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Interactive Learning Multimedia: A Shortcut for Boosting Gen-Z's Digital literacy in Science Classroom

Siti Zahra Mulianti Natsir[1*], Bibin Rubini[1], Didit Ardianto[1], Nurhaedah Madjid[2]

[1] Sekolah Pascasarjana, Universitas Pakuan, Indonesia
[2] SMPN. 22 Makassar, Indonesia

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Corresponding Author:
Siti Zahra Mulianti Natsir
zahranatsir@gmail.com

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Abstract: This study aims to develop interactive multimedia learning to sharpen Gen- Z's digital literacy on the material of substance pressure. The method used is research and development with research instruments including multimedia validation sheets, digital literacy questionnaires, teachers' response questionnaires, and Gen- Z response questionnaires. The research began with need analysis, then continued with the multimedia design stage. The multimedia design stage produces the first draft of multimedia and research instruments. The first draft of the multimedia was validated at the development stage. The development stage included the validation of multimedia and research instruments, as well as a limited field test. A valid Multimedia was subsequently implemented into science learning. The evaluation stage was carried out by administering a questionnaire on digital literacy questionnaires and teachers' and students' response questionnaires. The results showed that learning multimedia was declared feasible based on a content validity value of 100%, and Gen - Z's digital literacy index obtained a score of 3.30 or was in the medium category. It can be concluded that interactive learning multimedia can be an alternative way in enhancing Gen-Z's digital on-substance pressure materials. This study shows that science learning can contribute to accelerating digital transformation by enhancing youths' capacity in digital literacy.

Keywords: Digital Literacy; Interactive Learning Multimedia; Gen – Z

Introduction

The 21st century is characterized by digitalization in every aspect of life. A drastic evolving technology has impacted those who were born in 1997 – 2022 or called Generation-Z which become engaged with digital space since they were born. Having accustomed to digital space, gen-Z becomes the most internet-addicted user with a total duration of using the internet is more than 7 hours/day (Databoks, 2022).

Moreover, this phenomenon has led to a detrimental impact on gen-Z themselves. A study confirms that Gen-Z's behavior towards learning, for instance, time management, communication skills, and attitude shows negative performance (Mahadi, 2019). Besides, cyberbullying also appears to be a negative impact on internet use for gen-Z. A study in one Junior High School in Makassar reveals that 32% of its students experienced cyberbullying (Situmorang et al., 2018), whilst another study in Padang discovers 49% of Gen-Z respondents were cyberbullying victims (Riswanto & Marsinun, 2020).

By taking into account the negative impacts of internet and technology use, gen-Z shall possess skills in order to protect themselves from cybercrime. The skill is later known as digital literacy. Digital literacy is a required skill to prevent individuals from the negative effects of technology (Novanana, 2022; Purnama et al., 2021). Moreover, digital literacy is defined as skills in using technology and accessing, understanding, assessing, and communicating information obtained in the digital space safely (UNESCO, 2018). Another definition of digital literacy is individual skills in the use of digital devices to search, sort information, think

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critically and creatively, and communicate effectively through the digital landscape (Julien, 2019).

Moreover, digital literacy is highly essential in the digital era these days. The lack of digital literacy could be seen during the pandemic covid-19, where the hoaxes about covid-19 and the vaccine were massively spreading across the nation. According to the data released by the Ministry of Communication, there were 2.239 hoaxes that have been spreading on social media until 30 September 2022 (Ministry of CIT Indonesia, 2022). Given the reality that hoaxes are continuously spreading, the individual shall be digitally literate in order to combat the hoaxes. Align with that, a study confirms that digital literacy equipped individuals with critical thinking so that they can differentiate the real news and fake news (hoaxes) (Fauziyah et al., 2022).

On the other hand, the rapid development of technology in this century certainly requires competent human resources in order to adapt as well as contribute to the development of this science and technology. As the future generations of Indonesia, Gen-Z is expected to be able to improve 21st-century skills, one of them is digital literacy (Abaniel, 2021; Buitrago-Flórez et al., 2021; Dishon & Gilead, 2021; Emara et al., 2021; Novitra et al., 2021; Semilarski et al., 2021). For that reason, all learning including science learning shall train students' digital literacy.

A study confirms that digital literacy can be trained through science learning. This is due to the utilization of the scientific approach in the science classroom (Komang et al., 2020), where gen-Z are trained to look for relevant theories from various sources to verify the findings and concepts of science they are studying. In response to these opportunities, science learning should take a role in developing digital literacy to produce the 21st-century generation. It can be done through digital-based science learning. Digital-based science learning can be applied by harnessing digital learning multimedia. This is supported by research that shows that science learning can enhance digital literacy by using learning multimedia (Nurcahyo et al., 2020). Furthermore, the use of digital learning media can sharpen students' technological skills (Winasti et al., 2018).

Based on preliminary studies in two junior high schools that have used digital learning media in Makassar, it was found that 83.3% of science teachers design digital learning media using Microsoft Powerpoint which contains learning objectives, teaching materials, drawings, and learning videos. However, the results showed that the use of learning media created with Microsoft Powerpoint can reduce teacher-student interaction, causing students to be less active in learning (Ding & Liu, 2012). In addition, although this school has used digital learning media, the results of the digital literacy index survey at the time of the preliminary study revealed that the digital literacy index of students in the two schools was 3.78 with the highest score of 5. This indicates that the digital literacy index in the two schools has not reached the good category. Therefore, efforts are needed to train students' digital literacy by optimizing the use of digital-based learning multimedia. Given the preliminary study result and the potential of enhancing digital literacy through science learning, this study aims to develop interactive learning multimedia that contains digital literacy competencies.

Method

This study was research and development using the ADDIE model. The research took place in two Junior High Schools in Makassar and involved 46 Gen-Z at 8th Grade 30th January – 31st May 2022. The research began with the need analysis phase was conducted to acquire the students' and teachers' needs as well as analyze the science curriculum as a baseline to design interactive multimedia. The following phase was designing multimedia and research instruments such as a multimedia validation sheet, digital literacy questionnaires, and a set of questionnaires of teachers' and students' responses towards multimedia. Draft I of Multimedia and research instruments was subsequently validated by experts in the development phase. The draft I of Multimedia was declared valid by two experts in multimedia and science education with the content validity being 1.

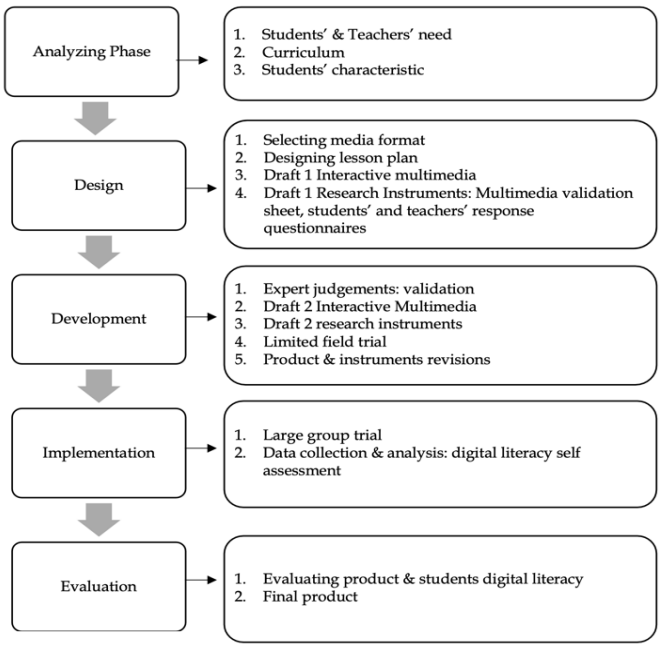

Figure 1. Research Scheme

Similarly, the digital literacy questionnaire and questionnaire of teachers' and students' responses towards multimedia were valid with a content validity

value of 1. According to Gregory, multimedia and research instruments can be declared valid if the content validity value is more than 0,60 (Gregory, 2015). Furthermore, digital literacy was acknowledged as reliable with an alpha Cronbach value of 0.930. The valid multimedia is then implemented in a science classroom in the implementation phase. Afterward, Gen-Z's digital literacy was measured along with teachers' and students' responses toward multimedia during the evaluation phase.

Furthermore, the digital literacy questionnaire consists of five competencies presented in Table 1.

Table 1. Digital literacy indicators

Competency	Competency
Digital Skills	The ability in using hardware and software
	The ability to upload and download file from internet
Information and data literacy	Ability to find out the truth of information received on the internet
	Ability to identify hoaxes
Communication and Collaboration	Ability to use google workspace features (google document, google drive)
	Ability to communicate through digital platforms
Digital Content Creation	Ability to create presentation materials online
	Giving credits to the author/creator of digital content
Digital safety	Data privacy
	Ability to avoid potential digital security hazards on the internet

Result and Discussion

The feasibility of multimedia is assessed based on two aspects, namely the validation results of multimedia experts and material experts as well as the responses of teachers and students to interactive learning multimedia.

Table 2. Multimedia Validity Result

Aspect	Content Validity Value	Validity Level
Usability	1	Very High
Science and Digital Literacy Content	1	Very High

According to expert validation of usability and science and digital literacy content on table 1, it is obtained that interactive learning multimedia is declared valid and feasible to be used in learning process. This is because interactive multimedia learning is equipped with a user guidebook, which making it easy for users to operate the multimedia. In addition, interactive learning multimedia features operate well and the multimedia installation process was running without any problems. Moreover, video, simulation and audio on multimedia can be played well. This is in line with the multimedia feasibility criteria developed by Thorn that interactive learning multimedia is declared feasible if it meets the requirements of easy navigation, usability, multimedia learning design and compatibility (Pratama et al., 2019). Furthermore, the feasibility of interactive learning multimedia on aspects of science and digital content is declared feasible by science education experts. This is because interactive learning multimedia is developed based on basic science competency on pressure of matter and digital literacy competencies. In regard with digital literacy content, multimedia is equipped with features to enhance Gen-Z's digital capacity in technology use, information and data literacy, communication and collaboration, digital content creation, dan digital safety.

Research findings show that interactive learning multimedia can enhance Gen – Z's digital literacy.

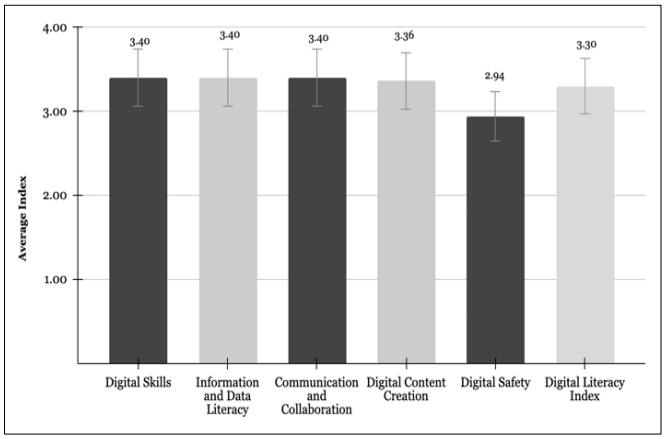

Figure 2. Digital Literacy Index on Each Competency

It was obtained that the average student literacy index was in the moderate category. This is in line with the results of a survey on the digital literacy status of the Indonesian people which shows that the digital literacy index of the Indonesian people is still in the moderate category (Kementerian Komunikasi dan Informatika RI, 2022). Similarly, another research also reveals that Gen-Z's digital literacy is in good category (Naci Çoklar & Tatli, 2021; Stjepić et al., 2019). The results are further analyzed on the digital literacy index on each competency and the role of interactive multimedia learning.

Competency in using technology or well known as digital skill is an important part of constructing an individual's digital literacy skills. Digital skills is constructed by two indicators such as the ability in operating hardware and software and the Gen – Z's ability in uploading and downloading file from internet. Based on these indicators, interactive learning multimedia is developed in the form of software to

increase students' knowledge in operating software, as well as facilitating students in training the ability to use hardware by operating multimedia.

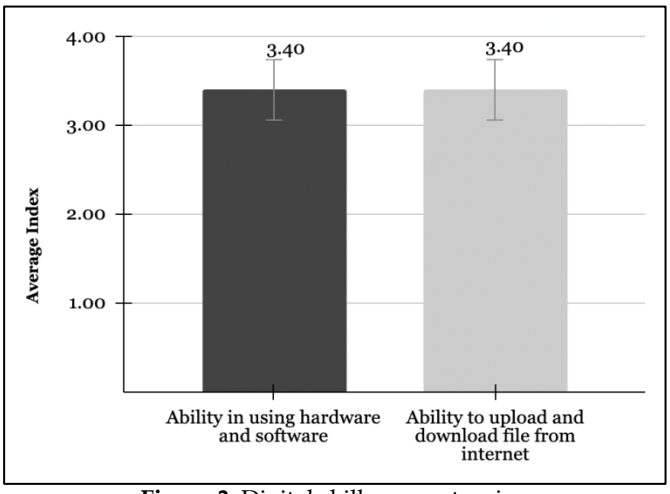

Figure 3. Digital skills competencies

Figure 2 shows the value of the digital literacy index on the indicator of the ability to use hardware and software as well as the ability to download and upload data to the internet is 3.40 or is in the moderate category. This is because the interactive learning multimedia is integrated with online students' worksheet using google document. Students' worksheet created with Google documents allows students to learn how to connect hardware with the internet network using WiFi and Hotspot which is a foundation of digital skills. Moreover, this students' worksheet also facilitates students in recognizing search engines. By using interactive learning multimedia, Gen-Z will get used to technology, which also contributes to enhancing their digital literacy skills. A study confirms that Gen-Z's digital literacy is influenced by their familiarity of using technology (Naci Çoklar & Tatli, 2021).

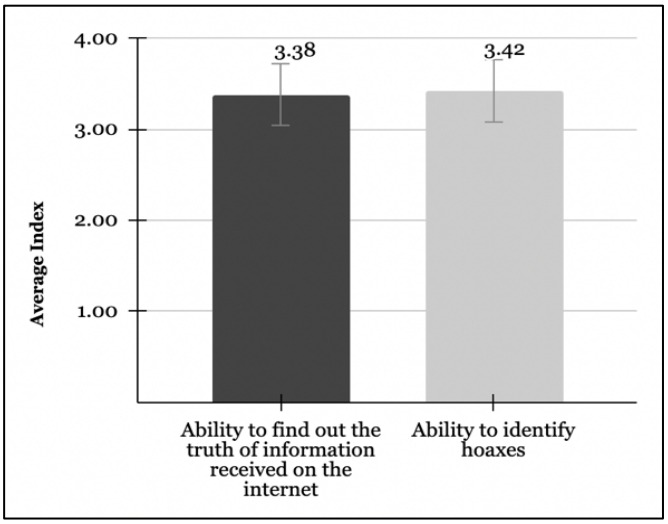

Figure 4. Information and Data literacy

Figure 3 shows the digital literacy index's value for finding out the truth of information received on the internet was 3.38 and the ability to identify hoaxes was 3.42. So it can be concluded that both sub-indicators are in the medium category. This achievement is supported by the existence of material on interactive learning multimedia that discusses the characteristics of fake news and how to identify it as presented in Figure 4.

Figure 5. Display of material–tips in recognizing fake news

The third competency is communication and collaboration. Communication and collaboration was measured on the ability of Gen-Z's in harnessing google workspace features particulary google document and google drive and communicating through digital platform.

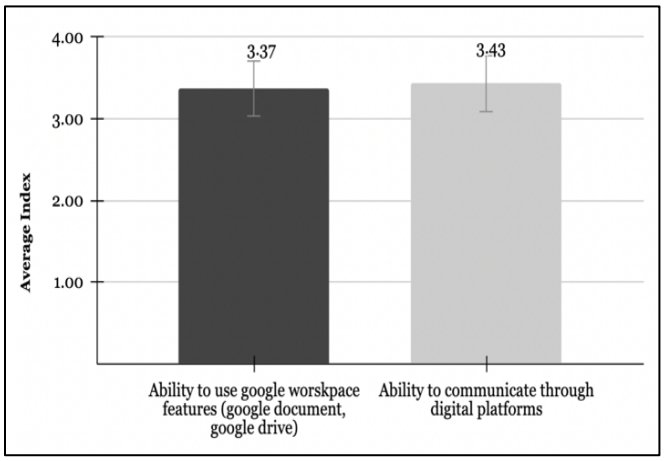

Figure 6. Communication and Collaboration Index

Figure 5 shows the digital literacy index value for the ability to use the google workspace feature is 3.37. Meanwhile, the ability to communicate through digital platforms has an index of 3.43 or is in the moderate category. To sharpen these competencies, interactive multimedia learning is equipped with a virtual

laboratory and online students worksheets using Google Documents. Both features facilitate learners to work together in conducting virtual experiment activities and writing reports collectively. In addition, the existence of online students' worksheets can lessen learning time given that the worksheet can be done simultaneously through google document.

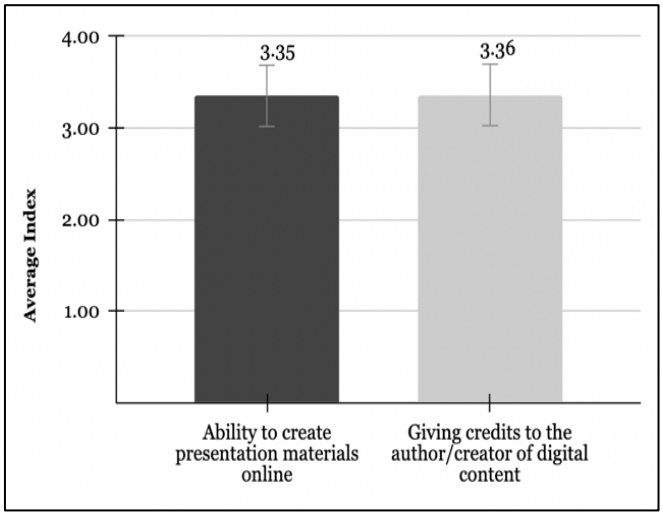

Figure 7. Digital Content Creation

Digital content creation focuses on developing individuals' abilities in creating digital content. Figure 6 reveals digital literacy index for an indicator of creating online presentation materials is 3.35 and Gen-Z's ability in giving credit to the author/creator of the digital work is 3.36 or is in the moderate category. Gen-Z was instructed to make presentation materials from the students' worksheets created to enhance this competency. The creation of this presentation material utilizes an online graphic design application, namely Canva. The creation of presentation materials using Canva also allows students to work collectively in real-time.

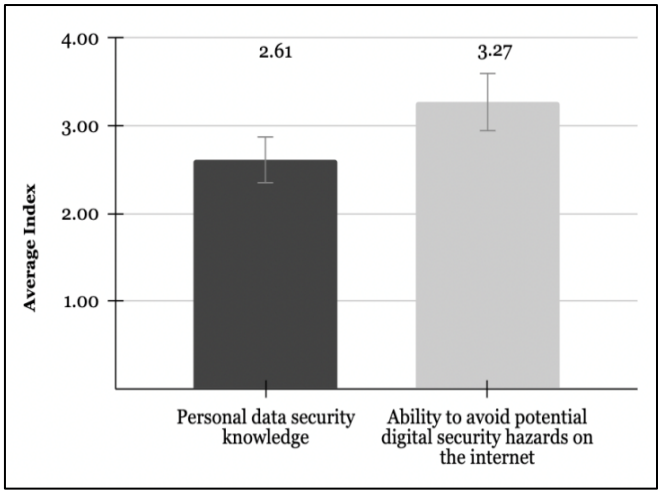

Figure 8. Digital Safety

Digital safety is the ability of students to maintain the security of personal data when doing activities in the digital space. Figure 7 shows the index value for the digital safety indicator is 1) personal data security knowledge of 2.61 or is in a low category and 2) the ability to avoid potential digital security hazards on the internet by 3.27 or is in the medium category. In regard to the enhancement of Gen-Z's digital safety, interactive multimedia learning is equipped with material about the types of personal data that should not be shared with others. In addition, interactive multimedia learning contains material on the characteristics of websites that contain viruses or malware. It aims to prevent Gen-Z from being exposed to malware or virus.

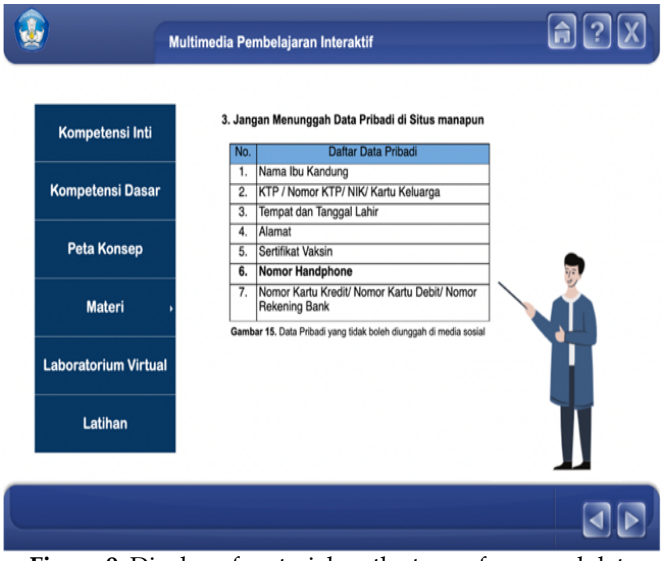

Figure 9. Display of material on the type of personal data privacy

Moreover, teachers' and Gen-Z's response toward interactive learning multimedia is becoming a factor of determine the feasibility of multimedia.

Table 3. Teachers' response towards interactive multimedia

Aspect	Teachers' response (%)
Technical	94.72
Content	96.82
Visual Design	95.00
Usefulness	100.00
Average Response	96.63

According to table 3, teachers' response towards multimedia is 96.63% or in the great category. To be specific, the average percentage of responses for each aspect is in the range of 94% - 100%, so teacher responses can be expressed in very strong categories. Another finding is that the usefulness aspect obtains the highest

percentage of responses of 100%. Based on these data, it can be stated that interactive learning multimedia is very beneficial for Schools A and B, especially in enhancing Gen-Z's capacity in digital literacy. Similarly, it is also very helpful in overcoming the limitations of substance-pressure practicum tools available in both schools. In addition, the existence of interactive multimedia makes learning time more efficient. The allocation of science learning time, which is limited to 40 minutes during the new normal, causes science teachers in Schools A and B to have to arrange learning time so that materials and practicums can be carried out. The existence of multimedia is very helpful in maximizing the allocation of very limited learning time. This is because interactive multimedia learning provides materials, virtual experiments, and practice questions in one application, making it easier for teachers and students to access and utilize the multimedia. This is supported by research that reveals that the use of interactive learning multimedia can make it easier for teachers to deliver material creatively and improve the quality of learning (Guan et al., 2018; Kapi et al., 2017; Khoiriah et al., 2016; Stark et al., 2018).

Table 4. Gen-Z's response to interactive multimedia

Criteria	Percentage (%)
Science content	83.80
Digital literacy content	84.09
The ease of operating multimedia	86.52
Average Response	84.70

Based on table 4, an average percentage of Gen-Z's responses to interactive learning multimedia was obtained at 84.70% or in the very good category. This is because multimedia is developed according to the needs of Gen-Z. In addition, multimedia is accompanied by a user guide, so students can easily understand the procedure for using multimedia. On the technical aspect, multimedia can be easily installed on the hardware used by students, and the process of loading multimedia applications goes well. Likewise, with the content on multimedia, both material, simulation videos, animations, and virtual experiments went well. In addition, based on the results of observations during the multimedia implementation stage, students showed interest and enthusiasm in participating in learning. Several studies have confirmed that multimedia can stimulate students' interest in learning (Guan et al., 2018; Khoiriah et al., 2016). Furthermore, at this stage of multimedia implementation, students show their activeness by giving questions about the material being taught. In addition, students become very active, especially when working on virtual experiments with group friends. This is supported by the results of other studies that reveal that the use of multimedia can transform the learning environment from teacher-centered to student-centered (Coleman et al., 2016).

Conclusion

Interactive learning multimedia that is feasible to use contains core competencies, basic competencies, learning objectives, materials, simulations, videos, practice questions, and virtual laboratories. Multimedia feasibility is indicated by the validation results of multimedia experts and science education experts which show a content validity of 1 or 100% or meet the criteria for feasible multimedia. In addition, the feasibility of multimedia is proven by the response of teachers and Gen-Z which is in the very good category. Furthermore, interactive learning multimedia can improve Gen – Z's digital literacy. This is because multimedia learning contains material that includes five digital literacy competencies, namely competencies in using technology, information and data literacy, communication and collaboration, digital content creation, and digital security. The value of the student's digital literacy index after learning science using interactive learning multimedia is 3.30 or is in the medium category.

References

Abaniel, A. (2021). Enhanced Conceptual Understanding, 21st Century Skills And Learning Attitudes Through An Open Inquiry Learning Model In Physics. *Journal of Technology and Science Education*, *11*(1), 30–43. https://doi.org/10.3926/jotse.1004

Aqmal Nurcahyo, M., Guru Sekolah Dasar, P., Keguruan dan Ilmu Pendidikan, F., Nahdlatul Ulama Kalimantan Barat, U., Kubu Raya, K., & Barat, K. (2020). Penggunaan Multimedia Interaktif untuk Meningkatkan Literasi Digital Siswa SMP Pada Mata Pelajaran IPA. *Jurnal Pendidikan Informatika Dan Sains*, *9*(2), 132–138. https://doi.org/10.31571/saintek.v9i2.2077

Buitrago-Flórez, F., Danies, G., Restrepo, S., & Hernández, C. (2021). Fostering 21st century competences through computational thinking and active learning: A mixed method study. In *International Journal of Instruction* (Vol. 14, Issue 3, pp. 737–754). Gate Association for Teaching and Education. https://doi.org/10.29333/iji.2021.14343a

Coleman, L. O., Gibson, P., Cotten, S. R., Howell-Moroney, M., & Stringer, K. (2016). Integrating Computing Across the Curriculum. *Journal of Educational Computing Research*, *54*(2), 275–294. https://doi.org/10.1177/0735633115616645

Databoks Katadata. (2022, June 29). *Survey: Gen Z Become The Most Internet Addicts*.

Ding, X., & Liu, J. (2012). Advantages and Disadvantages of PowerPoint in Lectures to Science Students. *International Journal of Education and Management Engineering*, *2*(9), 61–65. https://doi.org/10.5815/ijeme.2012.09.10

Dishon, G., & Gilead, T. (2021). Adaptability and Its Discontents: 21st-Century Skills and The Preparation For an Unpredictable Future. *British Journal of Educational Studies*, *69*(4), 393–413. https://doi.org/10.1080/00071005.2020.1829545

Emara, M., Hutchins, N., Grover, S., Snyder, C., & Biswas, G. (2021). Examining Student Regulation of Collaborative, Computational, Problem-Solving Processes in Open-Ended Learning Environments. *Journal of Learning Analytics*, *8*(1), 49–74. https://doi.org/10.18608/jla.2021.7230

Fauziyah, R., Hardini, T. I., Sunendar, D., Yulianeta, Y., Kurniawan, K., & Halimah, H. (2022). Bahasa Sebagai Pemersatu Bangsa: Eksistensi Literasi Digital dalam Penangkal Hoaks Language As a Unifying Nation: The Existence of Digital Literacy in Countering Hoaxes. *Jurnal Penelitian Pendidikan*, *22*(1), 98–107. https://doi.org/10.17509/jpp.v22i1.45505

Gregory, R. J. (2015). *Psycological Testing: History, Principles and Aplications*. Allyn and Bacon.

Guan, N., Song, J., & Li, D. (2018). On the Advantages of Computer Multimedia-aided English Teaching. *Procedia Computer Science*, *131*, 727–732. https://doi.org/10.1016/j.procs.2018.04.317

Julien, H. (2019). *Digital Literacy in Theory and Practice* (pp. 22–32). https://doi.org/10.4018/978-1-5225-7659-4.ch003

Kapi, A. Y., Ratna Zuarni Ramli, Osman Norlis, & Jamaliah Mohd Taib. (2017). Multimedia Education Tools for Effective Teaching and Learning. *Journal of Telecommunication, Electronic and Computer Engineering*, *9*(8). Retrieved from https://jtec.utem.edu.my/jtec/article/view/2645

Kementerian Komunikasi dan Informatika RI, K. (2022). *Status Literasi Digital di Indonesia 2021*.

Khoiriah, Jalmo, T., & Abdurrahman. (2016). The effect of multimedia-based teaching materials in science toward students' cognitive improvement. *Jurnal Pendidikan IPA Indonesia*, *5*(1), 75–82. https://doi.org/10.15294/jpii.v5i1.5793

Komang, I., Budi Wijaya, W., Ni, & Supadmini, K. (2020). *Pengembangan Literasi Digital pada Pembelajaran IPA di Era New Normal*. Retrieved from https://conference.ulm.ac.id/index.php/sndikdas/PS2DMP/paper/download/107/2

Mahadi, S. R. S. (2019). Cyber Addiction and the Impact towards Gen Zers Attitude in Learning. *International Journal of Academic Research in Business and Social Sciences*, *8*(12). https://doi.org/10.6007/ijarbss/v8-i12/5433

Ministry of CIT Indonesia. (2022, September 30). *Data Jumlah Hoaks Covid-19 per 30 September 2022*.

Naci Çoklar, A., & Tatli, A. (2021). Examining the Digital Nativity Levels of Digital Generations: From Generation X to Generation Z. *Shanlax International Journal of Education*, *9*(4), 433–434. https://doi.org/10.34293/education.v9i4.4224

Novanana, S. (2022). Empowering Digital Literacy for Underprivileged Youth in Jakarta. *Asian Journal of Community Services (AJCS)*, *1*(2), 59–70. https://doi.org/10.55927

Novitra, F., Festiyed, F., Yohandri, Y., & Asrizal, A. (2021). Development of Online-based Inquiry Learning Model to Improve 21st-Century Skills of Physics Students in Senior High School. *Eurasia Journal of Mathematics, Science and Technology Education*, *17*(9), em2004. https://doi.org/10.29333/ejmste/11152

Pratama, B. H., Eka Ratna, D., Ismanto, E., & Muhammadiyah Riau, U. (2019). *Pengembangan Media Pembelajaran Dengan Adobe Flash Pokok Bahasan Komunikasi Dalam Jaringan Untuk Kelas X SMK*. *3*(1), 29–40. Retrieved from https://urlis.net/pfot8cn

Purnama, S., Ulfah, M., Machali, I., Wibowo, A., & Narmaditya, B. S. (2021). Does digital literacy influence students' online risk? Evidence from Covid-19. *Heliyon*, *7*(6), e07406. https://doi.org/10.1016/j.heliyon.2021.e07406

Riswanto, D., & Marsinun, R. (2020). Perilaku Cyberbullying Remaja di Media Sosial. *Analitika*, *12*(2), 98–111. https://doi.org/10.31289/analitika.v12i2.3704

Semilarski, H., Soobard, R., & Rannikmäe, M. (2021). Promoting students' perceived self-efficacy towards 21st century skills through everyday life-related scenarios. *Education Sciences*, *11*(10). https://doi.org/10.3390/educsci11100570

Situmorang, D. D. B., Mulawarman, M., & Wibowo, M. E. (2018). Effect of assertive training on cyber bullying behavior for students. *Konselor*, *7*(2), 40. https://doi.org/10.24036/020187210294-0-00

Stark, L., Brünken, R., & Park, B. (2018). Emotional text design in multimedia learning: A mixed-methods study using eye tracking. *Computers & Education*, *120*, 185–196. https://doi.org/10.1016/j.compedu.2018.02.003

Stjepić, A.-M., Vukšić, M., & Suša Vugec, D. (2019). Digital literacy of generation z students and their attitudes and beliefs towards ICT knowledge and skills. *International Journal Vallis Aurea*, *5*(1), 17–29. https://doi.org/10.2507/IJVA.5.1.2.56

UNESCO. (2018). *A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2.*

http://uis.unesco.org/sites/default/files/documents/ip51-global-framework-reference-digital-literacy-skills-2018-en.pdf