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DEVELOPMENT OF VIBOT TO TRAIN DIGITAL LITERACY OF 10TH GRADE HIGH SCHOOL STUDENT

Pengembangan Media Pembelajaran Vibot untuk Melatihkan Literasi Digital Kelas X SMA

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Abstract

The world is transitioning toward Society 5.0, characterized by increasing globalization and advancements in digital technology, leading to substantial societal transformations, including the rise of Artificial Intelligence (AI), the Internet of Things, Big Data, and robots. Education may capitalize on this by utilizing ICT-based learning media accessible via diverse electronic device. Furthermore, it possesses the capacity to improve digital literacy competencies. Telegram is one of the available technologies. A survey conducted among 20 students revealed that 70% utilize the Telegram application, while its use for academic is infrequent. This project aims to create a valid, practical, and effective Telegram bot for acquiring knowledge about viruses. This study employs the 4D method (Define, Design, Develop, and Disseminate). Data were gathered utilizing validation procedures, Fry readability assessments, questionnaires, and examinations. The research trial was conducted on 20 students from Labschool Unesa 1 High School. We examined the gathered data employing descriptive-quantitative methodologies. The research findings indicate that ViBot possesses a high validity score of 3.87, rendering it appropriate for educational purposes; it is regarded as practical according to the readability assessment, which yielded a level 10 and a student response rate of 97.5%; ViBot is classified as highly effective based in the comprehensiveness of digital literacy indicators, achieving a percentage of 83.75%, which falls within the very good category. Consequently, we can ascertain that ViBot is valid, practical, and effective for imparting digital literacy in the 10th grade.
Keywords: media, bot, Telegram, virus, digital literacy, literacy skills.

Abstrak

Dunia memasuki era Society 5.0, dimana globalisasi dan evolusi teknologi digital berkembang sangat pesat serta membawa perubahan yang signifikan pada masyarakat seperti munculnya Artificial Intelligence *(AI/kecerdasan buatan),* Internet of Things *(internet untuk semua hal),* Big Data *(data yang besar), dan robot. Hal ini dapat dimanfaatkan dalam bidang pendidikan dengan menerapkan media belajar berbasis TIK yang bisa diakses melalui berbagai perangkat elektronik. Berkaitan dengan itu juga mampu melatih kemampuan literasi digital. Salah satu teknologi yang bisa dimanfaatkan adalah Telegram. Berdasarkan angket respon yang disebar ke 20 peserta didik, 70% diantaranya menggunakan aplikasi Telegram, namun jarang dimanfaatkan untuk belajar. Penelitian ini bertujuan untuk menghasilkan media pembelajaran bot Telegram pada materi virus yang valid, praktis, dan efektif. Penelitian ini menggunakan metode 4D (*Define, Design, Develop, *dan* Disseminate*). Data dikumpulkan melalui metode validasi, keterbacaan Fry, angket, dan tes. Uji coba penelitian dilakukan pada 20 peserta didik SMA Labschool Unesa 1. Data yang dikumpulkan dianalisis melalui teknik deskriptif-kuantitatif. Hasil penelitian menunjukkan bahwa ViBot sangat valid dengan perolehan skor validitas 3,87 sehingga tepat digunakan dalam pembelajaran; ViBot dinyatakan praktis ditinjau dari hasil uji keterbacaan yang menunjukkan level 10 dan respon peserta didik dengan persentase 97,5%; ViBot dinyatakan sangat efektif berdasarkan ketuntasan indikator literasi digital dengan persentase 83,75% menunjukkan kategori sangat bagus. Dengan demikian dapat disimpulkan bahwa dihasilkan ViBot yang valid, praktis, dan efektif digunakan untuk melatihkan literasi digital pada kelas 10.*
Kata Kunci: *media,* bot, Telegram, *virus, literasi digital, kemampuan literasi.*

INTRODUCTION

In this new era, Society 5.0 globalization and the advancement of digital technology are rapidly transforming society. Societies can address various societal difficulties by utilizing breakthroughs from the 4.0 industrial revolution, including artificial intelligence, the internet of things, big data, and robots (Hikmat, 2022). The advancement of digital technology necessitates persons to use diverse skills to accomplish jobs and resolve issues within a digital framework. These competencies are sometimes referred to as digital literacy (Milenkova & Lendzhova, 2021).

Digital literacy refers to the capacity to understand, access, and generate information obtained from digital technology (Hague & Payton in Kurnianingsih et al., 2017). Digital literacy within the educational context significantly enhances an individual's comprehension of a specific subject by fostering the inherent curiosity and inventiveness it entails (Hague & Payton in Kurnianingsih et al., 2017). Digital literacy empowers learner with the competencies to acquire information from the internet, utilize digital media and networks for research, implement, interpret, and generate information judiciously and intelligently, while complying with legal standards in everyday communication and interaction (Gilster in Kharisma, 2017).

Gilster in Kharisma (2017) classifies four competencies that an individual must possess to be deemed digitally literate. The competencies encompass: (1) internet searching; (2) hypertextual navigation; (3) content evaluation; and (4) knowledge assembly. A method to ascertain the average reading level of students is via the Programme for International Student Assessment (PISA) test. The PISA test occurs triennially, with Indonesia's most recent participation in 2022. The 2022 Programme for International Student Assessment (PISA) results indicate that Indonesia's literacy level is 359, well below the average score of OECD member nations, which varies from 472 to 480 points.

According to pre-study observations of 20 10th grade students, 55% struggle with navigation or directional guidance in web browsers; 75% faced challenges in exercising judgment or critical thinking to access the validity and completeness of information; 60% had difficulty compiling or constructing a body of knowledge regarding biology; and 65% faced obstacles in locating accurate and reliable sources of information online. The majority of students utilize websites to access supplementary educational materials. Additionally, 90% of students possess smartphones, although 10% utilize laptop. Utilizing contemporary electronic communication devices such as laptops and smartphones can enhance digital literacy. Nevertheless, the findings from the preliminary questionnaire indicate that the extensive utilization of contemporary electronic communication tool doesn't correspond with the students' digital literacy skills, which remain relatively deficient.

Digital literacy can be cultivated by the utilization of digital media among students, including the application of educational media or resources combined with digital technology (Mufarocha & Yuliani, 2021). Learning media include all items utilized as communicators that has the capacity to engage the intellect, attention, emotions, and aspirations of the learner, with the objective of facilitating a purposeful, focused, and regulated learning process.

Susantini et al. (2021) stated that information and communication technology-based learning facilitates digital education for both educators and learners by modernizing learning methods through the provision of digital learning resources. Telegram bots are a digital learning media that may be utilized with contemporary electronic communication tools. Telegram, a cloud-based instant messaging platform, has gained popularity as a communication tool across diverse societal strata.

Results from the pre-study questionnaire indicate that 55% of students had the Telegram application, although infrequently utilize it for educational purpose. The researchers aimed to capitalize on the chance to create educational media on Telegram. Telegram has established a Bot Application Programming Interface (API) accompanied by extensive documentation and functionalities (Telegram, 2023). Furthermore, the implementation of chatbot technology is seen as a means to get information in more efficient, inventive, and effective manners. Telegram as a learning media can facilitate the development of digital literacy in students by integrating the fundamental competences of digital literacy. The Telegram bot will include menu options for students, such as Foreword, Instructions for Use, Bot Characteristics, Learning Achievements & Learning Objectives, Flow of Learning Objectives, Mind Map, Material, Discussion Room, Bio Funxercise, Evaluation, Value Results, Glossary, Criticism & Suggestions, Developer Profile, and Student Response Questionnaire.

The fourth Sustainable Development Goals (SDGs) mandates the provision of quality education through technological innovation and initiatives to enhance digital literacy, enabling students to adapt to swift technological progress and equip them with the capabilities required for the 21st century. The creation of

learning media, exemplified by this Telegram bot, corresponds with this purpose. SDG 4 underscores the necessity of providing inclusive and equitable education while fostering lifelong learning opportunities for all individuals, as articulated on the official SDGs websites. Moreover, numerous technological innovations facilitate wider access to digital education, rendering technology an efficient instrument for equitable learner outreach. Consequently, the advancement of technology-driven educational tools, such as Telegram bots, is pertinent in enhancing students' learning efficacy.

Pre-study observations indicates that 65% of students have difficulties in understanding biology classes. Biology is a subfield of science that emphasizes the utilization of analytical, inductive, and deductive reasoning skills to identify and address issues pertaining to environmental phenomena. Agustina et al. (2017) endorse this notion by asserting that biology encompasses a systematic methodology for exploring and comprehending nature. Students are anticipated to engage actively in uncovering essential concepts in biology through diverse activities, including experiments, observations, graphics, illustrations, tables, and sharing their findings with others (Agustina et al., 2017). The pre-study questionnaire indicated that 65 of students identified virus content as the most challenging topic due to its complex concepts, numerous scientific terminologies, abstract nature, and unengaging learning media.

A study entitled "Development of ViBot Learning Media for Train Digital Literacy of 10th Grade High School Students" is required to resolve the issue outlined above.

METHODS

This study employs a quantities descriptive methodology utilizing a 4D framework (define, design, develop, disseminate). The media design of the ViBot virus material was produced with the assistance of the Telegram application and bot, incorporating feedback from lecturers and validators. The assessment was administered to 20 students in class X-2 at Labschool Unesa 1 High School from May 2023 to January 2024.

This study measure ViBot's validity, practically, and effectiveness. Three evaluators, comprising two biology lecturers from the Faculty of Mathematics and Natural Science at UNESA and a high school biology instructor, assessed the validity of the ViBot based on content feasibility, presentation feasibility, linguistic quality, and digital literacy indicators, employing a Likert scale and a 1-4 rating system. The validation score data is interpreted for the ViBot, with the following criteria: 1.00-1.75 = not valid; 1.76-2.50 = les valid; 2.51-3.25 = valid; and 3.26-4.00 = very valid. The assessment is deemed valid if the average score is ≥2.51.

The ViBot's functionality was evaluates based on the readability of virus-related content, thereafter analyzes using Fry's algorithm. The samples collected comprised the beginning, middle, and end segments, with each sample containing 1000 words. The number of phrases and syllables was counted and multiplied by 0.6, reflecting the ratio of syllables in Indonesian to foreign languages, which is 6:10. The readability findings are analyzed using the fry graph by extending a straight line until it connects at a single point. The fry graph categorizes the point's location into multiple tiers. ViBot is considered practical if its interpretation values range from levels 10 to 12, which is appropriate for high school readers.

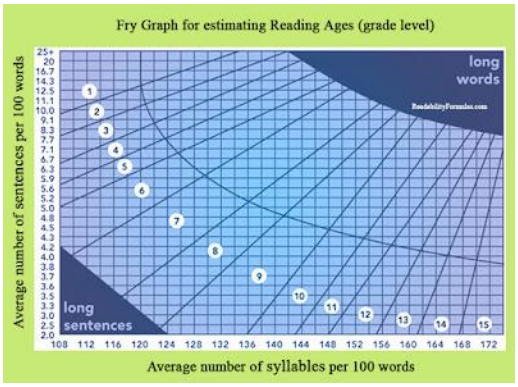


Figure 1. Fry Graph Formulation

The effectiveness of students' skills is assessed though the comprehensiveness of each digital literacy skill indicator: internet searching, hypertextual navigation, content evaluation, and knowledge assembly, which are evaluated against the passing grade score applicable at Labschool Unesa 1 High School (≥75). The attainment of each digital literacy indicators within ViBot features is determined by the following calculation:

$$\%\ indicator\ achievement = \frac{\sum students\ who\ are\ complete\ on\ indicator\ x}{\sum all\ sample\ students} \times 100\% \quad \text{.....(1)}$$

The outcomes for each digital literacy indicator are next analyzed according to the completeness interpretation criteria: 0-24% = incomplete; 25-49% = not complete; 50-74% = complete; and 75-100% = very complete, adapted from Groundlund (1982). ViBot is classified as complete if the indicator collection is ≥51%.

The effectiveness is evaluated based on the feedback from students and teachers through a questionnaire. The analysis utilized the Guttman scale, assign a score of 1

for the response "Yes" and a score of 0 for "No". The acquired data is subsequently computed as a percentage utilizing the formula outlined below:

$$Percentage\ of\ Student\ Responses = \frac{\sum aspect\ answerred\ "Yes"}{\sum students\ in\ class} \times 100\% \quad \text{.....(2)}$$

Upon acquiring the result using the aforementioned calculation formula, it was subsequently analyzed according to the interpretative criteria adapted from Riduwan (2013), which are as follows: 0-20% = not positive; 21-40% = less positive; 41-60% = quite positive; 61-80% = positive; and 81-100% = very positive. ViBot is deemed effective if the percentage of students is ≥61%.

RESULT AND DISCUSSION

The research has resulted in the creation of a ViBot learning media deign to enhance the digital literacy of 0th grade high school students. This ViBot contains virus material. The ViBot profile displays a profile photo representing the identity of the Telegram bot, along by content related to 10th grade high school material and a succinct description of the bot. the Telegram application can be downloaded, and the bot can be very easily searched by username/ID @Official_ViBot or by accessing the link t.me/Official_ViBot like in **Figure 2** below.

Figure 2. Telegram ViBot Profile

ViBot is manifested digitally as a Telegram bot, programmed by many bots including Botfather and Manybot, with media editing executed via the Canva application. The produced ViBot includes an introduction featuring (1) Foreword, (2) Instructions for Use, (3) Bot Characteristics, (4) Learning Achievements & Learning Objectives, (5) Flow of Learning Objectives, (6) Mind Map. For the content includes (7) Material (history of virus, virus characteristics, virus structure, virus form, virus reproduction, virus classification, and virus role), (8) Discussion Room, (9) Bio Funxercise, (10) Evaluation (containing 6 issues already integrated with digital literacy indicators), and (11) Value Results. The closing section contains (12) Glossary, (13) Criticism & Suggestions, (14) Developer Profile, and (15) Student Response Questionnaire. The vocabulary employed in ViBot has been crafted in compliance with the principles of the Indonesian language and is devoid of any ERRIPPPV (Ethnicity, Religion, Race, Intergroup, Pornography, Politics, Propaganda, and Violence) and structured plainly to enhance the clarity of the conveyed message.

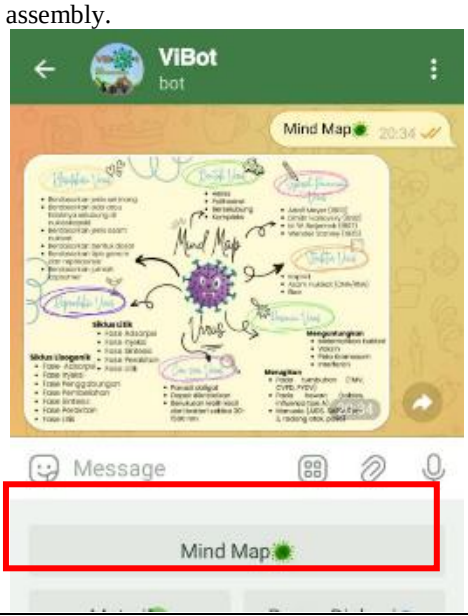
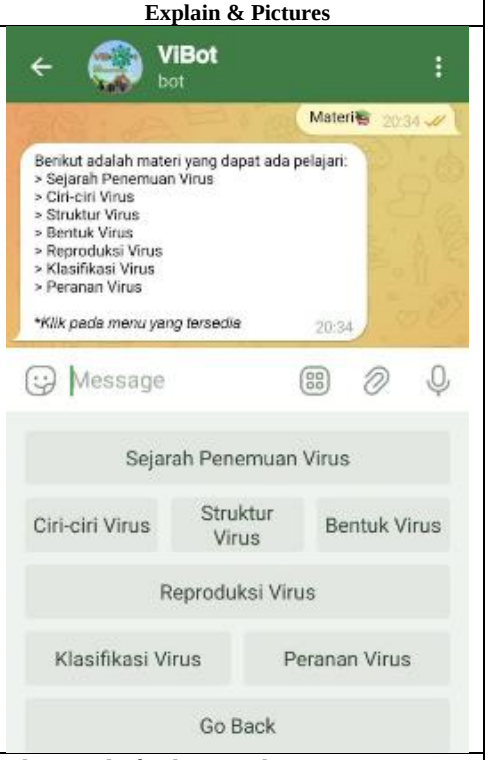
ViBot offers an elucidation of virus content via text and infographics, utilizing visual representations of images and colors to argument user engagement. Additionally, there are options for downloading, hyperlinks, and external links to other pages, including Jamboard/shared online board, websites, or YouTube. ViBot is accessible via multiple electronic devices, including smartphones, tablets, and laptops/PCs with internet connectivity. The ViBot is multimedia-oriented, capable of loading many forms of media including infographics, photos, videos, links, and documents. The ViBot includes menus and submenus equipped with a "Go Back" button for convenient navigation to the main menu. It not only downloads various media, but students can also submit similar content if a written command is provided on the ViBot. Kurniawati (2018) states that multimedia convey information through voice, visuals, and text given concurrently. The ViBot is applicable in remote education and is accessible at any time and from a location when students require it. According to Dhanan & Iwan (2021), distant learning can leverage technology-based educational resources that are location-independent and offer flexibility in terms of time limitations.

ViBot offers features tailored to virus content and includes questions designs to enhance student' digital literacy, such as internet searching, hypertextual navigation, content evaluation, and knowledge assembly. This aligns with Musthofa et al. (2020), indicating that the produced multimedia-based teaching tools can train students' digital literacy.

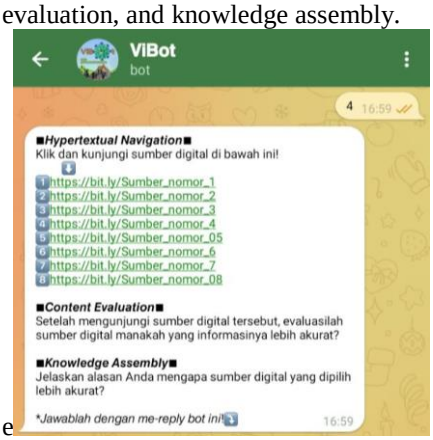
The primary attribute of the ViBot that emphasizes digital literacy instruction is the Evaluation features, with six questions that incorporate markers of digital literacy. Other features serve as supplementary element, including Foreword, Instructions for Use, Bot Characteristics,

Learning Achievements & Learning Objectives, Flow of Learning Objectives, Mind Map, Material, Discussion Room, Bio Funxercise, Value Results, Glossary, Criticism & Suggestions, Developer Profile, and Student Response Questionnaire. The features developed are presented in Table 1.

Table 1. Features in ViBot to Train Digital Literacy Skills

Features	Explain & Pictures
Mind Map	Features that incorporate Mind Map virus material and assist students in developing digital literacy skills, including hypertextual navigation and knowledge assembly. 
Material	A feature that includes text for reading and allows for the downloading of files such as images and PowerPoint presentations or provides access to links. This feature train digital literacy skills, including hypertextual navigation and knowledge assembly.
	
Discussion Room	This tool facilitates discussions among students and can support up to 200.000 member. This group allows the transmission of documents with a maximum capacity of 2 GB. 
Bio Funxercise	A feature for accessing student understanding through an engaging model, such as a quiz. This feature develops digital literacy skill, including hypertextual navigation and knowledge assembly. 
Evaluation	This feature aims to assess the comprehension of students linked to

Features	Explain & Pictures
	various web resources, including YouTube links, bot menfess links, Jamboard links, and others. The focus is on training students in digital literacy, encompassing hypertextual navigation, internet searching, content evaluation, and knowledge assembly. 
Evaluation question 2	Used to train digital literacy skills in accordance with what written in question 2 is internet searching. 
Evaluation question 1, 3, 5, & 6	The methods employed to develop digital literacy skills, as outlined question 1, 3, 5, and 6, include hypertextual navigation and knowledge assembly. 

Features	Explain & Pictures
	
Evaluation question 4	The training of digital literacy skills, as outlines in question 4, encompasses hypertextual navigation, content evaluation, and knowledge assembly.  e
Glossary	The glossary is a feature that provides definitions for a collection of important term, organized alphabetically, relevant to a specific field of knowledge.  e
Criticism	A tool for providing feedback on the

Features	Explain & Pictures
& Suggesti-ons	Telegram bot "ViBot" encompasses both critiques and recommendations aimed at enhancing the functionality of the ViBot. 
Students Response Question -naire	This feature includes several questionnaires that are completed after student utilize ViBot to assess its practicality in learning. 

The ViBot was subsequently validated by three validators. The validation results are presented as ViBot validity scores, accompanied by suggestions and inputs for enhancing ViBot prior to testing on samples. Table 2 presents the subsequent recapitulation of the ViBot.

Table 2. Recapitulation of ViBot Validation Results Data for Digital Literacy Training

No	Aspects assessed	Average
1.	Aspects Of Content Feasibility	3.93/Very Valid
2.	Aspects Of Presentation Feasibility	3.83/Very Valid
3.	Aspects Of Linguistic	3.87/Very Valid
4.	Aspects Of Digital Literacy	3.87/Very Valid
Average All Aspect/Category		3.87/ Very Valid

The validation results can be seen in Table 2 by three validators who obtained a validation of 3.87, which includes a very valid category and deserves to be used as teaching material in learning. The ViBot received a score of 3.93 for aspects of content feasibility, 3.83 for aspects of presentation feasibility, 3.87 for aspects of linguistics, and 3.87 for aspects of digital literacy.

Multimedia significantly influences the educational sphere, particularly due to the swift advancement of digital technology. Kurniawati (2018) asserts that multimedia has evolved beyond mere text and images to encompass sound, animation, and video delivered in an interactive manner. This technology facilitates the more efficient processing, storage, and delivery of information. In the realm of education, multimedia is important in delivering content that necessitates precision or is challenging to articulate vocally or in written form. The utilization of graphics, diagrams, photos, videos, infographics, colors, visualizations, and animations can optimize sensory engagement in knowledge acquisition and improve students' comprehension.

This study developed ViBot as a digital learning medium to enhance digital literacy. The validity of ViBot is evaluated based on multiple criteria, including content feasibility, presentation, language, and digital literacy. In terms of content feasibility, ViBot obtained an average score of 3.93, categorizing it as highly genuine. This demonstrates that ViBot can accurately communicate viral concepts and materials in alignment with the learning objectives and designated digital literacy KPIs. The material in ViBot is organized and facilitates learning activities, maintaining a harmonious balance between content and practice. The material includes concept maps that enhance students' comprehension of the structure and progression of learning.

Furthermore, ViBot offers ancillary information via visualizations and external resources, including images, documents, and connections, intended to facilitate autonomous learning. This aligns with the perspective of Ulumudin et al. (2017), who assert that effective learning materials should promote autonomous study among learners. Nevertheless, many categories necessitate enhancement, including the breadth and profundity of the material content, as well as the degree of currency, which attained a score of 3.67. The content provided is pertinent; nevertheless, it requires revisions to reflect the most recent advancements in research. The presentation quality of ViBot received a commendable average score of 3.83. The material is organized sequentially, beginning with the introduction, followed by the primary substance, and closing with a summary. The presentation of each sub-menu feature demonstrates a coherent line of reasoning and is readily accessible. ViBot's navigation is intuitively designed, featuring a "back" button that enables users to transition between functionalities with ease. The photographs utilized in ViBot are of high quality, clear, vibrant, and sourced appropriately. Nonetheless, several photographs are deemed less pertinent due to their origin from less reputable blogs. Consequently, it is prudent to obtain photos from

scientific journals or reference texts to augment the material's trustworthiness.

ViBot's design is straightforward and engaging, achieving a usability score of 3.67. While the majority of users consider the interface intuitive, enhancements are still necessary, including the simplification of the layout and the selection of more suitable font kinds and sizes to adhere to readability standards. This aligns with Landoni & Gibb (2000), who assert that information is more comprehensible when the text type is clear and legible. The file download and upload feature, which garnered a score of 3.67, demands further development. While this feature typically satisfies user requirements, enhancements to the interface are essential for an improved user experience.

The linguistic component of ViBot received a score of 3.87, categorizing it as highly valid. The wording employed conforms to EYD regulations, is clear, instructive, and compatible with pertinent biological terminology. This facilitates students' comprehension of the learning content, as indicated by Ulumudin et al. (2017), who underscore the significance of accurate and communicative language in enhancing students' understanding.

ViBot demonstrates significant efficacy in enhancing digital literacy, with an average score of 3.87. Students' digital literacy is developed through integrated elements, including the capacity to search for information online, comprehend hyperlinks and hypertext, and methodically organize information. The "Evaluation" function of ViBot comprises six questions aimed at developing the four markers of digital literacy. This corresponds with the perspectives of Western Sydney University, which underscores the significance of digital literacy in education, employment, and daily life within an ever-evolving digital technology landscape.

ViBot is considered valid from multiple perspectives, including content, presentation, language, and digital literacy. Nevertheless, other elements require enhancement, including the modernization of content, the selection of credible picture sources, and the refinement of the interface design. ViBot has excellent validity and offers potential for enhancement, making it an appropriate digital learning medium for cultivating digital literacy in pupils. The efficacy of ViBot is derived from the outcomes of readability assessments employing the Fry Graph methodology and feedback from student surveys. The readability of ViBot is assessed utilizing the Fry Graph developed by Edward Fry. This readability assessment evaluates content crafted to align with readers' proper difficulty levels, enabling the prediction that pupils who comprehend the text well would perform well. (Janan & Wray, 2014). Table 3 below presents the readability results.

Table 3. Summary of Readability Utilizing the Fry Graph Formula

Read-ing Sam-ples	On Featu-res	∑ Sentence	∑ Syllable	∑ Syllable*0,6	Le-vels
Beginn-ing	Virus History Sub-Material	7	268	160,8	10
Middle	Virus Structure Sub-Material	4,8	256	153,6	10
End	Role of Viruses Sub-Material	6,4	266	159,6	10
Average		6,06	263,33	158	10

The mean outcomes of the fry graph from the three datasets are illustrated in Figure 3 below:

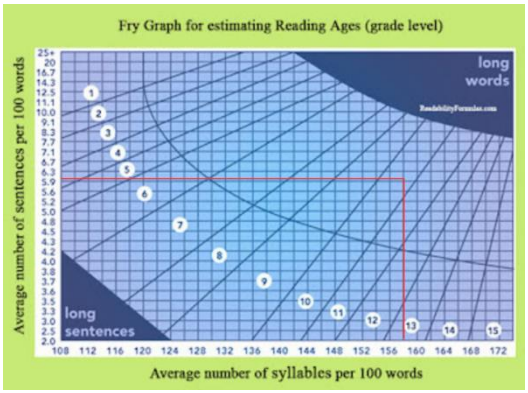


Figure 3. Fry Graph Readability Test Results

ViBot is classified as effective when the sentence and syllable count in the text aligns with the appropriate grade level and is comprehensible to students. Students encounter challenges in acquiring information when utilizing teaching materials that contain texts exceeding their grade-level readability. Conversely, paragraphs that utilize excessively simple vocabulary exhibit a readability level that is beneath the student's grade level (Anggraeni et al., 2022).

The conversion results of three paragraph samples from the beginning (virus history), middle (virus structure), and end (role of virus) of ViBot, as presented in Table 3 and Figure 3, illustrate the developed outcomes. The average number of sentences per hundred words in each sample was 7, 4.8, and 6.4, respectively. The average syllable count derived from the Fry graph was 160.8 for the first sample, 153.6 for the second sample, and 159.6 for the third sample. The analysis of the three tested samples revealed an average of 6.06 sentences and a total average of 158 syllables, as

determined by the Fry graph. This corresponds to a level 10, indicating that the ViBot is appropriate and effective for tenth-grade high school students. According to Tarigan (2019), understanding reading content necessitates consideration of the key point that the reading's level of ease or difficulty must be tailored to the target audience.

Students' responses revealed the second practicality. The questionnaire responses from the students were utilized to assess the feasibility of the developed ViBot Telegram. The data from the student response questionnaire were sindicated by the options "Yes" or "No." Figure 4 illustrates the results of the recapitulation of student responses.

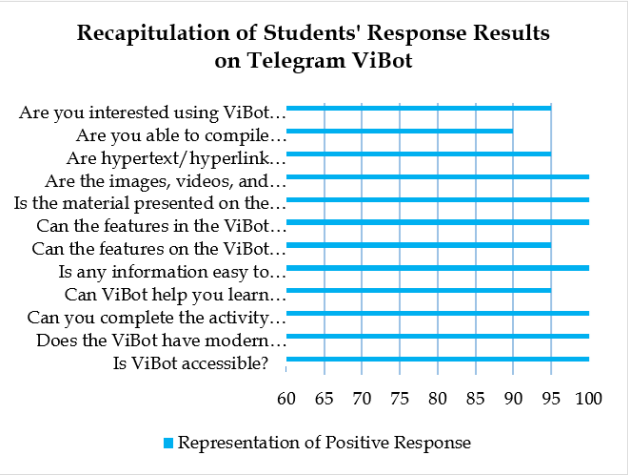


Figure 4. Recapitulation of Student Response Results on ViBot Telegram

Based on the data from student responses in Figure 4, an average percentage result of 97.75% was obtained, indicating a very positive response towards the developed ViBot Telegram. Criticism and suggestions were also found as shown in the following Table 4.

Table 4. Criticism and Suggestions from Students Regarding ViBot Telegram for Digital Literacy Training

No.	Criticism and Suggestions
1.	My personal critique is that I dislike prolonged study utilizing mobile or digital media; perhaps in the future, learning via Telegram or digital platforms could serve as a diversion.

The student response data were derived from a questionnaire completed by 20 students from class X-2 Labschool Unesa 1 High School. The students completed the questionnaire following their use of the developed ViBot. The distributed response questionnaire comprised 12 questions focused on ease of use. According to the research by Andayani (2021), the ease of operating educational media significantly affects students' willingness to utilize such media. This statement correlates directly with the survey results, which yielded an overall average of 97.5% in the highly positive category.

Students responded positively to seven questions, beginning with question 1, 2, 3, 5, 7, 8, and 9. Five questions yielded suboptimal responses, particularly question number 4, "Can ViBot help you learn independently?", which received a 95% positive response rate due to one student answering "No". In question number 6, "Can the features in ViBot attract your interest and motivation to learn?" 95% of respondents indicated a positive response, as only one student answered "No." The student who provided feedback and suggestions on the questionnaire was unable to view the smartphone screen for extended durations. In response to question number 10, which inquires whether the hypertext/hyperlink navigation instructions are easily accessible, one student indicated "No." In response to question number 11, "Are you able to organize knowledge related to the Virus material after using ViBot?", two students indicated "No." In response to question number 12, "Are you interested in using ViBot in the learning process?" one student indicated "No." According to Nuraliyah et al. (2022), several questionnaire items received suboptimal responses. They assert that mobile phones and smartphones serve as effective learning tools, as most devices possess sufficient features and services to facilitate the learning process. Prolonged use of mobile phones results in electromagnetic radiation exposure, which can lead to headaches and eye discomfort. The criticism presented in Table 4 suggests that a potential solution may involve integrating a digital learning model with alternative methods, including in-person instruction or hands-on activities. Telegram serves as a medium for introducing topics, assigning tasks, or conducting exercises. Furthermore, it may serve as an alternative communication channel. Another solution involves dividing the material into multiple segments, thereby reducing the content loaded in ViBot. Alternatively, the material can be provided in installments across several sessions, which effectively decreases the duration of screen time. Consequently, students should not excessively engage with their phone screens, as these devices serve merely as a supplement to in-person learning. Clark (2015) conducted an experiment demonstrating that the integration of digital and face-to-face learning enhances student engagement and improves learning outcomes. The blended learning approach, integrating digital learning with in-person interactions, enhances the educational experience and mitigates learning fatigue associated with digital media use.

Garrison and Kanuka (2004). Learning through Telegram or other digital media offers advantages, yet does so in a balanced manner that does not overwhelm students.

The effectiveness of ViBot in teaching digital literacy to 10th grade high school students is determined by the achievement of digital literacy indicators, assessed through evaluation questions designed for this purpose. Following an examination of ViBot and the completion of all test questions related to the evaluation feature, the objective is to assess students' digital literacy skills. Each evaluation question includes an explanation of the digital literacy skills being practiced. A single question can simultaneously assess one to three skill indicators. The outcomes for each digital literacy indicator for students are presented in Figure 5.

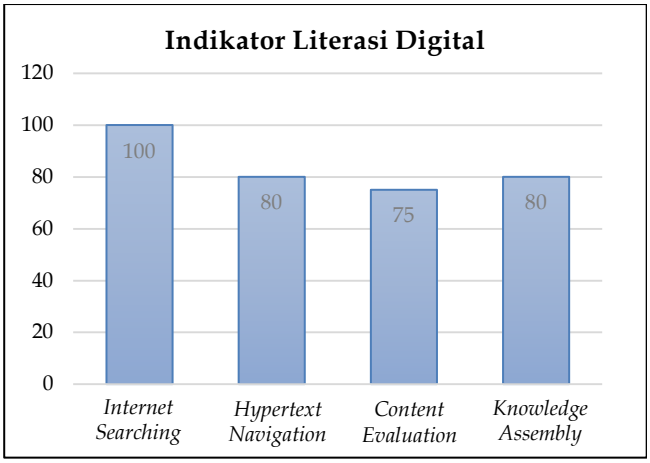


Figure 5. Summary of Digital Literacy Indicator Attainment

According to Figure 5, the data indicates that four digital literacy indicators taught to students are classified in the complete category, exhibiting an achievement range of 75%-100% and an average of 83.75%. The highest percentage of student proficiency in internet searching was 100% for the sub-material characteristics of viruses, followed by hypertextual navigation and knowledge assembly, both at 80%. The lowest percentage was for content evaluation, which was 75% for the sub-material classification of viruses.

This study's results on the digital literacy exam were predicated on the capacity to independently complete the evaluation questions. The assessment has been incorporated with digital literacy competencies, specifically internet searching, hypertextual navigation, content appraisal, and knowledge assembly, as referenced by Gilster (1997). The summary of individual literacy completeness, assessed through six evaluation questions on virus material integrated with digital literacy indicators, as illustrated in Figure 4, reveals results ranging from good to very good, with an overall average score of 83.75%, categorizing it as very good. This indicates that ViBot is highly effective in enhancing digital literacy training. Kurniawan & Kusniadi (2021) assert that digital learning media can facilitate the development of students' digital literacy skills. Digital literacy abilities encompass the capacity to utilize digital technology to acquire, manage, comprehend, integrate, analyze, evaluate information, and generate new knowledge. (Law et al., 2018).

The online search indicator received a 100% rating in the excellent category. This signifies that students can proficiently utilize a search engine to locate information online. The indicator is implemented in ViBot via the Evaluation function of question number 2, wherein students participate in tasks that involve locating digital knowledge sources pertinent to the subject of viruses. This evaluation question number 2 effectively cultivates digital literacy through the internet searching indication, as it encompasses the skills to access, search, and pick pertinent digital content. In ViBot, students are instructed to seek information pertaining to viruses, fostering fundamental digital literacy competencies including search engine proficiency, source verification, and comprehension of digital content. Digital literacy includes the skills necessary to comprehend, analyze, and evaluate information in the swiftly evolving digital landscape.

The hypertextual navigation indication achieved a score of 80%, signifying a commendable level and demonstrating the students' proficiency in comprehending and utilizing digital navigation tools, important to digital literacy. Hypertextual navigation refers to the capacity to comprehend navigational or directional aids in web browsers or digital resources and to know how to utilize them effectively. (Rini et al., 2020). This skill can be developed using the navigation tools included in ViBot. The initial display of ViBot, accessible by pressing "/start," presents many tools, including feature selections, assistance options, article references, and a "back" button. Certain navigation tools, such as those previously referenced, enable learners to traverse digital content and resources systematically and efficiently. Consequently, the utilization of navigation tools in ViBot aids learners in cultivating these competencies as an integral component of digital literacy. Questions 1, 3, 4, 5, and 6 have directional arrow directions specifying the links to be clicked. Hypertextual navigation serves as a directing framework that readers must comprehend when participating in digital literacy, as it directs them through the hyperlink

features embedded within the informational content. (Idris & Ashari, 2019).

The content evaluation yielded a score of 75%, categorizing it as very good, signifying that pupils possess the ability to critically assess content. Content evaluation assists students in determining the validity and relevance of information pertaining to the subject under examination. This instructs pupils to analyze critically the sources of information they receive on the internet. This indicator received the lowest proportion compared to other indicators. This may result from several circumstances. One issue is pupils' inability to critically assess material and ascertain the veracity and comprehensiveness of internet sources. While students may access and utilize information online, they may not yet possess a comprehensive understanding of how to evaluate the quality and authenticity of that information. Content evaluation necessitates the capacity to differentiate reputable material from questionable sources, a skill that some students may not have fully acquired, particularly during the initial phases of digital literacy education. (Kharisma, 2017). A further problem may arise from the question design, which might not adequately promote comprehensive analysis, or from the learners' insufficient experience in evaluating content quality. Effectively assessing digital material necessitates the progressive development of critical thinking skills. (Rini et al., 2020). This elucidates why knowledge assembly attained a score of 80%, as it is affected by the students' individual traits, who have not completely learned the skills in the interconnected indicators. In question number 4, which encompasses three primary indicators—hypertextual navigation, content evaluation, and knowledge assembly—students demonstrate proficiency in hypertextual navigation; however, deficiencies in content evaluation lead to subpar knowledge assembly skills. ViBot facilitates the development of digital literacy in the content evaluation domain, characterized by tasks that necessitate learners to assess the validity and comprehensiveness of encountered information via provided hyperlinks. For instance, in question number 4, learners must explore eight digital information sources and select one that offers the most accurate information. The capacity for content evaluation encompasses students' critical thinking skills and their ability to examine online information, as well as to discern the validity and comprehensiveness of information cited through hypertext links (Kharisma, 2017).

The knowledge assembly indication earned an 80% score, categorizing it as very good. The capacity for knowledge assembly is a competence in processing information sourced from diverse digital platforms by systematically organizing the acquired knowledge, ultimately yielding new insights. According to Sharma et al. (2021), the information processing model theory posits that individuals possess varying capacities in information processing due to variances in cognitive ability. Engaging in digital literacy is demonstrated through activities such as examining the structure of the virus in question one, viewing a video on virus replication and articulating it in one's own words for evaluation question three, justifying the selection of one of the eight more reliable digital sources in question four, analyzing the virus's role based on the reference journal in question five, and composing a sentence for the HIV/AIDS awareness campaign as outlined in question six. Consequently, the knowledge assembly indication necessitates cognitive techniques, such as information repetition, to attain superior outcomes.

Following the educational process utilizing ViBot on viral material, the outcomes from the four digital literacy indicators demonstrated an excellent classification. The findings demonstrate that ViBot is useful for educational purposes. The efficacy of ViBot is determined by its comprehensiveness, which can assist students in their educational endeavors. The ViBot utilized is packed with capabilities that encompass diverse learning directives, aiding pupils in the practice of digital literacy. The OECD (2019) asserts that digital media offering explicit instructions can augment knowledge of the potential benefits of utilizing ICT for personal well-being.

Four digital literacy metrics developed through ViBot activities facilitate students in constructing their knowledge. These activities assist students in accessing, processing, and cultivating the information and knowledge they obtain through digital literacy metrics. Student engagement in learning activities utilizing that strategy fosters independent idea construction. This construction process is intricately linked to the students' digital literacy competencies. In the realm of education, Piaget's theory posits that optimal learning transpires when students are actively involved in direct actions and experiences that enable them to construct their own knowledge, rather than passively absorbing information (Kalina& Powell, 2009). As previously stated, knowledge is derived from the individual experiences of learners during their interactions with ViBot. Individuals possessing digital literacy skills can obtain information pertaining to educational resources from diverse and continuously expanding sources. Mastery of digital literacy is essential for every individual, as the internet

offers diverse information and digital technology is swiftly advancing across multiple domains, including education. It is essential for individuals to possess a critical comprehension of information obtained via digital technology, to discern reputable sources, and to prevent the dissemination of disinformation. (Leaning, 2019). Consequently, the acquisition of digital literacy is essential for students to prepare for future problems.

CLOSING

Conclusion

The conclusion of the results of the study, this study produced ViBot virus material to train digital literacy skills of 10th grade high school students who were valid, practical, and effective with a validity score of 3.87 based on aspects of content feasibility, presentation, linguistic, and digital literacy indicators; ViBot readability by test results in accordance with the readability of 10th grade high school that is level 10; and the completeness of digital literacy indicators with an average score of 83.75% and students responses percentage of 97.5% with the same category is very good.

Suggestion

Further research related to media development follows technological developments in the era of society 5.0 that can train digital literacy skills, advanced research using Telegram bots, and advanced studies related to the application of ViBot in learning to find out the learning outcomes of students.

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