



The Development of Interactive Multimedia of TPACK-Based Buffer Solution Material Using Google Sites to Increase Student’s Interest in Learning

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ABSTRACT

Education is one of the important aspects of life. Currently, technology in Indonesia is progressing very rapidly. One of the fields that cannot be separated from the influence of technology is education. Chemistry is one of the important subjects to study in high school because chemistry can improve thinking skills and stimulate student’s creative mindset. One of the materials in chemistry is buffer solutions. Buffer solution materials are often considered difficult by students because of their complex nature and use a lot of mathematical calculations. The many problems and difficulties in learning certainly make student’s interest in learning low. The purpose of this study is to analyze the effectiveness of TPACK-based interactive multimedia Google Sites in increasing student’s interest in learning about buffer solution materials. The method used in this study is Literature Review or narrative literature review which aims to analyze, evaluate and synthesize all information from previous research that is relevant to the research topic. Literacy data search websites such as Mendeley and Google Scholar are used to search for articles used. The articles used are articles published between 2020 and 2024. The results of this study can be concluded that using TPACK-based interactive Google Sites multimedia as a learning media can increase student’s interest in learning.

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INTRODUCTION

Education is one of the important aspects of life. Education is the process of developing individual abilities and potentials so that they become intelligent and qualified human beings. This is in accordance with Law Number 20 of 2003 concerning the National Education System Article 3 of national education aims to develop the potential of students to become human beings who believe in and fear God Almighty, have noble character, are healthy, knowledgeable,

capable, creative, independent, and become democratic and responsible citizens.

Currently, technology in Indonesia is experiencing very rapid progress and has a huge impact on human life. One of the fields that cannot be separated from the influence of technology is education. In 21st century learning, the role of technology as a means of learning is very important. Technology allows easy access to online learning resources, such as e-books, interactive learning materials, and learning videos (Said, 2023).

Chemistry is one of the important subjects to study in high school because chemistry can improve thinking skills and stimulate student's creative thinking patterns (Nababan, 2023). But in reality, there are still many students who experience difficulties when learning chemistry. One of the materials in chemistry is buffer solutions. Buffer solution materials are often considered difficult by students because of their complex nature and use a lot of mathematical calculations (Sanjiwani et al., 2018). The many problems and difficulties in learning certainly make students' interest in learning low. Interest in learning is very important for students to have because it is a form of students' interest in learning. By having an interest in learning, it will be easier for students to understand the material and affect learning achievement (Aulia et al., 2023).

Currently, many teachers rarely use learning media when delivering material. Some teachers still use lecture and discussion methods when delivering material, so students often feel bored. To overcome these problems, the use of interactive multimedia will be very helpful in the learning process and the delivery of learning materials in an interesting way. Students will feel happy and active in learning because they can interact with the learning media.

According to Budiawan (2019), interactive multimedia is a media that is equipped with a controller or navigation device that can be operated by the user, in other words users can interact with the media. One of the websites for designing interactive multimedia is Google Sites whose use can be accessed anywhere and anytime. Google sites is one of the most popular websites in the context of digital learning. This is because the features offered by Google sites can support the development of interactive learning content (Qona'ah et al., 2024).

Technological Pedagogical and Content Knowledge or TPACK is an approach that integrates aspects of technology, pedagogy and content or teaching materials to produce ICT-based learning. This can increase student's interest in learning, because students will be more interested in modern and interactive learning (Sutrisno et al., 2023).

This study is important because it will explain the analysis of the effectiveness of the use of TPACK-based interactive multimedia, as well as its relationship with overcoming learning difficulties and low student interest in buffer solution materials. This research is expected to overcome the low interest of students in learning chemistry subjects, especially buffer solution materials.

RESEARCH METHOD

The method used in this study is Literature Review or narrative literature review which aims to analyze, evaluate and synthesize all information from previous research that is relevant to the research topic. The literature used is the result of research in scientific articles related to interactive multimedia, Google Sites and TPACK. Literacy data search websites such as Mendeley and Google Scholar are used to search for articles used. Descriptive analysis is the method used to analyze the data in this study. The criteria for articles used are 8 articles published between 2020 and 2024; written in Indonesian or English; and the data used were in the form of articles related to the development of interactive multimedia Google Sites, the TPACK approach and learning interests.

RESULT AND DISCUSSION

Some of the research articles related to Google Sites media and the TPACK approach are presented in table 1 below.

Table 1.
List of Reference Journals Used

Author and Year	Research Title	Research Result
Rahayu et al., (2022)	Pengembangan Media Pembelajaran Berbasis Google Sites Bermuatan Chemo-entrepreneurship pada Materi Gugus Fungsi Senyawa Karbon	Based on the results of the research, the percentage of ideals from material experts was 89.28% (Very Good); media experts were 87.5% (Very Good); reviewers of 94.41% (Very Good) and student responses of 97.5%. This shows that the Google Sites learning media containing Chemo-entrepreneurship that was developed can be a learning solution on carbon compound function group material.
Sitepu & Herlinawati (2022)	Pengembangan Media Pembelajaran Berbasis	In the research, the validation feasibility results were in the

	Web Google Sites pada Materi Ikatan Ion dan Kovalen untuk SMA Kelas X	feasible category without revision with the average score of content feasibility 3.63; language feasibility 3.85; presentation feasibility 3.87; and graphics feasibility 3.74 so that it shows that the development of Google Sites media on ion and covalent bonding material is feasible to be developed.
Nurlatifah & Suprihatiningrum, (2023)	Pengembangan Google Sites Berbasis Inkuiri Terbimbing pada Materi Asam Basa sebagai Media Belajar Mandiri Siswa SMA/MA Kelas XI	This research is developed guided inquiry-based Google Sites media with a percentage of 95.83% (Very Good) for material expert validation; 92.5% for media expert validation; 95.68% from teacher assessments and 91% from student responses. This shows that Google Sites media has the potential to be used as a self-learning medium.
Weni & Yerimadesi (2024)	Pengembangan Modul Struktur Atom Berbasis Guided Discovery Learning (GDL) Terintegrasi TPACK untuk Fase E SMA	The results of this research show that the TPACK integrated GDL-based atomic structure module is declared valid and practical for effectiveness tests with practicality values by teachers and students of 88% and 89%.
Yerimadesi & Afendi (2024)	Pengembangan Modul Laju Reaksi Berbasis Problem Based Learning Terintegrasi TPACK untuk Fase F	Based on the results of the research, a validity score of 0.90 was obtained with a valid category and an average practicality score of 96% by teachers and 89% by students. So that information was obtained that the TPACK integrated problem-based learning-based reaction rate module was valid and practical.
Ilmiyati &	Penerapan Technological	In this research, the TPACK-

<p>Maladona (2023)</p>	<p>Pedagogical Content Knowledge (TPACK) Model Stop Motion Terhadap Minat Belajar</p>	<p>based Stop Motion model media is an independent variable and the student's learning interest is a bound variable. The results of this study showed an increase in student's interest in learning as evidenced by the increase in N-Gain values and according to the results of the hypothesis test with the Z test at a significant level of 5% that $Z_{count} > Z_{table}$. This shows that the hypothesis is accepted and there is an increase in.</p>
<p>Hidayatillah et al., (2022)</p>	<p>Kepraktisan Media Pembelajaran Interaktif Berbasis Google Sites Berorientasi pada Hasil Belajar dan Minat Belajar Siswa</p>	<p>The results of this research show that Google Sites interactive learning media is practical to use in learning. This is shown from the results of the teacher's assessment of 94 in the very good category and the results of the response questionnaire of students on a limited scale and the main field with scores of 79 and 77.4 respectively in the good category.</p>
<p>Wulandari & Zuhroh (2023)</p>	<p>Pengembangan Media Pembelajaran Interaktif Berbasis Website Google Sites dalam Meningkatkan Hasil Belajar</p>	<p>The results obtained in this research were that in the experimental class, the scores for the pre test and post test were obtained which were 77.8 and 82.7. The validation assessment of media experts was obtained with a percentage of 94%; material experts 78%; teachers 78%; and student response 80%-100%. So the development of Google Sites media is declared feasible and the implementation of learning with this media can improve</p>

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Multimedia is a combination of two words, namely "multi" which means many, and "media" which means medium. Multimedia is a medium that combines various elements such as text, audio, motion animation, and video. If users get freedom in controlling and interacting with the media, this is called interactive multimedia (Oka, 2017). By combining images, animations, and even sound, interactive media can display concepts with an attractive appearance (Mustofa et al., 2024). In its use as a learning medium in schools, interactive multimedia can make learning more interesting and not boring because students can interact with the media. According to Wulandari (2020), interactive multimedia can increase interest in learning, because participants can be directly involved in learning, thereby stimulating them to pay attention and concentrate on learning.

In learning with the Kurikulum Merdeka, teachers are required to be proficient in utilizing technology in learning. Therefore, the TPACK (Technological Pedagogical and Content Knowledge) approach is very suitable to be applied in learning. TPACK is an approach that integrates three aspects, namely technology, pedagogic, and content/teaching materials (Sutrisno et al., 2023). The TPACK approach was first formulated by Misra and Koehler in 2006. The application of TPACK in learning can help students to learn actively and understand abstract materials such as buffer solution materials in chemistry subjects (Suyamto et al., 2020).

One of the materials studied in chemistry subjects is buffer solutions. Buffer solution materials are often considered difficult by students because of their complex nature and use a lot of mathematical calculations (Sanjiwani et al., 2018). In addition, the lack of student involvement in chemistry learning is caused by various factors from within and from outside. One of the factors from within students that affects student's seriousness in learning is interest (Pakuna et al., 2021). According to Dalimunthe (2021), learning interest is an interest or activity that supports the smooth learning process of a student. Interest in learning can be seen from several aspects, namely: (1) feeling of pleasure; (2) student interest; (3) student attention; and (4) student involvement during learning. Therefore, in order for learning interest to increase, an interactive learning media is needed that helps the learning process.

Based on research conducted by Rahayu et al (2022), which focuses on the Development of Chemo-entrepreneurship Google Sites-Based Learning Media on Carbon Compound Function Cluster Material. From the results of the study, it was concluded that the Google Sites learning media containing Chemo-

entrepreneurship that was developed could be a learning solution on carbon compound function group material. Then the research conducted by Sitepu & Herlinawati (2022) regarding the Development of Google Sites Web-Based Learning Media on Ion and Covalent Bond Materials, obtained very feasible results from validators so that it can be said that the google sites web-based learning media is very feasible to be used as a learning medium. Furthermore, research conducted by Nurlatifah & Suprihatiningrum (2023) regarding the Development of Google Sites Based on Guided Inquiry on Acid-Base Material, it can be concluded that Google Sites media has the potential to be used as a medium for independent learning on acid-base material.

In designing interactive multimedia, Google Sites is used which is one of the products of Google as a container for creating websites and has many features. Learning videos, evaluations, and materials can be included in the Google Sites website and can be accessed anytime and anywhere. Based on research conducted by Wulandari & Zuhroh (2023), the implementation of learning with Google Sites media is proven to improve student learning outcomes.

Google Sites is also supported on various devices such as laptops and smartphones. In addition, the content presented on Google Sites can be stored for a long period of time (Rahmatullah & Arsih, 2024). Google Sites can help teachers to create fun learning so that students do not easily feel bored and have an interest in learning.

The TPACK approach has been proven to increase student's interest in learning. This is evidenced by research conducted by Ilmiyati & Maladona (2023), where results were obtained that showed an increase in student's interest in learning as evidenced by the increase in N-Gain scores. According to Sari et al (2024), the use of learning media with the TPACK approach in learning activities makes student's interest increase because the learning carried out has used technology such as smartphones, so that students can easily understand the material. In addition, the TPACK approach can train and improve student's experience in using technology.

Therefore, an effective solution to increase students' interest in learning buffer solution materials is to utilize interactive multimedia in learning. This interactive multimedia is designed using Google Sites so that it can be accessed anytime and anywhere. Then to foster attraction and active learning that is focused on students, the TPACK approach is used that integrates technology, pedagogic and content/teaching materials.

CONCLUSION

From the description of the results and discussions that have been submitted, it can be concluded that using TPACK-based interactive Google Sites multimedia as a learning media can increase student's interest in learning. This is because TPACK-based interactive multimedia can make students interested in learning and help students to understand the material. In addition, students do not feel bored and will be interested in learning because the media used is interactive.

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