MUDIR (Jurnal Manajemen Pendidikan) P-ISSN : 2655-9331 E-ISSN : 2657-2230
Avalaible online at: **https://ejournal.insud.ac.id/index.php/mpi/index**
Volume 5, Nomor 2, Juli 2023 | DOI: https://doi.org/10.55352/mudir

EFFECTIVENESS ANALYSIS OF STUDENTS' CREATIVE THINKING SKILLS PROGRAM BY OPTIMIZING THE DEVELOPMENT OF ADOBE ANIMATE-BASED VLAB STATIC ELECTRICITY MEDIA

*[1]Anugriaty Indah Asmarany, [2]Windi Mudriadi, [3]Everhard Markiano Solissa, [4]Sudadi, [5]I Nyoman Sudyana

[1]Universitas Gunadarma, [2]Politeknik ATI Makassar, [3]Universitas Pattimura Ambon, [4]Universitas Islam Negeri Sultan Aji Muhammad Idris Samarinda, [5]Universitas Palangka Raya

Email: *[1]anugriatyindah09@gmail.com

Abstrak: *Investigasi ini membuat media listrik statis VLAB menggunakan Adobe Animate untuk menilai kepraktisannya dan mengukur reaksi siswa terhadapnya. Kajian tersebut termasuk dalam kategori penelitian dan pengembangan (R&D), mengikuti model pengembangan Borg & Gall, yang dibatasi pada tahap revisi produk utama. Alat evaluasi disusun berdasarkan standar siswa dengan bahasa yang sederhana. Eksperimen dilakukan pada siswa di ruang kelas. Pengumpulan data dilakukan melalui wawancara dan survei. Hasil temuan menunjukkan bahwa media VLAB Static Electricity berbasis Adobe Animate layak digunakan sebagai perangkat pembelajaran berdasarkan evaluasi validasi ahli materi dan media, dengan kriteria sangat layak. Uji coba pengembangan terbatas menghasilkan umpan balik siswa yang positif dengan penilaian dan keterampilan berpikir kreatif yang baik, sehingga menghasilkan kategori perkembangan yang berkembang.*
Kata kunci: listrik statis vlab, berpikir kreatif, siswa, instrumen

Abstract: This investigation created VLAB static electricity media using Adobe Animate to assess its practicability and gauge students' reactions to it. The study falls under the category of research and development (R&D), following the Borg & Gall development model, which is restricted to the main product revision stage. The evaluation tools are formulated based on student standards in simple language. The experiment was carried out on students in a classroom setting. Data gathering was done through interviews and surveys. The findings indicated that the Adobe Animate-based VLAB Static Electricity media was suitable for use as a learning tool based on the validation evaluation of material and media experts, with very feasible criteria. Limited development trials yielded positive student feedback with a good rating and creative thinking skills, resulting in a growing development category.
Keywords: vlab static electricity, creative thinking, students, instrument

Introduction

The development of the 21st century is characterized by advances in science and information and communication technology (ICT). ICT advances can help in several fields, one of which is education. The new paradigm does not see educators as the only determinant in the education and learning process. Science lessons are lessons that describe and explain natural phenomena and the phenomena around them (Basuki, 2021). Natural science is presented in a simple form through mathematical experiments and measurements. Practicum learning is an activity that is very important for students, and the implementation of practicum can improve understanding and skills, experiment with students, and help them find information on their own according to the learning objectives given. Laboratories in schools are rarely used, and there are obstacles to the implementation of practicums, namely that the time needed to prepare practicums is insufficient and the

practicum tools in the laboratory are limited (Gunawan et al., 2017). There are no other supporting tools to support the practicum implementation; for this reason, media is needed to overcome learning problems and foster students' creative thinking skills.

The results of observations by previous researcher at one senior high school to examine the conditions of learning and laboratory activities show that learning activities are carried out in the form of discussions, presentations, and practice. The need for practicum learning media in the laboratory and the need for teachers to convey learning with practicum are still very rare; 85% of teachers at school change practicum activities by discussing or lecturing, so they have not encouraged students to actively build knowledge and skills. The learning media used by the teacher in the form of animated videos is not optimal; the media is not interactive and does not encourage students to think creatively (Medica et al., 2021). This was clarified by another previous researcher, who stated that at another school, learning physics using the lecture method was relatively low; around 48% of students actively listened to the teacher's explanation, 40% took notes, and 38% of students did activities outside learning, while student learning outcomes show encouraging achievements. The lecture method does not achieve student learning completeness, so it is necessary to apply the practicum method (Monika et al., 2018).

One of the intriguing innovations in practicum learning media is the virtual laboratory. As per previous research, virtual laboratories are the most effective solution for students to conduct real practicums at any time and from anywhere. From the perspective of knowledge construction, learning media plays a supportive role, not only aiding in classroom learning activities but also serving as an independent source of learning for both teachers and students (Ramli et al., 2023). The virtual laboratory is an interactive medium based on experimental simulations, consisting of software that incorporates text, animation, and audio in a learning environment that replicates real-life situations and is meaningful for students. The operation of virtual laboratory media is inextricably linked to the role of software, which is a tool for designing and developing laboratories. Adobe Animate is one of the programs commonly used to create and develop virtual laboratories. Adobe Animate software is widely used to create various types of virtual learning media, which are alternatives chosen for the development of virtual laboratories (Nisa et al., 2019). The capabilities of Adobe Animate software include supporting the direct creation of presentations and animations by inserting audio and images, creating interactive buttons, practicum simulations, and more. The use of virtual laboratory media with specific software can simplify and minimize practical learning obstacles, both in real and virtual spaces. The material chosen is static electricity, which studies the electricity of objects without showing the flow of electric charge, discusses electric charges that are in a static state, and explains phenomena in everyday life. The subject matter of static electricity used in virtual laboratory media is electric charge. This material allows students to identify electric charges in objects (Nugroho et al., 2023). Apart from that, this material also contains concepts that must be practiced and seriously thought about by thinking creatively. The reason for choosing this material is that, apart from directing students to always think creatively and scientifically, this material can also familiarize and grow students' ability to think, understand the phenomenon of static electricity in everyday life, and learn independently (Nisyak & Syafi'i, 2021).

Creative thinking is a cognitive activity to find solutions as well as creative and reflective thinking to produce complex products. Cognitive activity, which is part of creative thinking, includes determining ideas, creating new ideas, and determining the effectiveness of existing ideas (Dianto et al., 2023). Learning conditions that provide freedom to think and are fun for students are needed in an effort to develop creative thinking skills. Creative thinking skills are very important in student learning systems with hands-on learning environments that give students the opportunity to think openly and flexibly without fear or embarrassment. Practical learning situations provided by teachers and student-centred can potentially be trained and developed through creative thinking because students are given the freedom to build their own knowledge and skills, discuss, freely submit opinions, and formulate conclusions (Rahayu et al., 2018).

The graduate standards for skill proficiency necessitate that learners possess the aptitude to generate innovative, fruitful, evaluative, autonomous, cooperative, and communicative ideas. The educator affirms that the current status of students' imaginative reasoning abilities can be enhanced through a learning process that incorporates both theoretical and practical components (Rosdiana et al., 2019). Fostering the imaginative thinking proficiencies of middle school students can be advanced via practical-oriented learning, and technology-based resources are indispensable, specifically virtual laboratory media. To address issues both in class and laboratory experimentation, students necessitate virtual laboratory media. However, there are obstacles to the implementation of practicums in schools, namely inadequate tools and equipment to carry out practicums, and the implementation of practicums for students is limited. As a result, students are unable to explore various knowledges, which causes a lack of interest and motivation to learn the natural sciences.

Students with hands-on practicum experience tend to have the skills and confidence of those with limited practicum experience. Virtual laboratories are not a substitute for real laboratories but rather extensions for new opportunities that have not been realized in real terms and are affordable laboratories. A virtual laboratory is needed to solve physics problems for students. Problem-based learning is designed to stimulate students to think consciously (Reynaldo et al., 2022).

The virtual laboratory has been extensively developed as a media tool, but students still find it challenging to grasp. A former researcher's experiment with the virtual laboratory in science education for middle school students revealed that the students struggled to comprehend the content due to the absence of visuals or animated elements in the material menu of the virtual laboratory media. To ensure that students comprehend the lessons and have engaging real-life experiences, virtual laboratory media should be compiled and presented consistently (Tendrita et al., 2016). The development of ViPhyLab media by previous researcher shows that the feasibility of ViPhyLab media is in the 87.45% very feasible category and student responses are in the 90.4% very good category. The similarities between previous research and this research are in the use of media as a virtual laboratory. The difference lies in the practicum material, namely static electricity. A virtual laboratory is a medium that can be used to understand a subject matter and overcome the limitations of laboratory equipment. A virtual laboratory can also be interpreted as a simulation space in cyberspace, a place to interact, organize, and discuss (Tannady, 2023). A virtual laboratory allows students to carry out simulations that cannot be carried out in real conditions and allows them to carry out practicums as if they were facing real laboratory phenomena. In general, the benefits of a virtual laboratory are that the learning process becomes more interesting, the teaching and learning process can be carried out, and it helps complement direct learning, where students can learn independently and virtually (Mustofa, 2018). The development of android-based virtual practicum media was successful, with an assessment by media experts of 71.7% in the appropriate category, a material expert assessment of 91.5% in the very feasible category, and student responses of 77% in the interesting category. The similarities between previous research and this research lie in the use of virtual practicum media, and the difference lies in the modification of practicum as a virtual laboratory.

The use of Adobe Animate software in this study refers to media developed by previous researcher. The development of Adobe Flash-based media is able to make students motivated and interesting, and media made with Adobe Flash is very useful and suitable for use by students as a medium for learning viral material. According to previous research, expert judgment was 85% and 93%, respectively, and the responses of teachers and students were 84% and 93%, respectively, in the interesting category. The similarities between this research and this research are the use of virtual laboratory media based on Adobe Flash. The difference is based on Adobe Animate (modified Adobe Flash). Previous research that aimed to determine the design, production, and feasibility of learning media used Adobe Animate and showed an average score of 89.375. According to the subjective rating, the SUS scale analysis for this application is in the superior category with a category B scale level and acceptable category tolerance (Tannady & Budi, 2023). The research equation is the use of Adobe Animate as a learning medium, while the difference is in the data analysis with the System Usability Scale (SUS). If the previous research made an application using Adobe Animate with SUS scale analysis, this research made a virtual laboratory medium using Adobe Animate with Likert scale analysis.

Method

The research method used is the research and development (R&D) method. This type of research uses the Borg & Gall development model. Product development procedure: research and information collecting, this stage identifies problems by conducting interviews with informants. Product planning is a step taken after identifying a problem. In addition, media products were made in the form of virtual laboratories, validation sheets, and student response questionnaires. The development of the initial draft of the product is the first step in making an attractive media design. Product validation is assessed by two material experts and two media experts. The trial phase was limited to students by providing media to operate and asking them to fill out a questionnaire to find out their responses to the media being developed. Based on the results of trials on students, it is known that students' responses to product deficiencies are poor, so it is necessary to improve product design. If it is known that student responses do not have product deficiencies, the product can be used as a practicum learning medium. The population in this study was class students, and the sampling technique used was purposive sampling with a total sample of 20 students. data collection using interviews and questionnaires. The data analysis techniques used in this study are as follows: expert validation tests and student response questionnaires.

Findings and Discussion

Product trials were carried out at the preliminary field-testing stage, namely the use of media products developed for students. The trial was carried out in class. Students are advised to download and install an application that is sent to them via WhatsApp as a form of initial perception of the product. The application is used as a learning tool during activities; students first open the media to use, then study the material before doing practical work in a virtual laboratory. In the next stage, students are guided to study practicum procedures, which contain a practicum guide menu. The next stage is when students do electroscope and Coulomb practicum on virtual laboratory media. Then, students are instructed to take observational data and write it on the observation data sheet and analyse it. After doing practicum in the virtual media laboratory, they are given a response questionnaire to fill out according to what they got from the practicum results. The assessment instrument uses a response questionnaire in the form of a percentage, which is converted into five criteria: very good, good, sufficient, less, and very less. The results of student responses to the quality of the content amounted to 73.33%, including good criteria. Because the presentation of material in the media used is easy to understand and useful for students.

Aspects of pleasure and motivation reached 73.33%, including good criteria. This is because students can feel happy and motivated to be creative by doing practicum experiments. The language aspect scored 70.00%, including good criteria. Because the contents of the material contained in the media are sufficiently understood by students and quite clear. The display aspect gets a percentage of 73.33%. Students find it helpful to understand the contents of the material in an interesting and not boring way with the help of pictures and animations on the media. Aspects of use and independence each obtain a percentage of 78.33% and 73.33%, respectively. This is because some students feel happy using the media because the media is interesting and fun when playing practicum animations. Some other students feel unhappy using the media because they are not used to using it independently. Aspects of creative thinking skills get a percentage of 73.33% in the developing category and are starting to grow. This is because students can do practicum independently with the ease of using media.

The final product is Adobe Animate-based media. Based on the results of teacher interviews, the need for virtual laboratory media is very important because schools have laboratories but they are rarely used. Based on these problems, this study developed a practicum medium for junior high school students with a simple and attractive format consisting of an electroscope practicum menu and coulomb style. The practicum in this medium is structured so that students can do it like they would in a real laboratory. The existence of this medium can help students learn independently, facilitate their understanding of static electricity material, help them think creatively, and contribute to a varied and not boring teaching and learning process. The results of interviews with teachers showed that students had difficulty understanding static electricity material. Previous research showed that students had difficulty learning physics material because it was not taught through practicum methods. The teacher also stated that the practicum learning method was used, but not all the time when studying because there was not enough study time, while the practicum method was a way to explain difficult material and learning experiences using laboratory equipment. It is very important to develop learning resources so students don't get bored with learning material, so this research creates other sources or media to support practicum learning.

The media that has been developed can display images, text, animation, sound, and practicum simulations and has clear material in a systematic presentation, so that it is easy to understand and the information is stored longer in students' memories. The use of media is also relatively easy and straightforward; using fingers, students get the opportunity to do practical work independently. Giving motivation and a sense of fun in the media can be used independently, motivating students to learn according to their needs and speed. This is in accordance with several previous studies regarding the use of virtual laboratory media in practical learning. virtual laboratory as a learning medium that is safe and affordable because it is easy to use and flexible. Using a virtual laboratory is proven to be a simple practicum simulation to understand concepts and solve practicum problems in the laboratory. The virtual laboratory media developed by previous researcher obtained a feasibility percentage score of 87.45%. Previous researcher developed a virtual laboratory medium with an eligibility percentage of 79.16%. When compared with some of the results of these studies, it can be seen from the results of the research that the developed Adobe Animate-based media is included in the very feasible criteria. This shows that clarity, suitability, usefulness, and use based on each aspect of the media are acceptable, so that this media can be used as a learning tool for junior high school students. Learning media that are declared feasible are not only reflected in the appearance of the media but also in the content of the media. The media display is the result of material visualization and simulation. Thus, the display of media and material is a unit that supports each other.

Analysis of student response questionnaire data on media products received good responses with a percentage of 73.60%. Most of the responses of students who had never used media in previous learning were good. Students who give good responses show that the media can be accepted as a practicum learning tool because the score obtained for each answer is in accordance with the assessment aspect. The results of the expert's assessment, which gave a good assessment, influenced the results of student responses and made this medium attractive. This is supported by previous research, which states that virtual laboratory media is interesting, with a percentage of student responses of 77%, so that it can be used as a learning medium. The virtual laboratory that was developed received positive responses from students and very good comments on the clarity of images, animation, sound, attractiveness, and usability of the media. Aspects of students' creative thinking, including the developing category, are starting to grow, which shows that students are independent in using media and can-do simulations well. One of the criteria for good learning media is ease of use.

The developed medium has the following characteristics: 1) can clearly visualize practicum on static electricity material; 2) media that is easy to reach and use offline and online; 3) the flexibility of use can be anytime, anywhere; 4) there are practicum guidelines that can be used as independent practicum guidelines. Virtual laboratory media has a positive influence on students through interesting and fun practicum learning. Based on the results of research and development, there are advantages and disadvantages, as follows: The advantages of media such as: (a) interesting media; (b) easy to operate; (c) helping understand static electricity material; and (d) encouraging and helping students learn independently as a practicum medium Some of these advantages are in accordance with the use of media, as shown in previous studies. Some users accept virtual laboratory media because it can help independent students understand phenomena. Limitations of the Coulomb-style practicum: students must be online to access the practicum at PheT because the developer's limitations to making Coulomb-style animations are not met. Based on the advantages and disadvantages of this media product, after expert assessment and limited product trials (student responses), the final product can be judged suitable for use as a learning medium.

Conclusion

The media that had been developed as practicum media based on the validation assessment of material experts obtained percentages of more than 88% and 90%, respectively, with very decent criteria. Students' responses to this medium are in the range of good criteria, and creative thinking skills are categorized as developing and starting to grow. Based on the results of media research and development that have been carried out, it is necessary to carry out large-scale trials to determine the level of effectiveness of the media, which is developed with other physics subject matter based on Adobe Animate software. The research time was limited because the trials were approaching the end of semester assessment time (PAS), so this research was only allocated based on research needs, did not take into account students' prior knowledge data such as test questions, and so on, and was not carried out to determine the effectiveness of learning media. Media product design does not suit the needs of students due to their limited abilities.

Reference

Basuki, A. D. (2021). Utilization of a Virtual Laboratory with a Cooperative Learning Model to Increase Activities and Learning Outcomes of Static Electricity Material at Kendal 2 Public High School. *Inspiratif*, 6, 166–185.

Gunawan, A. H., Sahidu, H., & Herayanti, L. (2017). Virtual Laboratory of Electricity Concept to Improve Prospective Physics Teachers 'Creativity. *Jurnal Pendidikan Fisika Indonesia*, 13(2), 102–111.

Medica, W. P., Suyana, I., & Tarigan, D. E. (2021). The Use of Virtual Laboratory Media in Learning to Increase Knowledge of the Concept of Sound Waves. *WaPFi (Wahana Pendidikan Fisika)*, 6(2), 229–239.

Monika, G., Haryanto, & Epinur. (2018). Development of e-LKPD Teaching Materials Using 3D Pageflip Software on Colligative Properties of Solutions in Class XII of SMAN 1 BATANGHARI. *Jurnal Ilmiah Universitas Jambi*, 10(1), 1–9.

Ramli, A., Sudadi, S., & Afendi, A. R. (2023). Evaluation implementation curriculum in productive SMK Negeri 1 Samarinda. *Jurnal Pendidikan dan Pengajaran*, *2*(1), 1-16.

Nisa, S. K., Nurmiyati, N., & Rinanto, Y. (2019). Development of Discovery Learning Based Virtual Laboratory Learning Media on Excretion System Material for Class XI MIPA. *Jurnal Bio-Pedagogi*, 8(2), 120.

Nugroho, B. S., Tannady, H., Fuadi, T. M., Aina, M., & Anggreni, M. A. (2023). Role of Work Experience, Work Motivation and Educational Background on Teacher Performance at Vocational School. *Jurnal Pendidikan dan Kewirausahaan*, *11*(2), 476-487.

Nisyak, K., & M. Syafi'i, Z. (2021). The Development of Animated Video Learning Media Using the Animaker

Application as An Effort to Improve the Cognitive Ability of Junior High School. *Jurnal FKIP*, 8(2), 1–13.
Dianto, A., Sultan, L. P., Hidayah, M., & Sudadi, S. (2023). Penerapan Program Tahfidzul Qur'an di SMP Islamic Center Samarinda. *Borneo Journal of Islamic Education*, *3*(1), 89-100.
Rahayu, N. K., Suherman, A., & Wibowo, F. C. (2018). Development of a Website-Based Virtual Physics Laboratory on the Subject of Dynamic Electricity. *Jurnal Untirta*, 1(1), 108–114.
Rosdiana, D., Suherman, A., & Darman, R. (2019). Development of Virtual Physics Laboratory Learning Media. *Journal of Natural Science and Integration (JNSI)*, 2(2), 132–142.
Reynaldo, J., Tannady, H., & Nurjanah, S. (2022). Role of Work Stress and Work Discipline on Performance of High School Teachers in East Jakarta, Indonesia. *International Journal of Early Childhood Special Education*, *14*(1).
Tendrita, M., Mahanal, S., & Zubaidah, S. (2016). The Empowerment of Creative Thinking Skills through Remap Think Pair Share. *Proceeding Biology Education Conference*, 13(1), 285–291.
Tannady, H. (2023). Role of Entrepreneurial Education and Self-Efficacy on Entrepreneurial Intention Among Students in Higher Education Institution. *Jurnal Pendidikan dan Kewirausahaan*, *11*(3), 877-887.
Tannady, H., & Budi, I. S. K. (2023). The Influence of Organization Culture, Work Environment and Leadership On Performance of Fulltime Lecturer (Case Study of Private Higher Education Institution which Supported by Corporate). *Journal on Education*, *5*(4), 13020-13025.
Mustofa, Z. (2018). The Effect of Interactive Multimedia on Remedial Learning to Enhance Student Achievement of Physics. *Journal Teknodik*, 22(2), 122–123.