JPPIPA 11(4) (2025)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Development of Canva-based Interactive Multimedia Presentation Using Problem Based Learning Model on the Material of Body Parts – Plants

Tania Elsa Rahayu[1], Isa Ansori[1]

[1] Elementary School Teacher Education, Faculty of Education and Psychology, Universitas Negeri Semarang, Semarang, Indonesia

Received: November 12, 2024
Revised: March 02, 2025
Accepted: April 25, 2025
Published: April 30, 2025

Corresponding Author:
Tania Elsa Rahayu
taniaelsarahayu1104@students.unnes.ac.id

DOI: 10.29303/jppipa.v11i4.10771

Abstract: Science learning in primary schools still faces challenges in improving student learning outcomes. One solution is the use of interactive learning media that utilise technology and appropriate learning models. Research at SDN Bringin 01 Semarang City developed an interactive multimedia presentation using the Problem Based Learning (PBL) model for science subjects. The research method used Research and Development (R&D) with the ADDIE model. The results showed that the multimedia developed was successful and feasible to use, with a feasibility assessment from media experts of 91.5% and material experts of 89.5%. The use of this multimedia is effective in improving student learning outcomes, with an increase of 25.5% and a significant difference between before and after use. The N-Gain test showed a high criterion of 0.72. Thus, PBL-based interactive multimedia presentations can be a solution to improve the quality of science learning in elementary schools. The PBL model itself has been proven effective in improving students' critical thinking and problem-solving skills Class IV of SDN Bringin 01 Semarang City, totalling 28 students.

Keywords: Interactive; IPAS; Learning Outcomes; Plants; Problem Based Learning.

Introduction

To realize the national education goals as stated in the 1945 Constitution, particularly in educating the nation's life, education plays a crucial role. According to Law No. 20 of 2003 Article 1 Paragraph 1, education is a systematic effort that facilitates active learning, enabling students to develop socially, culturally, spiritually, and skillfully to contribute to society and the nation. The national education function serves as a foundation for implementing the Merdeka Curriculum, which emphasizes student-centered learning (G. A. B. A. Putri et al., 2024).

In the 21st century, education demands innovation to enhance student engagement and comprehension (Memisevic et al., 2023). Technology integration in learning environments is essential to making learning more dynamic and relevant. One subject that requires improvement (Nurani & Tyas, 2024), through interactive media is Natural Science (IPA), particularly the topic of plant body parts . This topic is often perceived as abstract and uninteresting when delivered using conventional methods like lectures and textbooks.

The use of technology-based learning media is critical in the digital era to improve learning effectiveness, provide easy access to information, and develop students' digital literacy (Gray & Lewis, 2021). Interactive Multimedia Presentations offer an innovative solution by integrating various media elements such as text, images, videos, animations, and interactive features like quizzes, simulations, and educational games (Axhami & Axhami, 2023; Balqis & Andriani, 2024; Kerslake & Hannam, 2022). These elements help students visualize abstract concepts and encourage active participation, leading to better understanding and retention of knowledge.

How to Cite:
Rahayu, T. E., & Ansori, I. (2025). Development of Canva-based Interactive Multimedia Presentation Using Problem Based Learning Model on the Material of Body Parts – Plants. *Jurnal Penelitian Pendidikan IPA*, *11*(4, 685-693). https://doi.org/10.29303/jppipa.v11i4.10771

One effective approach to maximizing the potential of interactive media is the Problem-Based Learning (PBL) model. PBL is a student-centered learning method that presents real-life problems, requiring students to engage in exploration, investigation, and collaborative problem-solving (Boateng et al., 2024; Mulyaningsih et al., 2023). This model is particularly relevant for teaching plant body parts, as students can analyze plant growth, nutrition, and environmental interactions. Research has shown that PBL improves critical thinking, analytical skills, and student motivation (Saralee et al., 2024).

However, observations at SDN Bringin 01 Semarang City reveal significant challenges. The lack of innovative learning media has led to low student engagement and difficulty in grasping concepts. Conventional methods dominate classroom instruction, resulting in minimal student interaction and suboptimal learning outcomes (Hargrove, 2020). Many students struggle with understanding plant structures, identification processes, and creative problem-solving related to the topic. Assessment data indicate that a majority score below the KKTP (Criteria for Achieving Learning Objectives), highlighting the need for more effective instructional strategies (Wanti & Erita, 2024).

To address these challenges, this study proposes the development of a Canva-based Interactive Multimedia Presentation integrated with the PBL model (Dewi & Setyasto, 2024). Canva, a user-friendly graphic design platform, allows teachers to create visually appealing and interactive learning materials without requiring advanced design skills (Rahma et al., 2024). By incorporating PBL principles, this multimedia tool will present students with authentic problems, guide them through exploration, facilitate investigation, and encourage them to develop and present solutions.

The novelty of this research lies in combining Canva-based multimedia with the PBL approach to create an engaging and student-centered learning experience (Saimon et al., 2023). Unlike previous studies that focused solely on interactive media or PBL, this study integrates both elements to enhance concept understanding and learning outcomes effectively. Furthermore, this research contributes to modern science education by offering an innovative, practical, and effective solution for elementary school students with the support of the research (Roemintoyo et al., 2022; Septiyanto et al., 2024).

To address the lack of innovative and effective learning media in teaching plant body parts, this study aims to develop a Canva-based Interactive Multimedia Presentation integrated with the Problem-Based Learning (PBL) model. This research seeks to create a valid, practical, and effective learning tool that enhances students' conceptual understanding and academic performance (Errabo & Ongoco, 2024; Vidal-Esteve & Martín-Gómez, 2023). By combining interactive multimedia with PBL, this study introduces a novel approach that not only engages students but also fosters critical thinking and problem-solving skills. The expected outcome is an improved quality of science learning, offering a more meaningful and relevant educational experience that aligns with 21st-century learning demands.

Method

This study adopted the Research and Development (R&D) method, an approach commonly used to create new products and evaluate their effectiveness (Sugiyono, 2019). The researcher used the ADDIE model in conducting the development as shown in Figure 1.

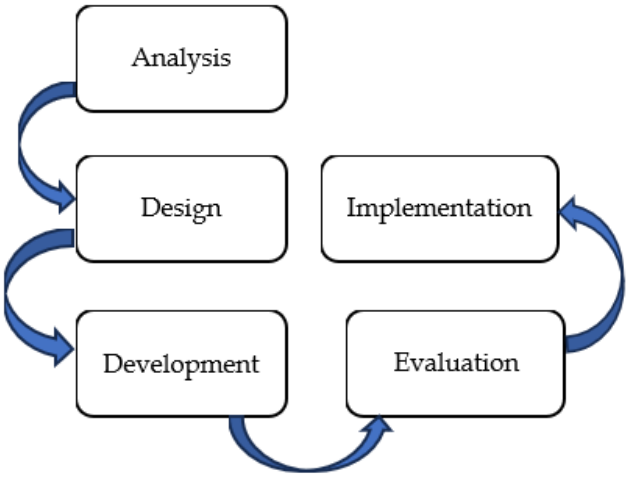


Figure 1. RnD Research Using the ADDIE Model

This study adopted the Research and Development (R&D) method, a systematic approach used to create new products and evaluate their effectiveness. The researcher utilized the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation, to guide the development process (Septiyanto et al., 2024; Zhang et al., 2023).

Analysis: Researchers conducted a comprehensive analysis in class IV SDN Bringin 01 Semarang City. This involved direct classroom observations, in-depth interviews with teachers, distributing questionnaires to students, and analyzing learning outcome documentation. The goal of this stage was to identify learning challenges, student needs, and areas where improvements could be made.

Design: Based on the analysis, researchers developed a blueprint for the Canva-based Interactive Multimedia Presentation (Angkarini, 2022). This stage involved determining the instructional goals, content

structure, and multimedia elements (text, images, videos, animations, quizzes) that would be integrated. The Problem-Based Learning (PBL) approach was embedded to ensure students actively engaged with the material.

Development: In this phase, the multimedia presentation was created using Canva. The product underwent multiple iterations, incorporating feedback from subject matter experts in education and multimedia design. Validation was conducted by media experts, material experts, and pedagogical experts who assessed the content quality, user-friendliness, and alignment with learning objectives. Adjustments were made based on expert recommendations.

Implementation: The developed multimedia presentation was tested in a real classroom setting with fourth-grade students at SDN Bringin 01 Semarang City. A total of 28 students (18 boys and 10 girls) participated. Teachers were trained on how to use the interactive presentation effectively. Students engaged with the multimedia materials, and their responses were observed. Evaluation: The effectiveness of the multimedia presentation was assessed through multiple evaluation methods.

Pretests and posttests were conducted to measure students' learning gains. Non-test instruments such as classroom observations, interviews, student questionnaires, and documentation analysis were used to collect qualitative feedback. The collected data underwent statistical analysis, including normality tests, t-tests, and N-Gain analysis, to determine the impact of the intervention. The normality test ensured that the data distribution was appropriate for further analysis. The t-test was used to compare pretest and posttest scores, while the N-Gain analysis measured the effectiveness of the learning improvement (Maulana et al., 2021). The success criteria were based on significant score improvements and positive student engagement.

This structured approach ensures that the multimedia presentation is valid, practical, and effective in enhancing students' conceptual understanding and academic performance. The study provides an innovative solution to address the limitations of conventional learning methods, making science education more engaging and interactive (Ridwan et al., 2023).

Result and Discussion

This study employs a Research and Development (R&D) approach to produce a Canva-based Interactive Multimedia Presentation using the Problem-Based Learning (PBL) model (Adhana & Andriani, 2024). This multimedia is designed in a link format to facilitate accessibility without space and time restrictions.

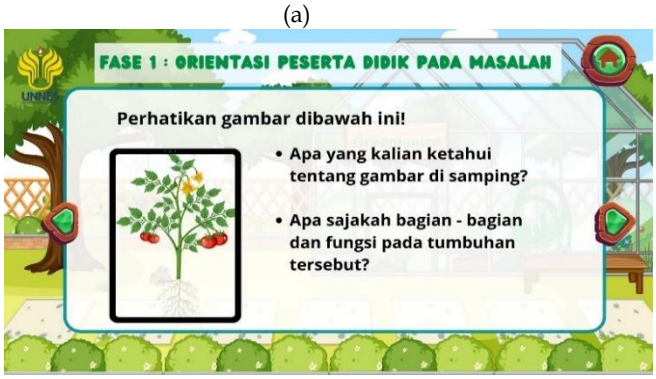
Development of Canva-Based Interactive Presentation Multimedia Using the Problem-Based Learning Model

The development follows the ADDIE model, consisting of Analysis, Design, Development, Implementation, and Evaluation stages (Purwanto et al., 2023). The initial stage involved analyzing potential and problems in the learning process at SDN Bringin 01. Observations, interviews with teachers, questionnaires, and analysis of learning outcome documentation were conducted. The main problem identified was the limited availability of technology-integrated learning resources, as well as the ineffective implementation of interactive and student-centered learning models. This was reflected in the low learning outcomes of students in science subjects, particularly on the topic of plant body parts.

Potential resources were identified, including the availability of school computers, students' mobile phones, Wi-Fi, and LCD projectors, which could support the implementation of interactive digital learning. The lack of variation in learning strategies and media was also found to be a key barrier to student engagement and comprehension. These findings align with previous research (Mahliatussikah, 2021; Setiadi & Andriani, 2024), which highlights the need for technology-based interactive learning media to enhance student understanding. In the design stage, the Interactive Multimedia Presentation was structured based on the Problem-Based Learning model. A prototype was developed, ensuring alignment with student and teacher needs. Canva was selected as the primary design tool due to its versatility in creating visual and interactive learning. The uniqueness of this research lies in the integration of Problem-Based Learning syntax within the multimedia, incorporating real-life problem scenarios, group discussions, solution presentations, and reflection activities. Interactive elements such as clickable images, embedded videos, narrations, and gamified quizzes were added to enhance engagement and conceptual understanding. materials such as presentations, posters, and animations Referring to the statement stated by Ristanti & Isdaryanti (2024). The uniqueness of this research lies in the integration of Problem-Based Learning syntax within the multimedia, incorporating real-life problem scenarios, group discussions, solution presentations, and reflection activities. Interactive elements such as clickable images, embedded videos, narrations, and gamified quizzes were added to enhance engagement and conceptual understanding.

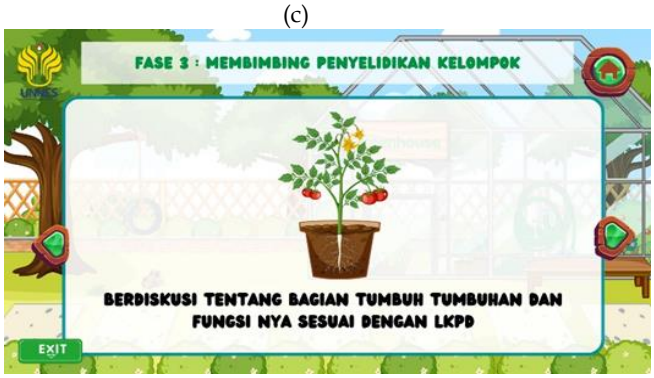
(a)

(b)



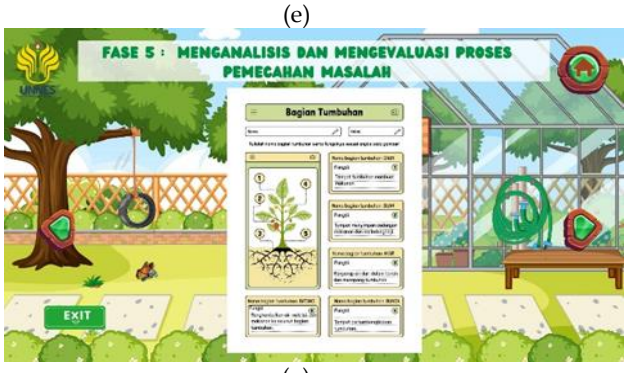
(c)

(d)



(e)

(f)



(g)

Figure 2. (a) cover Page; (b) Instructions Page; (c) PBL Syntax phase 1; (d) PBL Syntax phase 2; (e) PBL Syntax phase 3; (f) PBL Syntasx phase 4; (g) PBL Syntax phase 5

The development stage involved assembling multimedia components—text, images, animations, narration, and interactive elements—ensuring coherence with the Problem-Based Learning structure. The interactive multimedia was tested for usability and effectiveness through expert validation and user trials. The evaluation phase involved assessing its impact on student learning outcomes through pretests and posttests, analyzed using normality tests, t-tests, and N-Gain calculations.

The results of this study demonstrated a significant improvement in student learning outcomes, with

statistical tests confirming the effectiveness of the developed multimedia (Inayati & Setyasto, 2024). A comparison of pretest and posttest scores indicated a measurable increase in student comprehension and engagement. This aligns with research findings that emphasize the role of interactive multimedia in fostering active learning (Fatonah & Isdaryanti, 2024). The integration of the PBL model in digital learning media was found to enhance students' problem-solving skills and conceptual understanding, reinforcing the importance of technology in modern education.

Tables, research images, and supporting literature have been integrated to ensure clarity and strengthen the validity of findings. The results further suggest that the developed multimedia is not only practical but also effective in addressing challenges in science education, providing an engaging and student-centered learning experience. The following results of product development by researchers are presented in Figure 2.

Innovation in Interactive Multimedia Development. The innovation in this development lies in its structured learning approach that integrates multiple stimuli to enhance student engagement and comprehension. The interactive multimedia is designed to introduce learners to key concepts through a combination of visual images and learning videos (Sujarwo et al., 2022; Untari et al., 2020).

In the first phase, learners encounter visual representations and instructional videos that illustrate abstract concepts more tangibly, leveraging interactive media. The second phase involves organizing learners into groups based on their comprehension levels—high, medium, and low—to facilitate collaborative learning. Students work on Learner Worksheets (LKPD), reinforcing their understanding through structured problem-solving activities. In the third stage, the learning material is presented through engaging visual images, prompting discussion among students. The fourth stage involves the presentation of students' work, fostering communication and critical thinking skills. Finally, the fifth stage comprises the conclusion phase, where students summarize the key learning points. Additionally, interactive educational games are incorporated to encourage students to think critically and explore solutions. The learning process concludes with a reflection session and a glossary section to support the comprehension of scientific terminology.

Implementation and Evaluation. The fourth stage of development, implementation, involved testing the interactive multimedia with students. Small-scale testing was conducted with eight students before expanding to a larger group to assess usability and effectiveness. The revised product was subsequently tested in a classroom setting, allowing researchers to gather feedback and refine the multimedia elements. The fifth and final stage, evaluation, assessed the quality and effectiveness of the developed multimedia. This evaluation was conducted at every stage of development, ensuring continuous improvement.

Validation by Media Experts: A media expert evaluated the product to ensure it met usability and technological feasibility criteria. The media expert, an experienced academic in digital media, validated the multimedia as meeting all required assessment criteria without requiring revisions. Validation by Material Experts: A subject matter expert assessed the content's accuracy and alignment with the curriculum (Syaflin, 2022). The evaluation confirmed the multimedia was suitable for use in fourth-grade science learning at SDN Bringin 01 Semarang City. Additionally, a pretest and posttest were conducted to measure students' comprehension before and after using the interactive multimedia. The results also helped determine the product's feasibility and effectiveness in an actual learning environment.

Feasibility of Interactive Multimedia Presentation Using Problem-Based Learning Model to Improve Science Learning Outcomes

The feasibility assessment of Interactive Multimedia based on Problem-Based Learning (PBL) was conducted by media experts and material experts. The evaluation results can be seen in the Table 1.

Table 1. Validator Assessment of Feasibility

Validator	Percentage %	Criteria
Material Expert	89.50	Very Eligible
Media Expert	91.50	Very Eligible

The validation process involved 20 assessment statements evaluated by media and material experts. Media experts provided a score of 73 out of 80, yielding a feasibility percentage of 91.5%. Similarly, material experts assigned a score of 71 out of 80, resulting in an 89.5% feasibility rating. These results indicate that the developed interactive multimedia is categorized as very feasible for implementation in learning activities (Arina et al., 2020). Additionally, learners and teachers participated in assessing the feasibility of the multimedia. Their responses were collected through questionnaires, as shown in the Table 2.

Table 2. Results of Teacher and Learner Response Questionnaires

Respondent	Percentage (%)	Criteria
Teacher	95	Very Eligible
Students	97.5	Very Eligible

Based on the survey results, 28 learners awarded an average score of 78 out of 80 (97.5%), while teachers provided an average score of 76 out of 80 (95%). These high feasibility ratings indicate that the interactive multimedia presentation is highly suitable for student learning needs. The multimedia integrates high-quality images, clear audiovisual components, and educational games that actively engage students in problem-solving activities, thereby fostering a deeper understanding of abstract concepts.

Effectiveness of Interactive Multimedia Presentation Using Problem-Based Learning Model to Improve Science Learning Outcomes

The effectiveness of the multimedia was measured by comparing cognitive learning outcomes before and after its implementation. Various statistical analyses were conducted, including normality tests, t-tests, and N-Gain tests.

Table 3. Pre-Test and Post-Test Normality Test Results

Action	N	Mean	Sig.	Category
Pre-test	28	65	0.152	Normal
Post-test	28	90.5	0.175	Normal

Based on the normality test results, the significance values for the pre-test (0.152) and post-test (0.175) were greater than 0.05, indicating that the data were normally distributed. A paired sample t-test was conducted to determine whether there was a significant difference in learning outcomes before and after the use of interactive multimedia. The effectiveness of learning can be assessed by observing changes in cognitive learning outcomes, which are obtained through comparison between pretest and posttest scores. The assessment of the effectiveness of interactive multimedia presentation was conducted through various analyses, including normality test, t-test, and N-Gain test. The average retest score was recorded at 65, while the average posttest score increased to 95.5, indicating an average increase of 25.5.

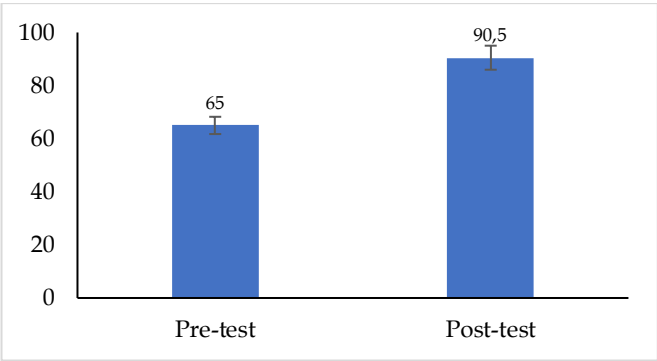


Figure 9. Mean results of pre-test and post-test of fourth grade students of SDN Bringin 01 Semarang City.

The data as in Figure 9, includes the results of the pre-test and post-test and then the researcher applies a normality test to determine whether the data is normal with the test criteria stating that if the significance value ≤ 0.05, then the data is not normally distributed; conversely, if the significance value > 0.05, then the data is normally distributed.

Table 4. t-Test Results for Pre-Test and Post-Test

Action	N	Mean	T	Sig. (2- tailed)
Pretest	28	65	-11.924	0.001
Posttest	28	90.535		

The t-test result (-11.924) is lower than the critical t-table value (-2.502), confirming a significant difference between pre-test and post-test scores. This indicates that the interactive multimedia effectively improved students' understanding of the science material. Additionally, an N-Gain test was performed to measure the degree of cognitive improvement.

Table 5. N-Gain Test

Action	N	Different	N-Gain	Category
Pretest	28	25.5	0.72	High
Posttest	28			

With an N-Gain of 0.72 (high category), the results demonstrate that interactive multimedia based on PBL significantly enhances student learning outcomes. These findings align with previous studies (Indarti & Harjono, 2022), which emphasize the benefits of interactive digital media in education. Research by Meilina et al. (2024; Putri et al. (2023) also confirms the effectiveness of PBL-based learning models in improving student comprehension. The significant increase in post-test scores compared to pre-test results indicates that students effectively grasped the material after using the multimedia. The integration of interactive elements such as animations, videos, and problem-solving activities played a crucial role in enhancing student engagement and conceptual understanding. The findings of this study align with research by Rambe et al. (2024), which highlight the importance of interactive media in promoting active learning and retention.

Furthermore, the multimedia product was designed using Canva, incorporating structured PBL activities where students explored real-world problems through digital interactions (Paramitha et al., 2023). The presence of educational games reinforced their understanding, as students actively participated in critical thinking exercises. The study's findings confirm that the developed interactive multimedia aligns with prior research and offers a valuable learning tool (Miaz et al., 2019). The high feasibility and effectiveness scores validate its potential for broader application in

elementary science education. Future research could further investigate its impact on different learning styles and long-term retention.

Conclusion

Based on research conducted on fourth-grade students at SDN Bringin 01 Semarang City, this study successfully developed Interactive Presentation Multimedia using the Problem-Based Learning model through the R&D method based on the ADDIE model. The multimedia integrates text, images, sound, and video to enhance student engagement. Developed using Canva, it is accessible via links that include covers, main menus, instructions, problem-based learning materials, games, evaluations, and developer profiles, ensuring ease of access. The validation results indicate high feasibility, with media experts rating it at 91.5% and material experts at 89.5%. The effectiveness test showed a significant improvement in students' learning outcomes, with an N-Gain score of 0.72 in a large-group trial, classified as high. Students demonstrated enhanced conceptual understanding and engagement in learning plant body parts. This study confirms that Interactive Presentation Multimedia using the Problem-Based Learning model is an effective and viable learning tool for science education. Future research could explore its application to other subjects or grade levels, as well as further refinement based on student feedback. The findings highlight the importance of integrating technology-based learning media to enhance 21st-century education.

Acknowledgments

The researcher would like to express my deepest gratitude to alma mater, Semarang State University, Elementary School Teacher Education Study Program, Faculty of Education and Psychology, to my parents, to my supervisor, Mr. Drs. Isa Ansori, M.Pd., Grade IV and V Teachers of SDN Bringin 01 Semarang City along with related school officials, fellow researchers, for their support and prayers that contributed to the success of the research.

Author Contributions

T.E.R as the first author, and the second author I.A who contributed in helping to prepare the instruments and analyze the research data. The first author created the media, learning tools, conducted the research, then analyzed the data. Both authors are responsible for reviewing and approving the final manuscript of the article.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflict of interest.

References

Adhana, H. M., & Andriani, A. E. (2024). Development of Interactive Multimedia based on Problem-Based Learning to Improve IPAS Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, *10*(9), 6737–6745. https://doi.org/10.29303/jppipa.v10i9.7588

Angkarini, T. (2022). Utilizing interactive powerpoint to develop students' speaking skills in new normal. *Journal of Learning and Instructional Studies*, *2*(2), 46–57. https://doi.org/10.46637/jlis.v2i2.26

Arina, D., Sri Mujiwati, E., Kurnia, I., Achmad Dahlan No, J. K., & Kota Kediri, M. (2020). Pengembangan Multimedia Interaktif Untuk Pebelajaran Volume Bangun Ruang Di Kelas V Sekolah Dasar. *Prima Magistra: Jurnal Ilmiah Kependidikan*, *1*(2), 168–175. https://doi.org/10.37478/jpm.v1i2.615

Axhami, L., & Axhami, M. (2023). Use of Information and Communication Technologies as a Medium for Education in Albania. *International Journal of Information and Education Technology*, *13*(12), 1932–1938. https://doi.org/10.18178/ijiet.2023.13.12.2007

Balqis, A. S., & Andriani, A. E. (2024). Development of Learning Evaluation Based on Automatic Assessment through Quizizz Paper Mode to Improve Students ' Natural and Social Sciences Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, *10*(6), 3357–3366. https://doi.org/10.29303/jppipa.v10i6.7251

Boateng, S. L., Penu, O. K. A., Boateng, R., Budu, J., Marfo, J. S., & Asamoah, P. (2024). Educational technologies and elementary level education – A bibliometric review of scopus indexed journal articles. *Heliyon*, *10*(7). https://doi.org/10.1016/j.heliyon.2024.e28101

Dewi, I. M., & Setyasto, N. (2024). Pengembangan Media Pembelajaran Digital Flipbook Berbasis Canva Pada Mata Pelajaran IPAS Materi Sistem Pernapasan Kelas V di Sekolah Dasar. *Jurnal Penelitian Pendidikan IPA*, *10*(5), 2300–2308. https://doi.org/10.29303/jppipa.v10i5.7030

Errabo, D. D., & Ongoco, A. A. (2024). Effects of interactive-mobile learning modules in students' engagement and understanding in genetics. *Journal of Research in Innovative Teaching and Learning*, *17*(2), 327–351. https://doi.org/10.1108/JRIT-01-2024-0023

Fatonah, U., & Isdaryanti, B. (2024). Development of Web-Based Learning Media Using Google Sites to Improve Learning Outcomes of IPAS. *Jurnal Penelitian Pendidikan IPA*, *10*(8), 6053–6058. https://doi.org/10.29303/jppipa.v10i8.8151

Gray, L., & Lewis, L. (2021). Use of Educational

Technology for Instruction in Public Schools: 2019-20. First Look--Summary. NCES 2021-017. *National Center for Education Statistics*. Retrieved from https://eric.ed.gov/?id=ED615755

Hargrove, M. H. (2020). *Quantitative Study Exploring Traditional and Standards-Based Grading Practices' Effect on Student Yearly Reading Achievement Growth as Measured by MAP* [Thesis: Northcentral University]. Retrieved from https://shorturl.asia/IJoTi

Inayati, D., & Setyasto, N. (2024). Pengembangan Media Pembelajaran Interaktif Berbasis Website dengan Berbantuan Lectora inspire Untuk Meningkatkan Hasil Belajar IPAS. *Jurnal Penelitian Pendidikan IPA*, *10*(5), 2480–2487. https://doi.org/10.29303/jppipa.v10i5.7028

Indarti, D., & Harjono, N. (2022). Pengembangan Media Pembelajaran (POINTTER)"Powerpoint Interaktif" pada Mata Pelajaran IPA Materi Rangka Manusia untuk Meningkatkan Hasil Belajar Peserta Didik Kelas V SD Negeri Harjosari 01 Bawen. *JIIP-Jurnal Ilmiah Ilmu Pendidikan*, *5*(11), 5045–5050. http://jiip.stkipyapisdompu.ac.id

Kerslake, L., & Hannam, J. (2022). Designing media and information literacy curricula in English primary schools: children's perceptions of the internet and ability to navigate online information. *Irish Educational Studies*, *41*(1), 151–160. https://doi.org/10.1080/03323315.2021.2022518

Mahliatussikah, H. (2021). Development of Interactive Learning Media "Lectora Inspire" for Balaghah Learning. *Advances in Social Science, Education and Humanities Research*. https://doi.org/10.2991/assehr.k.211212.024

Maulana, A., Sofyan, A., & Rafiudin, R. (2021). Pengembangan Multimedia Pembelajaran Ipa Interaktif Untuk Meningkatkan Hasil Belajar Siswa Di Sekolah Dasar. *Journal of Instructional Technology J-INSTECH*, *2*(2). https://doi.org/10.20527/j-instech.v2i2.3819

Meilina, S., Prasasti, P. A. T., & Listiani, I. (2024). Pengembangan Multimedia Interaktif Flash Berbasis Project Based Learning Untuk Pengembangan IPAS Siswa Kelas 4. *Al-Madrasah Jurnal Pendidikan Madrasah Ibtidaiyah*, *8*(2), 611. https://doi.org/10.35931/am.v8i2.3472

Memisevic, H., Biscevic, I., Hadzic, S., & Kuduzovic, A. (2023). Exploring Current Trends In Education: A Review Of Research Topics. *The Problems Of Education In The 21st Century Journal. Problems of Education in the 21st Century*, *81*(2), 258–268. https://doi.org/10.33225/pec/23.81.258

Miaz, Y., Helsa, Y., Zuardi, Y., Febrianto, R., & Erwin, R. (2019). The development of interactive multimedia-based instructional media for elementary school in learning social sciences. *Journal of Physics: Conference Series*, *1321*(3). https://doi.org/10.1088/1742-6596/1321/3/032107

Mulyaningsih, T., Hendratno, H., & Subrata, H. (2023). Literature Review: Development of Google Sites – Based Multimedia to Improve Elementary School Students' Reading Literacy. *International Journal of Emerging Research and Review*, *1*(4), 45. https://doi.org/10.56707/ijoerar.v1i4.45

Nurani, M. F., & Tyas, D. N. (2024). Development of Interactive Powerpoint-Based IPAS Learning Media on the Material of Plant Sources of Life on Earth for Class IV SD Negeri Tugurejo 02 Semarang City. *Jurnal Penelitian Pendidikan IPA*, *10*(9), 6701–6709. https://doi.org/10.29303/jppipa.v10i9.7402

Paramitha, M., Fadillah, S., & Sari, M. (2023). Pengembangan Multimedia Interaktif Berbasis Aplikasi Canva Pada Materi Sistem Pernapasan. *Jurnal BIOEDUIN*, *13*(2), 58–68. Retrieved from https://journal.uinsgd.ac.id/index.php/bioeduin/article/view/21203

Purwanto, D., Mentara, H., & Marhadi. (2023). Development of Sport Massage (e-Sport Massage) Based on Android App with ADDIE Design as a Learning Media for Students. *International Journal of Human Movement and Sports Sciences*, *11*(5), 1084–1090. https://doi.org/10.13189/saj.2023.110517

Putri, D. S. A., Erdiana, L., & Rahmawati, E. (2023). Pengembangan Media Pembelajaran Power Point Interaktif untuk Meningkatkan Hasil Belajar Kelas V Tema 9 Subtema 3. *JIIP-Jurnal Ilmiah Ilmu Pendidikan*, *6*(12), 10742–10748. https://doi.org/10.54371/jiip.v6i12.3050

Putri, G. A. B. A., Fauzi, A., Syazali, M., & Guru Sekolah Dasar, P. (2024). Pengembangan Multimedia Interaktif Berbasis Kearifan Lokal Sasak Pada Pembelajaran IPAS. *Journal of Classroom Action Research*, *6*(4). https://doi.org/10.29303/jcar.v6i4.9459

Rahma, D. N., Ramadhani, K. A., Corazon, M., Fami, A., Rasita, I., & Bagus, G. (2024). The Influence of Canva Application Features on The Graphic Design Confidence: A Case Study of College Students. *Journal of Applied Multimedia and Networking*, *8*(1). Retrieved from http://jurnal.polibatam.ac.id/index.php/JAMN

Rambe, Y. S., Rozi, F., Mailani, E., Sirait, A. P., & Manurung, I. F. U. (2024). Pengembangan Multimedia Interaktif Menggunakan Canva Pada Pembelajaran Ipas Kelas Iv Sdn 19 Rantau Utara T.A 2023/2024. *JGK (Jurnal Guru Kita)*, *8*(4), 715. https://doi.org/10.24114/jgk.v8i4.59420

Ridwan, M. F. A., Anjarini, T., & Ngazizah, N. (2023). Multimedia Interaktif Berbasis Problem Based Learning Pada Materi Ciri–Ciri Makhluk Hidup Bagi Siswa Sekolah Dasar. *Edukasiana: Jurnal Inovasi Pendidikan*, *2*(1), 56–63. https://doi.org/10.56916/ejip.v2i1.218

Ristanti, S., & Isdaryanti, B. (2024). Development of Canva-Based Science Infographic Learning Media to Improve Students' Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, *10*(10), 7984–7992. https://doi.org/10.29303/jppipa.v10i10.9506

Roemintoyo, R., Miyono, N., Murniati, N. A. N., & Budiarto, M. K. (2022). Optimising the utilisation of computer-based technology through interactive multimedia for entrepreneurship learning. *Cypriot Journal of Educational Sciences*, *17*(1), 105–119. https://doi.org/10.18844/cjes.v17i1.6686

Saimon, M., Lavicza, Z., Houghton, T., & Rahmadi, I. (2023). A model for integrating microgames in teaching primary education for sustainable development. *Journal of Research in Innovative Teaching and Learning*. https://doi.org/10.1108/JRIT-12-2022-0085

Saralee, A., Fitria, Y., Sukma, E., & Hidayati, A. (2024). Development of E-Module IPAS Based on Problem Based Learning Assisted with Articulate Applications to Improve Students Think Critically. *Jurnal Penelitian Pendidikan IPA*, *10*(4), 2032–2040. https://doi.org/10.29303/jppipa.v10i4.7014

Septiyanto, A., Oetomo, D., & Indriyanti, N. Y. (2024). Students' interests and attitudes toward science, technology, engineering, and mathematics careers. *International Journal of Evaluation and Research in Education*, *13*(1), 379–389. https://doi.org/10.11591/ijere.v13i1.25040

Setiadi, Z. W., & Andriani, A. E. (2024). Development of Interactive Multimedia Based on Appy Pie to Improve Learning Outcomes of Elementary School Students. *Jurnal Penelitian Pendidikan IPA*, *10*(7), 4048–4057. https://doi.org/10.29303/jppipa.v10i7.8121

Sugiyono. (2019). *Metode Penelitian Pendidikan Pendekatan Kuantitaif, Kualitatif, dan R&D*. Bandung: Alfabeta.

Sujarwo, H., N., S., Sekaringtyas, T., Safitri, D., Lestari, I., Suntari, Y., Umasih, M., A., I., R., & Sudrajat, A. (2022). Android-Based Interactive Media to Raise Student Learning Outcomes in Social Science. *International Journal of Interactive Mobile Technologies*, *16*(7), 4–21. https://doi.org/10.3991/ijim.v16i07.25739

Syaflin, S. L. (2022). Pengembangan Multimedia Interaktif Berbasis Macromedia Flash Pada Materi Ipa Sekolah Dasar. *Jurnal Cakrawala Pendas*, *8*(4). https://doi.org/10.31949/jcp.v8i2.3003

Untari, R. S., Kamdi, W., Dardiri, A., Hadi, S., & Nurhadi, D. (2020). The development and application of interactive multimedia in project-based learning to enhance students' achievement for 2D animation making. *International Journal of Emerging Technologies in Learning*, *15*(16), 17–30. https://doi.org/10.3991/ijet.v15i16.16521

Vidal-Esteve, M. I., & Martín-Gómez, S. (2023). Digitalization of Classrooms: A Comparative Study on Teachers' Perceptions about the Use of Digital Teaching Materials in Early Childhood and Primary Education. *Education Sciences*, *13*(11). https://doi.org/10.3390/educsci13111156

Wanti, C. Y., & Erita, Y. (2024). Development of powtoon media in IPAS learning assisted by the pbl model in fourth grade elementary school. *Jurnal Penelitian Pendidikan IPA*, *10*(8), 7534–7540. https://doi.org/10.29303/jppipa.v10i10.8976

Zhang, Y., Zulkifli, N., Fauzi, A., Ayub, M., D, S., Z., & Nurul, B. (2023). Analysis to Creation: Using the ADDIE Model to Develop an Educational Game for Children. *International Conference on Computers in Education*, *1*, 621–623. https://doi.org/10.58459/icce.2023.1043