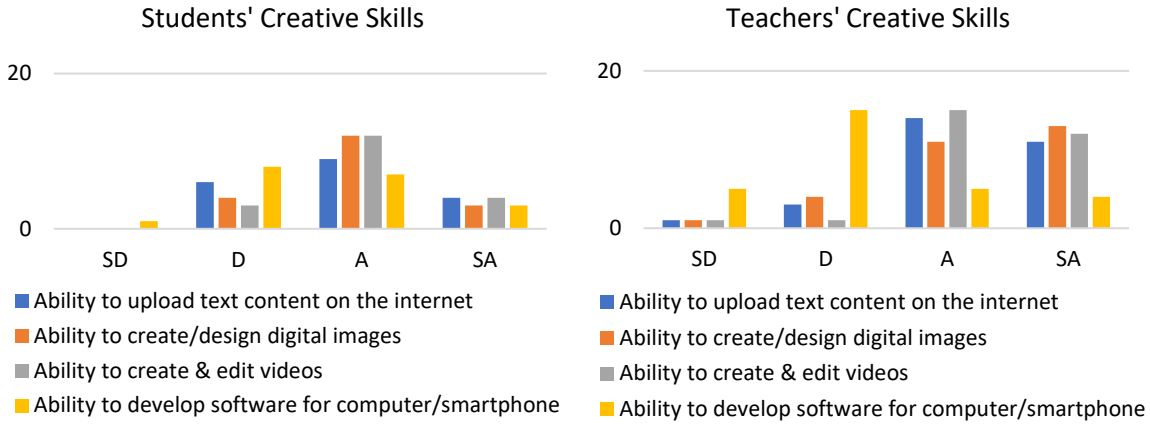


Figure 6. Responses for the Creative Skills Category

From the responses to the four statement items in the creative skills category, students have average scores of 1.9, 1.9, 2.1, and 1.6, respectively, as shown in the order in Figure 6 three of them fall within the moderate category, with only the video creation skill falling within the high category. On the other hand, teachers have average scores of 2.2, 2.2, 2.3, and 1.3, respectively; the first three fall within the high category, while the ability to create software for computers or smartphones falls within the moderate category.

***School Learning***

In school learning, respondents expressed: (1) Which digital media have been used in their school's learning process; (2) Whether they would like more digital media to be used in their school; and (3) Which specific digital media types they would like to see used in their school. The result can be shown in Figure 7.

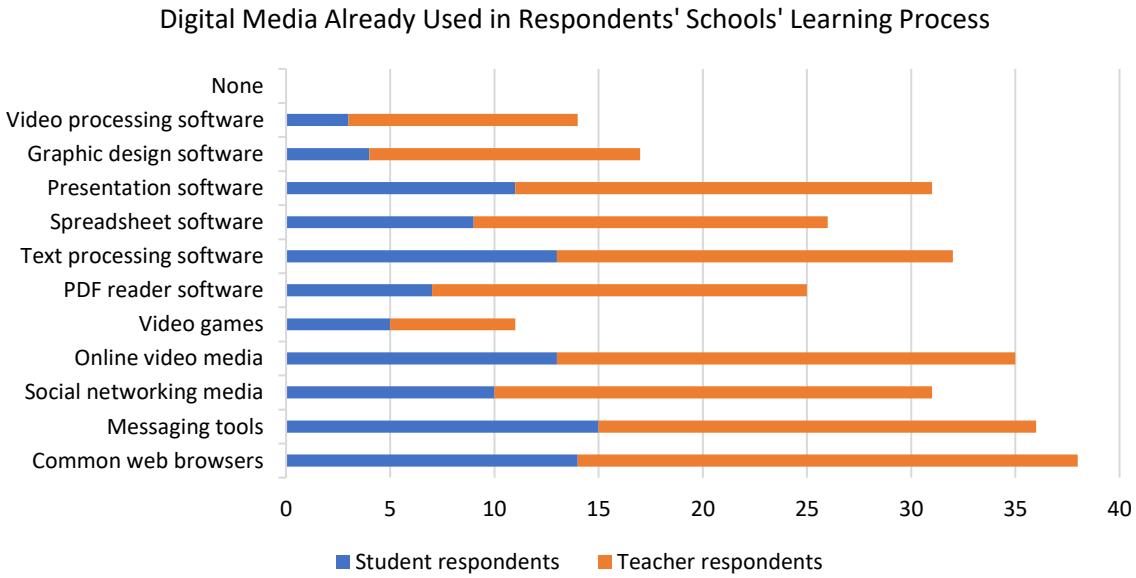


Figure 7. Digital Media Types that Have Been Used in Respondents' Schools' Learning Process

For the first statement item, student and teacher responses: Web browsers such as Chrome and Firefox are the most widely used types of digital media in learning (38 respondents), followed by messaging apps like WhatsApp and LINE (36), then online video platforms like YouTube and TikTok (35). Video games are the least used among the choices of digital media types (11).

Meanwhile, the second statement about the respondents who want more digital media use at school in Figure 8 found that most respondents want digital media to be used more in their school's learning activities (16 students and 28 teachers).

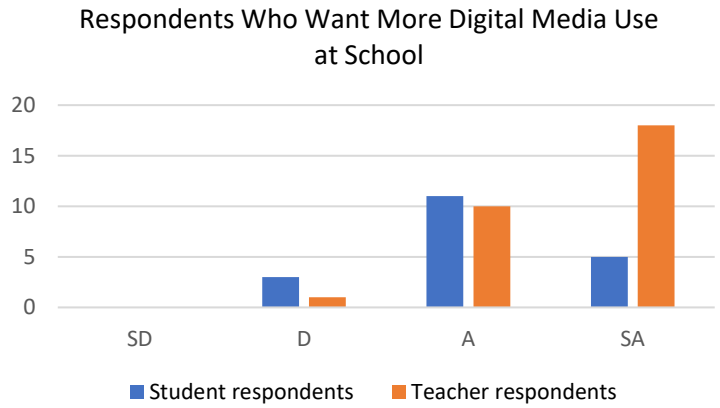


Figure 8. Respondents who want more Digital Media to be used in their Schools' Learning Process

Among all respondents shown in Figure 8, it can take the result that only three students and one teacher indicated disinterest. There is a slight inconsistency with some of the responses in the third statement item, as seen in Figure 9.

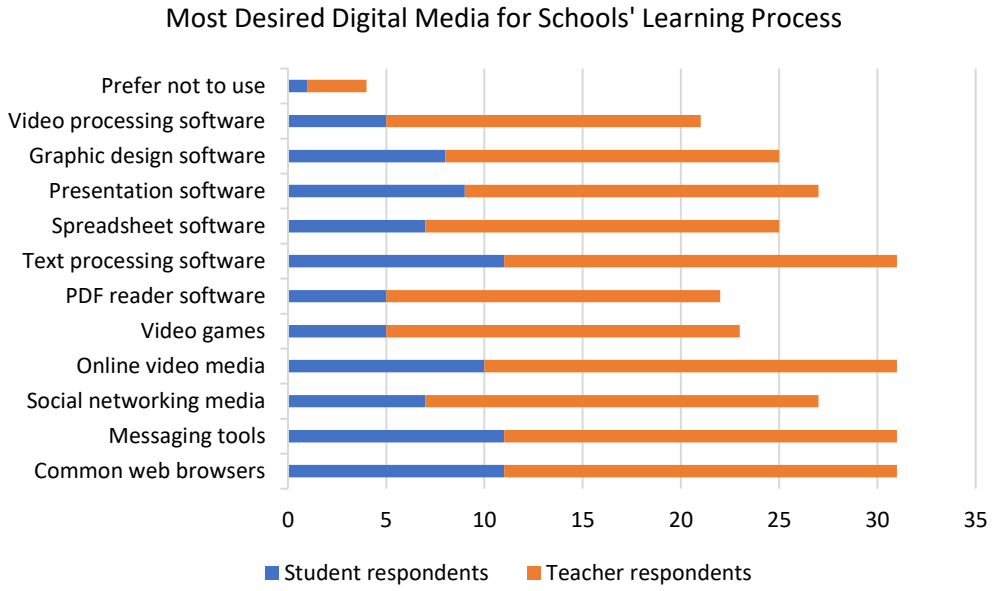


Figure 9. Most Desired, Digital Media Types Respondents would Like to See Used

For the third statement item in Figure 9, it was found that the most desired digital media for learning are not significantly different from the responses in the first statement item. This is evident from the positions of web browsers, messaging apps, online video platforms, and text editors; the top four choices in the first statement item, as mentioned in Figure 7, were also the most commonly selected in this section. Regarding the "Prefer not to use" option, one student and three teachers expressed disinterest in digital media for learning. This differs from the response to the second

statement item, where three students and one teacher indicated that they do not want more digital media to be used.

To determine the most wanted but still unused digital media types by respondents, the researchers calculated the ratio of respondents desiring a particular digital media type to the number of respondents mentioning that the media had been used in their school. The result can be seen in Figure 10.

As a result, in Figure 10, video games are the most desired digital media for both students and teachers to be used in school learning, considering the relatively low number of respondents who have learned using video games. This is followed by video editing software and graphic design tools.

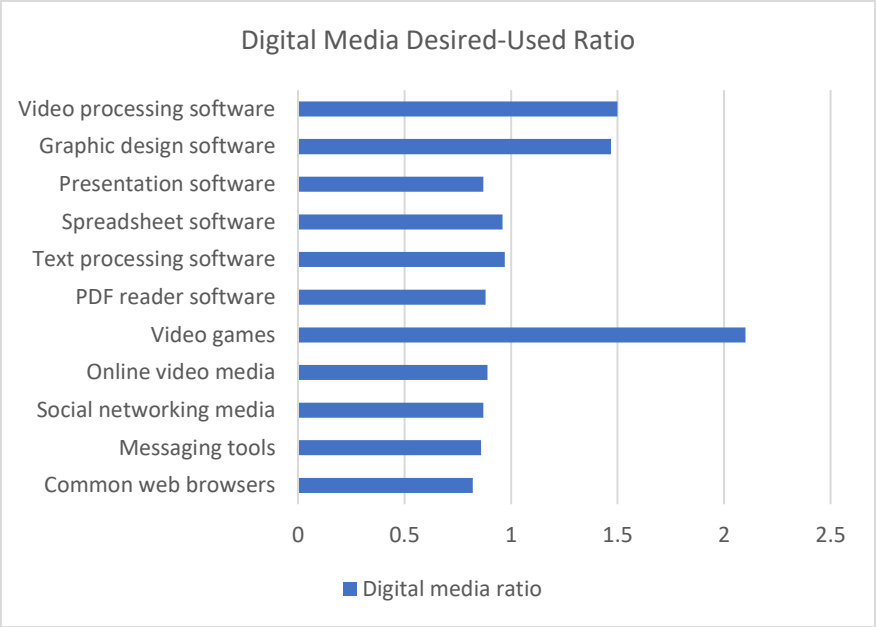


Figure 10. Comparison of Desired Digital Media Types with Those Already Used at School

## Discussion

### *Five Digital Literacy Skill Categories*

There are several similarities and differences between the findings of this research and a couple of studies mentioned in the introduction, namely the studies by Dinata (2021) and Nahdi & Jatisunda (2020). The findings in the operational skills category, where students and teachers feel competent in using computers/laptops, smartphones, and the internet, are consistent with the results of those two articles. As the ability to use hardware and software is the foundation of digital literacy (Iordache et al., 2017), a good level of operational skills is a solid basis for mastering other areas of digital literacy. Although respondents received an average score indicating moderate skills in the number of software types used, some of the software mentioned in the questionnaire are specialized tools, and therefore, the general usage of digital devices might not be fully reflected in those statement items.

The research results in the information skills category are similar to those of Dinata (2021) and quite comparable to Nahdi & Jatisunda's (2020) findings. In Dinata's (2021) research, the majority of student respondents, who were prospective mathematics teachers, claimed to possess good skills in searching for, selecting, and analyzing information in the digital realm, which aligns with the findings of this study. Meanwhile, Nahdi & Jatisunda's (2020) research discovered that most prospective elementary school teacher students had good information-related skills, such as identifying, selecting, comparing, and verifying. However, respondents also had varying responses (ranging from "good," represented by "yes," "moderate," represented by "partly," and "low," represented by "no") to the statement items addressing information analysis skills. Referring to Eshet's (2004) opinion, analyzing and evaluating information is a crucial skill for academics and

information users in the digital era; information skills are a high priority in both students' and teachers' abilities that must be maintained and enhanced.

Nahdi & Jatisunda's (2020) study did not extensively examine communication skills. However, there is a typical pattern between this research's findings and Dinata's (2021) communication skills, even though different aspects of communication were covered in each study. In this research, the three communication aspects discussed were expressing ideas, receiving ideas, and knowing communication ethics online. As seen in Figure 4, the ability to express ideas is an aspect with a lower average score than the others.

A similar pattern can be found in Dinata's (2021) study, in which most responses indicated a relatively weak skill average to the statement about the ability to negotiate opinions. However, other statement items that can be categorized as expressing ideas, such as the ability to explain concepts, received most responses indicating a relatively good skill average. Despite comparing these findings, communication skills are one of the critical competencies of this era, as more accessible access to the internet makes understanding and sending messages more crucial to participating in the increasingly participatory culture, among other reasons (Iordache et al., 2017). Therefore, teachers and students should continuously learn to communicate through digital media.

The field of strategic skills differs slightly from the previous categories as it focuses less on analyzing respondents' perceptions of specific skills and more on understanding their habits with digital media and assessing their mastery based on those habits. This difference arises from the fact that the utilization of information in digital media for personal and professional purposes is considered a high-level digital skill (van Deursen & van Dijk, 2014), and respondents who are more accustomed to using digital devices are likely to make better decisions (Iordache et al., 2017).

The high number of students and teachers who use digital devices in their daily lives and for hobbies is a positive sign, indicating that respondents actively utilize digital media. For the last statement item, most respondents not using digital devices for side jobs suggest that most students and teachers might not have additional jobs, such as selling products. Therefore, this final statement item is not considered a priority for schools' learning process and merely indicates that students and teachers who use digital devices for side jobs are likely to have higher digital literacy skills.

Creativity is one of the digital literacy categories discussed in Dinata's (2021) study. However, this research is more specific in mentioning the types of products respondents believe they can create in the statement items about the ability to create products, alongside other statement items not covered in this study. Most respondents answered that they can, although many students indicated they are not skilled in this area. Additionally, there was one statement item in Nahdi & Jatisunda's (2020) study regarding product creation, specifically whether respondents can create a website; most respondents answered negatively.

As a category that reflects the ability to create something new, form a creative expression, and integrate existing digital media content, the creative skills category represents individuals' capabilities to achieve specific goals in a better and more expressive way (Ala-Mutka, 2011; Iordache et al., 2017). The content of the statement items in this category are specific skills that digital device users do not always possess. Therefore, obtaining an average score in the middle range, like the respondents in this study regarding the statement item about creating software, does not necessarily imply low digital literacy skills.

With this data, one of the research objectives to discover the digital literacy perceptions of high school students and teachers has been achieved. Students and teachers generally have relatively high average abilities in all five types of digital literacy skills. With teachers' higher average perceived abilities compared to students, schools with profiles like this are relatively prepared to develop more lessons that utilize digital media. The ability to express opinions and be creative with digital media, which received relatively low scores in student and teacher responses, should be further explored with priority in school lesson implementation.

### *School Learning*

The "school learning" section illustrates the profile of students' and teachers' interests in using digital media for school lessons, which is the second objective of this research. The high number for each digital medium shown in Figure 7 indicates that most of the respondents' schools have already

implemented digital media in their educational programs. Therefore, increasing the utilization of digital media would align with the profile of respondents who are already accustomed to it.

Meanwhile, the analysis of responses in the following three figures shows that video games, video editing software, and graphic design software are not widely used in schools yet but are desired by both students and teachers for implementation. Video games or digital gaming software are forms of entertainment that are highly popular, with the gaming market in Indonesia reaching US$880 million in 2017 and US$1.92 billion in 2021, according to Zhou (2019), US$1.1 billion in 2018 according to the AGI (Asosiasi Game Indonesia), n.d., and US$1.59 billion in 2022 according to Statista, n.d. Therefore, using them in education would tap into a large audience not unlike that of movies or concerts. Additionally, video editing and graphic design software have become increasingly popular due to the growing participatory culture in the digital realm, as mentioned by Iordache et al. (2017). This provides students and teachers with opportunities for creative expression and engagement with content creation on famous photo and video-sharing platforms on the internet.

## CONCLUSION

This research contains a substantial amount of data from respondents to uncover the profile of interests and perceptions regarding the level of digital literacy among high school students and teachers. The results of the data analysis indicate that the overall level of digital literacy among respondents is already relatively high. However, certain aspects are comparatively lower than others and should be improved, such as the ability to express ideas through digital media and creatively produce specific products using digital tools. The analysis of respondents' interests also reveals that several digital media types are relatively underutilized in education but are desired by both students and teachers, namely video games, video editing tools, and graphic design software. These findings address some of the needs for profiles of interest and digital literacy skills in the educational context, which can be used to enhance further the quality and appeal of Indonesian education in the digital era. This study is limited to collecting data on the perceived level of digital literacy among high school students and teachers. To conduct a more in-depth analysis of digital literacy skills, it would be beneficial to incorporate testing methods so that the research outcomes are not solely based on respondents' feelings and experiences. Furthermore, to follow up on the findings of this research, it is suggested that future studies explore the best ways to implement video games, video editing tools, graphic design software, and similar software as engaging educational media in educational institutions.

## REFERENCES

AGI (Asosiasi Game Indonesia). (n.d.). *AGI (Asosiasi Game Indonesia)*. Retrieved June 17, 2023, from https://www.agi.or.id/faq

Aka, K. A. (2017). Pemanfaatan teknologi informasi dan komunikasi (TIK) sebagai wujud inovasi sumber belajar di sekolah dasar. *ELSE (Elementary School Education Journal): Jurnal Pendidikan Dan Pembelajaran Sekolah Dasar*, *1*(2), 28–37. https://journal.um-surabaya.ac.id/index.php/pgsd/article/view/1041

Akarawang, C., Kidrakran, P., & Nuangchalerm, P. (2015). Enhancing ICT competency for teachers in the Thailand basic education system. *International Education Studies*, *8*(6), 1–8. https://doi.org/10.5539/ies.v8n6p1

Ala-Mutka, K. (2011). Mapping digital competence: Towards a conceptual understanding. *Joint Research Centre: European Commission*, 5–57. https://www.academia.edu/download/62706965/MappingDigitalCompetence20200401-127207-1xyc56f.pdf

Allcorrect. (n.d.). *The Indonesian gaming market*. Allcorrect Game Content Studio. Retrieved June 17, 2023, from https://allcorrectgames.com/insights/indonesia/

American Library Association (ALA). (n.d.). *Digital library*. Welcome to ALA's Literacy Clearinghouse. Retrieved December 9, 2022, from https://literacy.ala.org/digital-literacy/

Asari, A., Kurniawan, T., Ansor, S., & Putra, A. B. N. R. (2019). Kompetensi literasi digital bagi guru dan pelajar di lingkungan sekolah Kabupaten Malang. *BIBLIOTIKA: Jurnal Kajian Perpustakaan Dan Informasi*, *3*(2), 98–104. http://journal2.um.ac.id/index.php/bibliotika/article/view/11592

Bhattacharjee, B., & Deb, K. (2016). Role of ICT in 21st century's teacher education. *International Journal of Education and Information Studies*, *6*(1), 1–6.

Budiman, H. (2017). Peran teknologi informasi dan komunikasi dalam pendidikan. *Al-Tadzkiyyah: Jurnal Pendidikan Islam*, *8*(1), 31–34. https://doi.org/10.24042/atjpi.v8i1.2095

Cheung, D. (2018). The key factors affecting students' individual interest in school science lessons. *International Journal of Science Education*, *40*(1), 1–23. https://doi.org/10.1080/09500693.2017.1362711

Clark, L. A., & Watson, D. (2019). Constructing validity: New developments in creating objective measuring instruments. *Psychological Assessment*, *31*(12), 1412–1427. https://doi.org/10.1037/pas0000626

Dewey, J. (2009). *Interest and effort in education*. Southern Illinois University Press.

Dewi, S. Z., & Hilman, I. (2019). Penggunaan TIK sebagai sumber dan media pembelajaran inovatif di sekolah dasar. *Indonesian Journal of Primary Education*, *2*(2), 48–53. https://doi.org/10.17509/ijpe.v2i2.15100

Dinata, K. B. (2021). Analisis kemampuan literasi digital mahasiswa. *Edukasi: Jurnal Pendidikan*, *19*(1), 105–119. https://doi.org/10.31571/edukasi.v19i1.2499

DiStefano, C., Shi, D., & Morgan, G. B. (2021). Collapsing categories is often more advantageous than modeling sparse data: Investigations in the CFA framework. *Structural Equation Modeling: A Multidisciplinary Journal*, *28*(2), 237–249. https://doi.org/10.1080/10705511.2020.1803073

Eshet, Y. (2004). Digital literacy: A conceptual framework for survival skills in the digital era. *Journal of Educational Multimedia and Hypermedia*, *13*(1), 93–106. https://www.learntechlib.org/p/4793/

Fu, J. (2013). Complexity of ICT in education: A critical literature review and its implications. *International Journal of Education and Development Using ICT*, *9*(1), 112–125. https://www.learntechlib.org/p/111900/

Hague, C., & Payton, S. (2010). *Digital literacy across the curriculum* (1st ed., Vol. 4). Futurelab.

Harackiewicz, J. M., Smith, J. L., & Priniski, S. J. (2016). Interest matters. *Policy Insights from the Behavioral and Brain Sciences*, *3*(2), 220–227. https://doi.org/10.1177/2372732216655542

Hermawan, H. D., Deswila, N., & Yunita, D. N. (2018). Implementation of ICT in education in Indonesia during 2004-2017. *2018 International Symposium on Educational Technology (ISET)*, 108–112. https://doi.org/10.1109/ISET.2018.00032

Hernandez, R. M. (2017). Impact of ICT on education: Challenges and perspectives. *Journal of Educational Psychology-Propositos y Representaciones*, *5*(1), 337–347. https://eric.ed.gov/?id=EJ1139346

Iordache, C., Mariën, I., & Baelden, D. (2017). Developing digital skills and competences: A quick-scan analysis of 13 digital literacy models. *Italian Journal of Sociology of Educatio*, *9*(1), 6–30. https://ijse.padovauniversitypress.it/2017/1/2

Jamilah, & Isnani, G. (2017). The influence of classroom climate, learning interest, learning discipline and learning motivation to learning outcomes on productive subjects. *Jurnal*

*Pendidikan Bisnis Dan Manajemen*, *3*(2), 85–96. https://doi.org/10.17977/um003v3i22017p085

Jamun, Y. M. (2018). Dampak teknologi terhadap pendidikan. *Jurnal Pendidikan Dan Kebudayaan Missio*, *10*(1), 48–52. https://doi.org/10.36928/jpkm.v10i1.54

Jebb, A. T., Ng, V., & Tay, L. (2021). A review of key Likert scale development advances: 1995–2019. *Frontiers in Psychology*, *12*, 1–14. https://doi.org/10.3389/fpsyg.2021.637547

Jenkins, H., Clinton, K., Purushotma, R., Robinson, A. J., & Weigel, M. (2006). *Confronting the challenges of participatory culture: Media education for the 21st century*. MacArthur Foundation.

Juliff, P. (2005). *Real-life learning: Why, what and how?* (Vol. 182, pp. 1–12). https://doi.org/10.1007/0-387-25997-X_1

Kaware, S. S., & Sain, S. K. (2015). ICT application in education: An overview. *International Journal of Multidisciplinary Approach & Studies*, *2*(1), 25–32. https://www.academia.edu/download/36949501/04.01.2015.pdf

Khasanah, U., & Herina, H. (2019). Membangun karakter siswa melalui literasi digital dalam menghadapi pendidikan abad 21 (Revolusi Industri 4.0). *PROSIDING SEMINAR NASIONAL PENDIDIKAN PROGRAM PASCASARJANA UNIVERSITAS PGRI PALEMBANG 12 JANUARI 2019*, 999–1015. https://jurnal.univpgri-palembang.ac.id/index.php/Prosidingpps/article/view/2662

Kinematsu, H., & Barry, D. M. (2016). *STEM and ICT education in intelligent environments*. Springer.

Kurnianingsih, I., Rosini, R., & Ismayati, N. (2017). Upaya peningkatan kemampuan literasi digital bagi tenaga perpustakaan sekolah dan guru di wilayah Jakarta Pusat melalui pelatihan literasi informasi. *Jurnal Pengabdian Kepada Masyarakat (Indonesian Journal of Community Engagement)*, *3*(1), 61–76. https://doi.org/10.22146/jpkm.25370

Lavrakas, P. J. (2008). Questionnaire. In *Encyclopedia of Survey Research Methods*. Sage Publications, Inc. https://doi.org/10.4135/9781412963947.n424

Lestari, S. (2018). Peran teknologi dalam pendidikan di era globalisasi. *EDURELIGIA; JURNAL PENDIDIKAN AGAMA ISLAM*, *2*(2), 94–100. https://doi.org/10.33650/edureligia.v2i2.459

Lim, C. P., Yan, H., & Xiong, X. (2015). Development of pre-service teachers' information and communication technology (ICT) in education competencies in a mainland Chinese university. *Educational Media International*, *52*(1), 15–32. https://doi.org/10.1080/09523987.2015.1005425

Lowther, D. L., Inan, F. A., Daniel Strahl, J., & Ross, S. M. (2008). Does technology integration "work" when key barriers are removed? *Educational Media International*, *45*(3), 195–213. https://doi.org/10.1080/09523980802284317

Marshall, G. (2005). The purpose, design and administration of a questionnaire for data collection. *Radiography*, *11*(2), 131–136. https://doi.org/10.1016/j.radi.2004.09.002

McCombes, S. (2019). *Descriptive research | Definition, types, methods & examples*. https://www.scribbr.com/methodology/descriptive-research/

Mishra, P., Pandey, C., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia*, *22*(1), 67–72. https://doi.org/10.4103/aca.ACA_157_18

Nahdi, D. S., & Jatisunda, M. G. (2020). Analisis literasi digital calon guru sd dalam pembelajaran berbasis virtual classroom di masa pandemi COVID-19. *Jurnal Cakrawala Pendas*, *6*(2), 116–123. https://doi.org/10.31949/jcp.v6i2.2133

Ornstein, A. C., Levine, D. U., Gutek, G. L., & Vocke, D. E. (2011). *Foundation of education*. Cengange Learning.

Paul, G., & Glister, P. (1997). *Digital literacy*. Wiley Computer Pub.

Polit, D. F., & Beck, C. T. (2004). *Nursing research: Principles and methods* (7th ed.). Lippincott Williams & Wilkins.

Reddy, P., Sharma, B., & Chaudhary, K. (2020). Digital literacy. *International Journal of Technoethics*, *11*(2), 65–94. https://doi.org/10.4018/IJT.20200701.oa1

Rivalina, R. (2015). Kompetensi teknologi informasi dan komunikasi guru dalam peningkatan kualitas pembelajaran. *Jurnal Teknodik*, *18*(2), 165–176. https://doi.org/10.32550/teknodik.v0i0.121

Sarkar, S. (2012). The role of information and communication technology (ICT) in higher education for the 21st century. *Science*, *1*(1), 30–41. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=8582a7d8de9ca9172fbfd548af9c63e763e53e7d

Setiawan, D. (2018). Dampak perkembangan teknologi informasi dan komunikasi terhadap budaya. *JURNAL SIMBOLIKA: Research and Learning in Communication Study*, *4*(1), 62–72. https://doi.org/10.31289/simbollika.v4i1.1474

Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology*, *100*(4), 765–781. https://doi.org/10.1037/a0012840

Spante, M., Hashemi, S. S., Lundin, M., & Algers, A. (2018). Digital competence and digital literacy in higher education research: Systematic review of concept use. *Cogent Education*, *5*(1), 1–21. https://doi.org/10.1080/2331186X.2018.1519143

Statista. (n.d.). *Video games - Indonesia*. Retrieved June 17, 2023, from https://www.statista.com/outlook/dmo/digital-media/video-games/indonesia

Su, C.-H., & Cheng, C.-H. (2015). A mobile gamification learning system for improving the learning motivation and achievements. *Journal of Computer Assisted Learning*, *31*(3), 268–286. https://doi.org/10.1111/jcal.12088

Taherdoost, H. (2016). Validity and reliability of the research instrument; how to test the validation of a questionnaire/survey in research. *International Journal of Academic Research in Management (IJARM)*, *5*(3), 28–36. https://doi.org/10.2139/ssrn.3205040

Tondeur, J., Aesaert, K., Prestridge, S., & Consuegra, E. (2018). A multilevel analysis of what matters in the training of pre-service teacher's ICT competencies. *Computers & Education*, *122*, 32–42. https://doi.org/10.1016/j.compedu.2018.03.002

Tondeur, J., Aesaert, K., Pynoo, B., van Braak, J., Fraeyman, N., & Erstad, O. (2017). Developing a validated instrument to measure preservice teachers' <scp>ICT</scp> competencies: Meeting the demands of the 21st century. *British Journal of Educational Technology*, *48*(2), 462–472. https://doi.org/10.1111/bjet.12380

van Deursen, A. J. A. M., Helsper, E. J., & Eynon, R. (2016). Development and validation of the Internet Skills Scale (ISS). *Information, Communication & Society*, *19*(6), 804–823. https://doi.org/10.1080/1369118X.2015.1078834

van Deursen, A. J., & van Dijk, J. A. (2014). *Digital skills: Unlocking the information society*. Springer.

van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, *72*, 577–588. https://doi.org/10.1016/j.chb.2017.03.010

Vitanova, V., Atanasova-Pachemska, T., Iliev, D., & Pachemska, S. (2015). Factors affecting the development of ICT competencies of teachers in primary school. *Procedia - Social and Behavioral Sciences*, *191*, 1087–1094. https://doi.org/10.1016/j.sbspro.2015.04.344

Widaryanto, W., & Sulfemi, W. B. (2016). Korelasi penguasaan TIK guru dengan kemampuan TIK siswa. *Edutecno: Jurnal Pendidikan dan Administrasi Pendidikan*, *14*(1), 1–8. https://osf.io/j23zs/download

Yaddanapudi, S., & Yaddanapudi, L. (2019). How to design a questionnaire. *Indian Journal of Anaesthesia*, *63*(5), 335–337. https://doi.org/10.4103/ija.IJA_334_19

Zhou, D. (2019). *Insights into the Indonesian games market*. https://newzoo.com/resources/blog/insights-into-the-indonesian-games-market