Based Leaening Media Development In Junior High School

Zineb El Atmani[1]
Abdelmalek Essaadi University

El Mehdi Bellfkih[2]
Hassan II

Mourad Madrane[3]
Abdelmalek Essaadi University

Corespondence : Zineb El Atmani (zineb.elatmani@etu.uae.ac.ma)

Abstract

Since the COVID-19 outbreak, numerous technology-based learning tools have been developed, including the availability of Virtual Field Trips (VFT) at various museums and organisations. This is an innovation in scientific education that is expected to improve students' cognitive and emotive capacities. The purpose of this study is to assess the need for VFT-based learning media in scientific instruction at the Junior High School level. The study takes a qualitative approach, gathering both quantitative and qualitative data using questionnaire surveys. The respondents, 33 Junior High School teachers from diverse regions in Indonesia, are already experienced with using electronic devices and internet access to enhance technology-based learning in their scientific lessons. Furthermore, Junior High School teachers are used to using technology-based learning resources into scientific instruction. However, as an innovative method to teaching, there is a need to develop technology-based learning media, notably Virtual Field Trips (VFT), in science education at the Junior High School level. As a result, more research into the development of VFT-based learning media in science teaching at the Junior High School level is required.

Keywords: Learning Media; Needs Analysis; Virtual Field Trips

Introduction

The advent of technology has ushered in substantial transformations in the realm of education. The advent of technology has facilitated the broadening of accessibility and the emergence of novel prospects for students and educators globally. The invention and utilisation of learning media have had a profound impact on the advancement of technology in education. Researchers, both in Indonesia and beyond, have created educational media that rely on technology. The technology-driven learning resources encompass e-modules, educational games, virtual reality, augmented reality, artificial intelligence, and various other tools. The utilisation of technology-based learning media has been widely recognised for its ability to enhance interactivity in the learning process (Alfin & Listiadi, 2021; Shalikhah, 2016; Yazdi, 2012). It also provides students with opportunities to develop self-regulated learning skills (Marpaung et al., 2021; Sutarno & Mukhidin, 2013; Syaputrizal & Jannah, 2019), foster creativity (Nurmala et al., 2021; Sugandi & Rasyid, 2019), and promote creative thinking (Heswari & Patri, 2022; Rohimah et al., 2020). Furthermore, it stimulates students' interest in learning (Estapa & Nadolny, 2015; Muammar & Suhartina, 2018; Negara et al., 2019; Nursyam, 2019), enhances collaboration skills (Mawaddah et al., 2022), serves as a valuable tool for numeracy-focused education (Santosa & Hasibuan, 2022), and facilitates interaction between students and teachers, as well as among students (Ishak et al., 2019).

Technology can be effectively employed in science education to enhance learning. Various entities have developed technology-based educational applications to serve as learning tools in science education, aiding students in comprehending scientific concepts. Several examples of these applications include ChemCraft (Han, 2021), Ubiquitous-Physics (Purba & Hwang, 2017, 2018), SimplePhy (Lago,

2021), and numerous others. These applications facilitate independent study of science subjects for students and learners. In addition, technology-driven instructional games like Minecraft: Education Edition, ChemBlaster, and Gravity Simulator can enhance science education by facilitating the development of students' scientific proficiency.

Due to the global impact of the COVID-19 epidemic, schools have transitioned from traditional methods of learning to technology-driven approaches. This movement has been prompted by the implementation of severe regulations on human interactions and the use of remote learning. Virtual classrooms are utilising a range of technology-based learning programmes to enhance education. In addition to educational applications, a diverse range of instructional videos are being extensively disseminated by various entities to facilitate student learning. Traditional laboratory activities conducted in person have been converted into virtual laboratories (Daineko et al., 2017; Vasiliadou, 2020). Moreover, traditional learning activities undertaken outside the classroom, such as field excursions, have been substituted with virtual field trip programmes offered by museums and educational institutions. These programmes enable off-site learning without the requirement for physical visits to the venues. Indonesia has a number of museums that provide virtual tours to make virtual field trips easier. These include the Museum Nasional, the Museum Geologi, the Museum Sangiran, and others.

A school trip is a visit organised by a school or class that allows students to engage with the surroundings, exhibits, and exhibitions in order to link the educational content with the direct experiences of the students (Krepel & DuVall, 1981). Multiple studies have demonstrated that incorporating field trips into education is a successful method for improving students' learning outcomes and cognitive and affective abilities (Muchsin et al., 2021; Ningsih, 2021; Nurhaedah & Pagarra, 2017; Petersen et al., 2020; Rahayu et al., 2023; Rochmadhani et al., 2019; Yuliati & Martuti, 2015). Nevertheless, the progress in technology over this decade has resulted in the rise of virtual field excursions, gradually supplanting the conventional practice of physically visiting the destination (Seifan et al., 2019).

According to Woerner (1999), a virtual field trip (VFT) is a travel that is undertaken without physically visiting the location. Researchers from multiple nations have undertaken numerous studies on the use of virtual field trips in teaching. Melinda et al. (2017) have undertaken the task of developing VFT-based learning media in Indonesia to enhance social studies education in elementary schools. The study conducted by Melinda et al. (2017) shown the efficacy of VFT-based learning media in facilitating learning. Nevertheless, there is a lack of published research on the creation of VFT-based educational materials for scientific instruction in Indonesian elementary schools. However, multiple studies have demonstrated that incorporating field trips into science education is a successful strategy for teachers to improve students' learning achievements (Muchsin et al., 2021; Rochmadhani et al., 2019) and positively influence students' process skills, scientific literacy, and scientific attitudes (Dinata et al., 2018; Rifqiawati et al., 2017).

Hence, the incorporation of Virtual Field Trips (VFT) as a fusion of physical excursions and technological tools in science education is imperative for educators, particularly at the Junior High School level, as it corresponds to the traits of the students and represents a novel approach to learning. Therefore, it is imperative to perform research to analyse the necessity of utilising VFT-based learning media in science education at the Junior High School level. This is conducted to validate the necessity of utilising VFT-based learning materials in scientific education at the Junior High School level. This study attempts to analyse the necessity of creating virtual field trips as a learning medium for scientific education at the Junior High School level. The findings of this study will establish an initial groundwork for doing subsequent research on the creation of science learning materials using virtual field trips for Junior High School students.

Methods

This study employs a qualitative methodology. Data were gathered via the dissemination of a questionnaire utilising the Google Forms platform, administered between April and May 2023. The questionnaire comprised 13 questions presented in the format of checkboxes (permitting multiple responses), multiple choice (permitting just one response), and brief answers. The questions from the requirements analysis questionnaire are succinctly outlined in Table 1.

Questions	Types	Options
Which instructional resources do you utilise in your scientific education sessions? (Question number 1)	Checkboxes	Textbooks issued by a publisher. Textbooks now accessible in the school library. Modules exclusively utilised by the internal community of the school. (restricted). Modules created autonomously by teachers. The modules are created by the topic teacher working group (MGMP). Visual aids for presentations, such as PowerPoint (PPT) or Canva slides. Alternative ...
Which electronic devices do you employ in your teaching and learning endeavours? (Question number 2)	Checkboxes	Computer, PC, laptop, smartphone, tablet, and projector. Alternative ...
What is the frequency of your internet usage during science learning classes in the classroom? (Question number 3)	Multiple Choice	I abstain from utilising the internet during science instructional sessions in the classroom. I exclusively utilise the internet for specific subjects just during classroom scientific lessons. I consistently utilise the internet during science instruction sessions in the classroom. Alternative ...
If you utilise the internet for instructional purposes in your classroom, which network do you employ? (Question number 4)	Multiple Choice	The school's accessible Wi-Fi network. Accessing the internet via a personal smartphone's tethering or hotspot feature. Alternative ...
Do you incorporate technology-based educational resources into your science lessons in the classroom? (Question 5)	Multiple Choice	YesNo
Among the given options, which statement most accurately characterises your scenario in terms of using science education learning media in the classroom? (Question number 6)	Multiple Choice	I utilise self-created science education learning media. I utilise pre-existing science education learning media created by others. I abstain from utilising educational media for science instruction within the classroom.
Which learning material, whether technology-based or non-technology-based, do you utilise in your science teachings inside the classroom? (Question 7)	Short Answer	-
Is the use of technology-based learning material necessary for performing science instruction in the classroom? (Question 8)	Multiple Choice	YesNo
Have you ever implemented science education classes utilising the field trip approach beyond the confines of the classroom or school? (Question number 9)	Multiple Choice	YesNo
Which scientific issue is appropriate for the application of the field trip methodology in the context of learning? (Question number 10	Short Answer	-
Are you acquainted with virtual field trips (VFT)-based educational media? (Question 11)	Multiple Choice	YesNo

Questions	Types	Options
Virtual field trips (VFT) are a learning experience that allows students to explore specific places or locations using technology such as videos, photos, or animations, enabling observation without physically being present or having the opportunity to receive explanations from experts. In your opinion, is the development of virtual field trips (VFT)-based learning media needed in science education lessons in the classroom? (Question number 12)	Multiple Choice	YesNo
If there is a free virtual field trip (VFT)-based learning media available for Junior High School science learning, would you use it in your future teaching? (Question number 13)	Multiple Choice	YesNo

Table 2. Respondents Information

Components	Information
Current Grade Level Being Instructed	One participant is presently instructing a class of first-grade students. There are presently 2 individuals that are instructing Grade 2. Currently, there are three individuals that are instructing students in Grade 3. There are presently 9 individuals that are instructing Grade 4. There are presently 8 individuals that are instructing Grade 5. There are presently 10 individuals that are instructing Grade 6.
Gender	10 males 23 females
Institution	There are 8 participants that are currently employed as educators in private educational institutions. There are 25 individuals who are now employed as educators in public schools.
Province	There are 17 participants who are from DKI Jakarta. There are a total of 9 participants who are from the province of Banten. There are a total of 6 responses from the Jawa Barat region. One participant is from Bali.
Educational Background	There are 27 participants who possess a Bachelor's degree (S1) as their educational qualification. There are 6 participants who possess a Master's degree (S2) in their educational background.

The participants consist of Junior High School educators distributed throughout multiple regions in four Indonesian provinces, specifically DKI Jakarta, West Java, Banten, and Bali. This study involved a cohort of 33 Junior High School teachers from 26 public and private institutions who actively participated as responders. Table 2 displays the data regarding the respondents.

Following the collection of data, the responses to the short answer questions were tabulated and subsequently processed to determine the percentage for each item. The identical procedure was utilised. The data from the checkbox and multiple-choice questions was analysed to determine the proportion for each option. The data analysis is centred on determining the percentage value of each individual item or option. The data analysis procedure involved eliminating extraneous data, followed by the presentation of the data in diagrammatic form. Subsequently, the analysis was used to make further validation or conclusions (Hasibuan et al., 2020). Figure 1 displays the research flowchart.

Figure 1 displays a flowchart representing the research process.

The conclusions regarding the necessity of virtual field trips-based learning media in Junior High School science learning are derived from the findings gathered through data analysis.

Results and Discussion

The findings from the questionnaire are outlined in the subsequent presentation. The analysis of these findings will establish a solid foundation for investigating and creating educational media centred around virtual field trips (VFTs) in science teaching for Junior High School.

Instructional resources and technology-enhanced educational aids

Questions 1-4 on the questionnaire pertain to the teaching materials and technology-based learning support aids employed by Junior High School instructors in their science classes. Figure 2 displays the findings of question number 1, which pertain to the teaching materials employed by teachers.

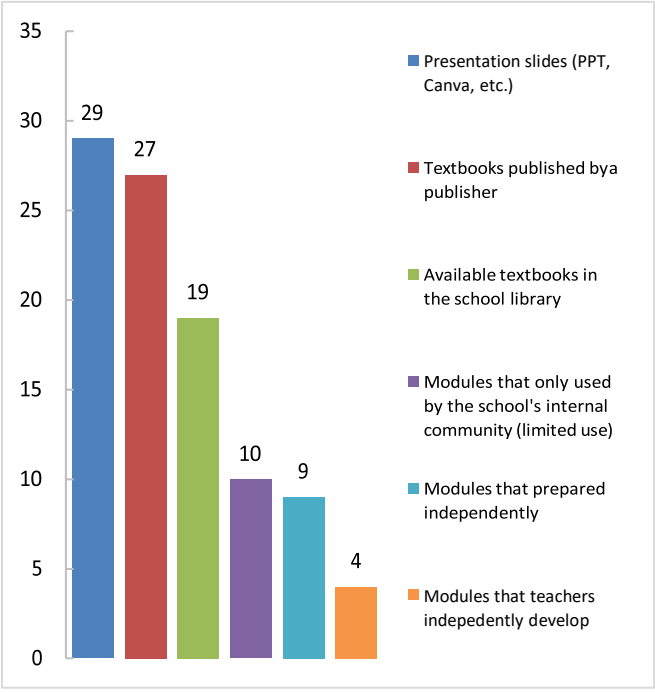


Figure 2 displays the teaching materials utilised by junior high school teachers.

According to the statistics depicted in Figure 2, it is evident that 88% of respondents utilise presentation slides, such as PowerPoint, Canva, and other similar tools, as instructional resources in the classroom. Moreover, a significant majority of respondents, specifically 82%, rely on textbooks produced by publishers, whilst 58% make use of textbooks accessible at the library for instructional purposes. However, the utilisation of modules as teaching materials is rather low among respondents. Specifically, 30% of respondents employ modules within a restricted number of institutions, 27% of respondents utilise self-created modules, and a mere 12% make use of modules developed by the subject teacher working group (MGMP).

Therefore, it can be asserted that presentation slides and textbooks are the primary teaching materials that teachers utilise in their education, surpassing the use of modules. However, the data shown

in Figure 1 also indicates that certain teachers employ diverse instructional resources throughout classroom instruction. This suggests that certain educators utilise a diverse range of instructional resources in order to facilitate students' understanding of the educational materials. This aligns with the conclusions made by Ariesandi et al. (2021) and Ali et al. (2022), which indicate that teachers employ various forms of instructional resources in their classroom teaching to enhance students' comprehension of the content.

Questions 2, 3, and 4 pertain to technology-driven educational resources. Question 2 pertains to the use of electronic devices for scientific education in the classroom, with the corresponding outcomes being displayed in Figure 3.

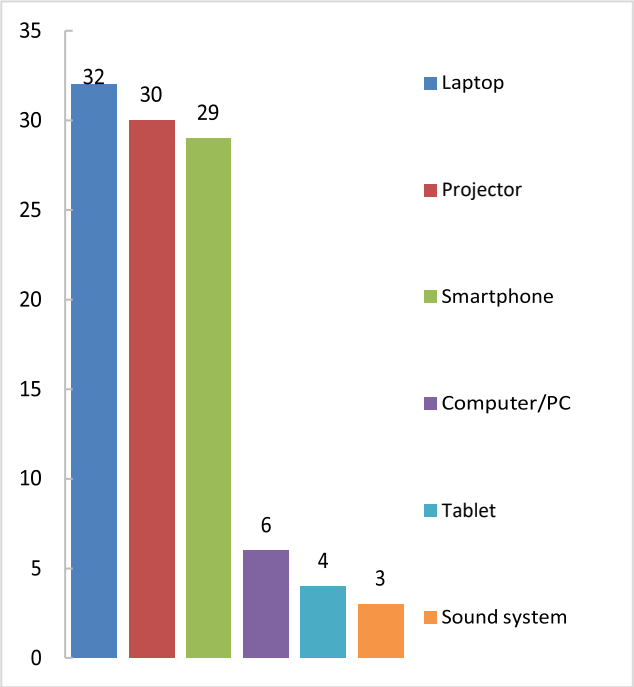


Figure 3 displays the electronic devices employed for science education in the classroom.

According to the statistics depicted in Figure 3, it is evident that nearly all participants, 97%, utilise computers for science instruction in the classroom. Likewise, 88% of the total respondents reported using smartphones, while 91% reported using projectors. These findings suggest that the majority of participants are familiar with utilising electronic devices to facilitate technology-driven education. Thus, teachers who possess knowledge of electronic devices can indeed deliver technology-based learning materials with the aid of these gadgets. Questions 3 and 4 pertain to utilising the internet to facilitate technology-driven education within the classroom. Figure 4 displays the outcomes of these inquiries.

According to the statistics shown in Figure 4, the majority of respondents utilise the internet for their classroom instruction, as depicted in the first graphic. Among the 33 responders, a solitary individual abstains from using the internet for instructional purposes in the classroom. In addition, the second diagram in Figure 4 reveals that the majority of respondents utilise their own internet connection via personal equipment, such as tethering their own smartphones or personal modems. These settings strongly facilitate technology-driven education that relies on internet access (Purcell et al., 2013), including education that utilises virtual field trip (VFT) based instructional media (Kundu, 2016; Woerner, 1999). Hence, the utilisation of Virtual Field Trips (VFT) as a technology-driven educational tool in science instruction is highly viable for further development, given the significant number of teachers who are already proficient in integrating internet resources into their teaching practices.

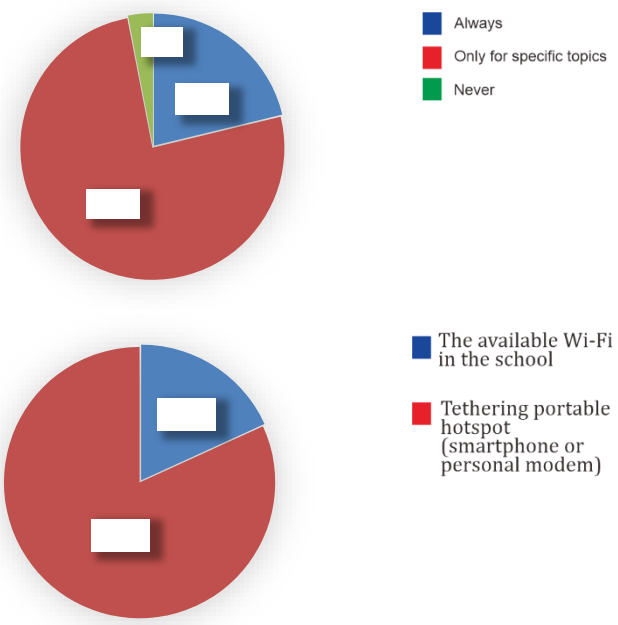


Figure 4 illustrates the utilisation of the Internet to facilitate technology-based learning inside the classroom setting.

Science learning media that utilises technology

Questions 5-8 pertain to technology-based learning used by Junior High School instructors in their scientific classes, notably focusing on the instructional medium employed in science education. Questions 5 and 6 pertain to the utilisation of technology-based educational tools for teaching science in the classroom. The outcomes of these inquiries are displayed in Figure 5.

According to the data depicted in Figure 5, the first figure shows that nearly all participants, specifically 30 out of 33 respondents, utilise technology-based learning resources in their scientific lessons. Junior High School teachers are already familiar with technology-based learning media. However, the analysis of the data presented in Figure 5 of the second diagram reveals a balanced utilisation of learning materials created by individual teachers and those created by others. Some teachers have independently devised their own educational materials for use in their classes (Babiker, 2015; Purcell et al., 2013), while others readily utilise technology-based learning resources created by others. These findings indicate that Junior High School teachers can potentially utilise Virtual Field Trip (VFT) instructional resources that will be created in the future.

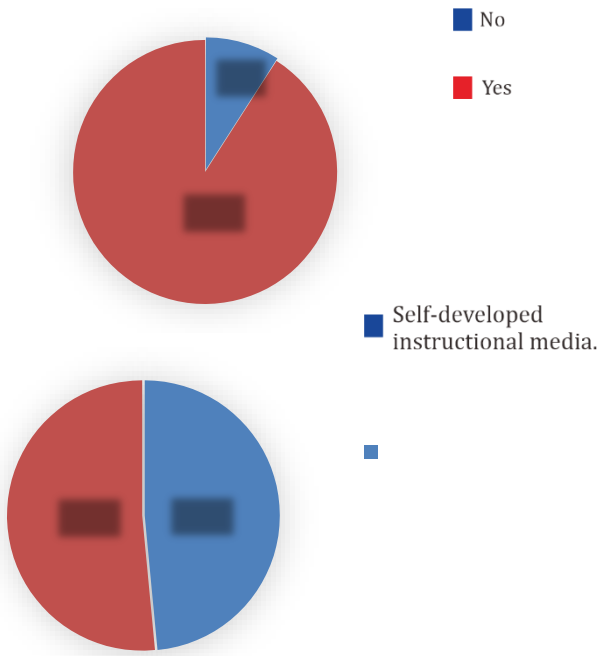


Figure 5 illustrates the utilisation of technology-based learning media for science education in the classroom.

Moreover, question number 7 pertains to the learning media utilised by the participants for science education. Figure 6 displays the results.

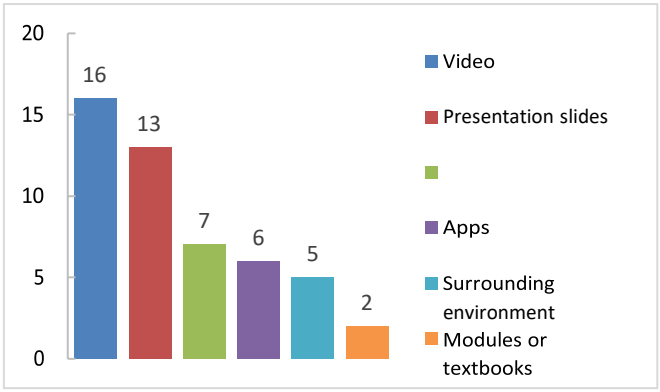


Figure 6 displays the various forms of instructional media employed in science education.

According to the data shown in Figure 6, it is evident that the respondents utilise a range of learning media, including technology-based options like videos, presentation slides, and apps, as well as non-technology-based options like science teaching aids, the surrounding environment, and modules or textbooks. Based on the data, it can be inferred that teachers predominantly utilise technology-based learning media, comprising 71% of the overall responses, as opposed to non-technology-based media. This is consistent with the statistics depicted in Figure 5, which suggests that the majority of teachers have already incorporated technology-based learning. Thus, it can be concluded that Junior High School teachers utilise technology-based learning methods along with technology-based learning materials, as supported by the research conducted by Widianto et al. (2021). This statement is further reinforced by the findings of question number 8, which pertains to the necessity of incorporating technology-based learning materials in science education within the classroom, as depicted in Figure 7.

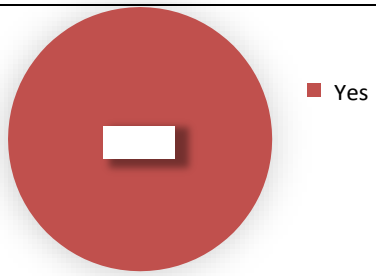


Figure 7 illustrates the necessity of utilising technology-based learning media for science education in the classroom.

Figure 7 demonstrates that all participants expressed a desire to utilise technology-based learning tools in science teaching within the classroom. It is extremely probable that Junior High School teachers will utilise VFT-based learning material in the future, given that VFT is one of the technology-based learning tools.

Virtual field trips are educational resources that use digital technology to provide immersive learning experiences.

Questions 9-13 pertain to the necessity of creating VFT-based learning materials for scientific instruction in Junior High School. Question 9 pertains to participants who have undertaken scientific educational excursions outside of their academic institution. Figure 8 displays the results.

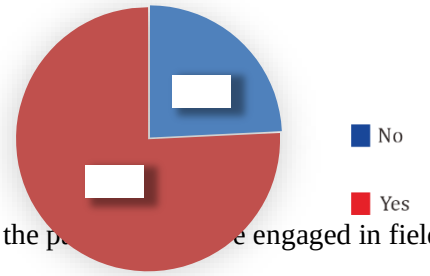


Figure 8 illustrates that the p e engaged in field trips as part of their science education.

According to the data shown in Figure 8, it is evident that a majority of the respondents, specifically 25 out of 33, had participated in field trips as part of their science education. Hence, this data suggests that field trips are a familiar approach for the majority of Junior High School instructors in their science education. Considering the findings presented in Figure 7, which highlight the importance of technology-based learning materials, these factors form a solid basis for creating Virtual Field Trip (VFT) learning materials in science education for Junior High School. These materials can serve as a substitute for actual field trips (Çaliskan, 2011; Klippel et al., 2019; Wen & Gheisari, 2020). The responses to question number 10, which asked about suitable science topics for field trips at the Junior High School level, are displayed in Figure 9.

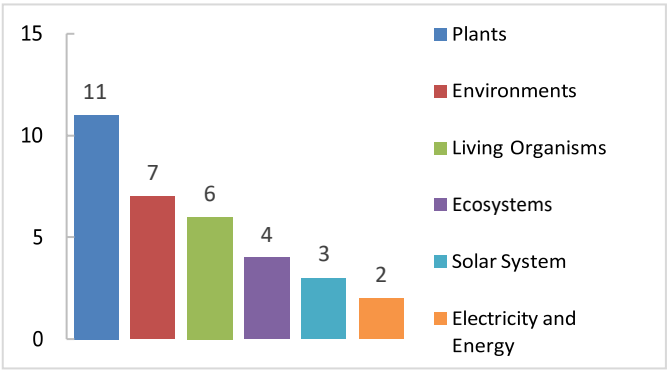


Figure 9 illustrates the scientific subjects that can be acquired through real-life excursions.

Figure 9 indicates that the actual field excursions approach can be used to cover several science courses at the Junior High School level. Thus, VFT-based learning media can be applied to these subjects and perhaps to other subjects as well, as VFT facilitates the advancement of students' understanding across multiple academic domains (Çaliskan, 2011; Seifan et al., 2019; Wen & Gheisari, 2020). In addition, question number 11 was posed to assess the respondents' familiarity with VFT, and the outcomes are illustrated in Figure 10.

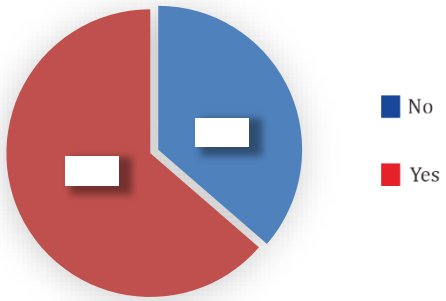


Figure 10: The respondents possess knowledge regarding Virtual Field Trips (VFT).

According to the data depicted in Figure 10, a considerable number of respondents are still not knowledgeable about VFT. Nevertheless, a higher proportion of respondents are acquainted with VFT compared to those who are not. In addition, after presenting information about VFT in question number 12, a question regarding the necessity of creating VFT-based educational materials for science teaching at the Junior High School level was asked, and the findings are depicted in Figure 11.

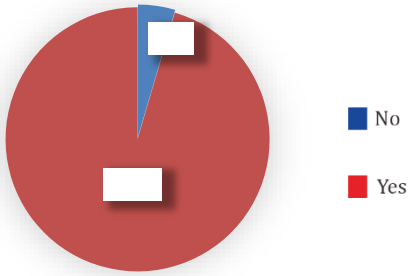
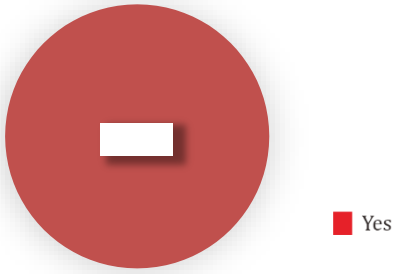


Figure 11 illustrates the necessity of creating Virtual Field Trip (VFT)-based educational materials for science learning in junior high school.

According to the data shown in Figure 11, it is evident that nearly all participants indicated a requirement for the creation of VFT-based educational materials for science instruction in Junior High School. A single responder expressed the opinion that there is no necessity to create VFT-based learning materials for scientific instruction at the Junior High School level. This serves as a solid foundation for future research that concentrates on creating VFT-based educational materials for scientific instruction at the Junior High School level. This assertion is further substantiated by the findings of question number 13, which inquired about respondents' inclination to utilise VFT-based educational materials in scientific



instruction at the Junior High School level. These materials will be created and distributed to instructors without charge. Figure 12 displays the results.

Figure 12 illustrates the level of willingness among teachers to utilise Virtual Field Trip (VFT)-based learning media in science education at the junior high school level.

Figure 12 depicts that all participants, who are Junior High School educators from diverse regions in Indonesia, demonstrated their eagerness to use VFT-based instructional materials in scientific education inside their classes. Consequently, the significance of VFT-based learning media in science education at the Junior High School level may be inferred from the findings depicted in Figure 11 and Figure 12. The results of the analysis on the necessity of creating VFT-based learning materials in scientific education at the Junior High School level will provide a solid foundation for future research in this field. Moreover, the advancement of VFT-based learning media in science education at the Junior High School level is anticipated to bring about a transformative approach to teaching and learning. This innovation has the potential to enhance students' cognitive and affective skills, as supported by previous studies (Çaliskan, 2011; Petersen et al., 2020; Seifan et al., 2019; Woerner, 1999).

Conclusion

According to the requirements analysis completed in this study, it can be inferred that Junior High School teachers are already familiar with using electronic devices and internet networks as supplementary resources for technology-based learning, which are extensively integrated into their scientific classrooms. In addition, Junior High School instructors has prior knowledge and experience in using technology-based educational resources for teaching science. There is a requirement to provide technology-driven educational resources, particularly Virtual Field Trips (VFT), for science education in Junior High School. This is seen as an inventive method for teaching and learning. Thus, in order to meet these requirements and relying on the examination of the gathered data, it can be inferred that additional investigation is required in relation to the development of VFT-based educational materials for scientific instruction at the Junior High School level.

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