

# Development of Integrated Thematic Teaching Materials with the Discovery Learning Model Using Adobe Flash CS6 Interactive Multimedia

Hanafi<sup>1</sup>, Andre Satrio<sup>1</sup>, Desyandri<sup>1\*</sup>, Risda Amini<sup>1</sup>, Daharnis<sup>1</sup>

<sup>1</sup> Basic Education Masters Study Program, Faculty of Science Education, Universitas Negeri Padang, Padang, Indonesia.

Received: May 26, 2024

Revised: August 11, 2024

Accepted: August 25, 2024

Published: August 31, 2024

Corresponding Author:

Desyandri

[desyandri@fip.unp.ac.id](mailto:desyandri@fip.unp.ac.id)

DOI: [10.29303/jppipa.v10iSpecialIssue.7793](https://doi.org/10.29303/jppipa.v10iSpecialIssue.7793)

© 2024 The Authors. This open access article is distributed under a (CC-BY License)



**Abstract:** The use of teaching materials in elementary schools is not optimal, teachers tend to only use students' books as teaching materials. To overcome this problem, integrated thematic teaching materials were developed with the Discovery Learning model using interactive multimedia Adobe Flash CS6 in class V of elementary schools. This research aims to develop integrated thematic teaching material products with the Discovery Learning model using interactive multimedia Adobe Flash CS6. This research uses research and development (R&D) methods with the ADDIE development model. In the ADDIE development model there are five main stages, namely Analysis, Design, Development, Implementation, and Evaluation. Validation is carried out to determine the suitability of the teaching materials developed. The material aspect obtained 91.81% in the very valid category, the media aspect obtained 90.83% in the very valid category, and the language aspect obtained 96% in the very valid category. At the Implementation stage, practicality tests and effectiveness tests are carried out. The results of the practicality test with teachers obtained an average of 95%, by teachers and 86% by students in the very practical category. Effectiveness testing was carried out on aspects of student motivation and learning outcomes. The motivation aspect obtained an average of 83% in the very high category. Learning outcomes in the knowledge aspect, posttest scores at SDN 09 Selayo were 82.66 with a Good predicate, and at SDN 24 Selayo 85.33 with a Good predicate. From the research conducted, it can be stated that integrated thematic teaching materials with a discovery learning model using Adobe Flash CS6 interactive multimedia are valid, practical and effective for use in class V elementary schools.

**Keywords:** Adobe flash CS6; Discovery learning; Thematic teaching materials

## Introduction

In the era of Industrial Revolution 4.0, education needs to innovate so as not to be left behind. The 2013 curriculum emphasizes developing student competencies in the aspects of attitudes, knowledge and skills. Integrated thematic learning in elementary schools, such as in class V, requires creative and effective teaching materials (Dahlia et al., 2023). The Discovery learning model is suitable for integrated thematic learning (Lena et al., 2019; Melindawati, 2020;

Rahmatina et al., 2019; Wahyuni & Ananda, 2021). Discovery Learning encourages students to find information on their own, organize and conclude learning (Alfieri et al., 2011; Fahmi et al., 2019; Winarni et al., 2020). Teaching materials play an important role in completing the learning process, helping students think and achieve specified competencies (Arifin et al., 2018).

Interactive multimedia Adobe Flash CS6 in learning can increase student engagement and make learning more interesting. Teachers need to understand students' needs, the learning environment, and choose

## How to Cite:

Hanafi, H., Satrio, A., Desyandri, D., Amini, R., & Daharnis, D. (2024). Development of Integrated Thematic Teaching Materials with the Discovery Learning Model Using Adobe Flash CS6 Interactive Multimedia. *Jurnal Penelitian Pendidikan IPA*, 10(Special Issue), 466-474. <https://doi.org/10.29303/jppipa.v10iSpecialIssue.7793>

appropriate learning models, such as Discovery Learning, to achieve learning goals effectively (Magda et al., 2020).

The background to the problem faced in this context is the need for innovation in education to keep up with the development of the Industrial Revolution 4.0. The 2013 curriculum emphasizes the importance of developing student competencies in aspects of attitudes, knowledge and skills. In integrated thematic learning in elementary schools, especially class V, creative and effective teaching materials are needed (Trisnawati et al., 2020).

The Discovery learning model is considered suitable for integrated thematic learning because it encourages students to actively seek information, organize and conclude learning. The role of teaching materials is very important in supporting the learning process, helping students think and achieve the desired competencies (Suyono, 2015). The use of interactive multimedia Adobe Flash CS6 in learning is expected to increase student involvement and make learning more interesting. It is important for teachers to understand student needs, the learning environment, and choose appropriate learning models, such as Discovery Learning, in order to achieve learning goals effectively (Irsyad, 2020).

## Method

This research uses a Research and Development (R&D) approach which aims to develop effective teaching material products in the context of school learning (Putra et al., 2020; Rostyawati et al., 2021; Zulfadewina et al., 2020). This development method focuses on testing the effectiveness of the resulting product. This research adopts the ADDIE Model which consists of five stages: analysis, design, development, implementation and evaluation (Desyandri et al., 2019; Siburian et al., 2020).

The research procedure began with the Preliminary Study stage, where observations were carried out at SDN 24 Selayo and SDN 09 Selayo to spread the use of ICT-based teaching materials and the use of computers in learning which was not yet optimal. The Model Development Stage is carried out by designing teaching material products using Adobe Flash CS6 based on the ADDIE Model (Mubarak, 2022).

Next, the analysis stage includes student analysis, curriculum analysis, and material analysis to identify product development needs. The Design Phase involves designing the appearance of an open material product with various features that support learning. The Development Stage involves product validation by experts and trials on students at SDN 09 Selayo and SDN 24 Selayo.

The Implementation stage is carried out to obtain feedback on the product, while the Evaluation stage includes evaluating the practicality and effectiveness of the product. Primary data was obtained from respondents and informants through questionnaires, interviews and documentation (Alam, 2021). Data collection instruments include validity instruments, interviews, and questionnaires to measure the effectiveness and practicality of the products being developed.

## Result and Discussion

This research is development research that focuses on developing integrated thematic teaching materials with the Discovery Learning model using interactive multimedia Adobe Flash CS6, especially on theme 8 "Our Friendly Environment" for fifth grade elementary school students. The development model used is ADDIE, which consists of five stages: analysis, design, development, implementation and evaluation.

The research process lasted for two months from the beginning until the teaching materials were deemed valid by material, media and language experts. Initial observations were carried out through interviews with class V teachers at SDN 09 Selayo to identify needs for teaching materials, curriculum and related situations. Then, researchers created teaching materials with the Discovery Learning model using interactive multimedia Adobe Flash CS6.

Once completed, the teaching materials are validated by experts, including Prof. Yalvema Miaz, MA., Ph.D., Drs. Syafrri Ahmad, M.Pd., Ph.D., Silvia Handayani, M.Pd., Dr. Darmansyah, ST., M.Pd., and Dr. Nur Azmi Alwi, S.S., M.Pd. The aim of the product produced is to provide alternative teaching materials for teachers as an addition to schools. The process of developing teaching materials is carried out in several stages, including analysis, design, development, implementation and evaluation, with a focus on implementing the Discovery Learning model using Adobe Flash CS6 interactive multimedia (Sari, 2023; Syafriatma & Amini, 2021). The analysis stage in this research includes analysis of teaching material needs, curriculum analysis, and analysis of student characteristics.

### *Learner Analysis*

Analysis of student characteristics aims to understand the level of student abilities, especially in critical and creative thinking (Suchyadi & Suharyati, 2021). Teachers at SDN 09 Selayo reported that students were less active in learning, tending to only receive information without looking for it themselves. The characteristics of students at SDN 09 Selayo show

activity and a tendency to use traditional methods in learning. Lack of teacher understanding and creativity in developing teaching materials results in less interactive learning, causing students' need for interesting and interactive learning media.

*Curriculum Analysis*

The curriculum used at SDN 09 Selayo is the 2013 revised 2017 curriculum based on integrated thematic learning. The goal of integrated thematic learning is to integrate learning content into "themes" to create a

complete understanding for students. In class V theme 8 "Our Friends' Environment", there are core competencies and basic competencies that must be adapted to the cognitive, affective and psychomotor domains. This analysis is the basis for developing teaching materials using interactive multimedia Adobe Flash CS6.

The results of the analysis related to basic competencies from 5 subjects in theme 8 "Our Friendly Environment" are explained in Table 1.

**Table 1.** Competence Base Theme 8 Subtheme 1 and 2

Payload Eye LearningTheme 8 (Environment Friend We)	Competence Base	Subtheme	
		1	2
PPKn	1.3 Grateful diversity social public as the gift of God Almighty in the context of BhinnekaSingle Ika	v	v
	2.3 Behave tolerant in diversity social culture society in context Bhinneka Single Ika	v	v
	3.3 Studying diversity social culture public	v	v
	4.3 Organize activity Which supports diversity social culture public	v	v
	3.8 Elaborate sequence of events or Action Which there is on the text non-fiction	v	v
Language Indonesia	4.8 Serve return incident or Action with notice background behind Which there is on textfiction	v	
IPA	3.3 Analyze cycle water and impact on event in earth and the survival of creatures life	v	v
	4.8 Make work about scheme cycle water based on information from various source		
Social Sciences	3.3 Analyze role economy in effort improving people's lives in the social sector and culture to strengthen unity and unity nation Indonesia as well as relationship with characteristics room	v	v
	4.3 Presents the results of an analysis of the role of economics in effort prosperous life society in fieldsocial and cultural for strengthen unity and unity nation	v	v
SBdP	3.2 Understanding stairs tone	v	
	4.2 Make story pictures	v	

Based on competence base, formulate it indicator-indicator for support achievement competence base. Results analysis indicator learning on theme 8 (Environment Friend we) sub theme 1 (Humans and the Environment is carried out by means develop indicators that have been created by the fifth grade teacher in SDN 09 Selayo. The results of the indicator analysis can be seen at Table 2.

*Design*

To produce teaching materials using *Adobe Flash CS6*, a flowchart and storyboard are created as a design plan from material teach with model discovery learning use interactive multimedia adobe flash CS (Haj et al., 2024; Ratnaningsih et al., 2022).

*Making Flow chart*

Having a flowchart will help in development of the teaching materials that will be made and each part of the

flowchart have a certain relationship (Afifah et al., 2023; Sitompul, 2021). The following is a flowchart of model teaching materialsdiscovery learning using Adobe Flash interactive multimedia CS6.

*Making Storyboarding*

Storyboarding containing all data Which will appear in screen and datasupporters who will help in creating parts of the teaching materials (Albana & Hartayu, 2023; Rudiansyah et al., 2021). Following *Storyboarding* from model *discovery learning* use interactive multimedia *adobe flash CS6*.

Based on the flowchart and storyboard that have been created be produced material teach with model discovery learning use multimedia interactive adobe flash CS6 . For appearance material teach model discovery learning use multimedia interactive adobe flash CS6 can see in the attachment.

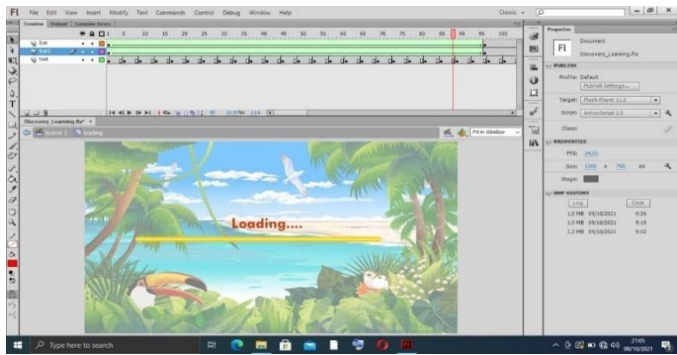
*Development*

At this development stage, multimedia product validation is carried out learning. The purpose of this product validation is to find out appropriateness and quality from material teach. Testing validity that is with

validate learning teaching materials by experts and, then revision was carried out. The validation of this teaching material is validated by experts material, expert media, and expert Language. Suite activity Which carried out based on the development carried out until stated valid.

**Table 2.** Results Analysis Indicator

Indicator Learning in School	Indicator results Analysis
Learning 1	
Language Indonesia	
3.8.1 Explain characteristic features text non-fiction	3.8.1 Identify incident- incident or action Which there is on text non-fiction (C4)
4.4.1 Tell the story of the eventthere is on text non-fiction	3.4.2. Conclude characteristic features text nonfiction (C5) 4.4.1 Serve map thought about benefit water for humans, animals and plants correctly (P3)
IPA	
3.8.1 Explain cycle water Which happenin earth	Analyze the benefits of water for man, animal and land (C4) Identify impact cycle water on events on earth as well life sustainability (C4)
4.8.1 Understand benefit water for human survival, andlife on earth.	Make scheme cycle water based on information and source right (P5) Serve information Which related benefit water for man, animal and plant (P5)
Learning 2	
Language Indonesia	
Read text about cycle water	Analyze picture about group water cycle (C4)
Read text fiction	Analyze the sequence of events on text fiction with use language Indonesia is good and right (C4)
4.8.1 Tell fill song lyrics	4.8.1 Identify order events in reading with correct (P4) 4.8.1 Analyze fill verse song (P4)
IPA	
3.8.1 Explain cycle water based onobservation picture	3.8.1 Analyze cycle water based on observations image (C4)
4.8.1 Make chart about cycle water	4.8.1 Serve chart about cycle water based on information from various source (P5)
SBdP	
3.2.1 Sing a song correctly	Find elements Which there is on song (C4) Summarizing elements Which there is on song (C5)
4.2.1 Identify various laddertone correctly	4.2.1 Serve elements ladder tone (P3)
Learning 3	
PPKn	
3.3.1 Observe diversity socialcommunity culture Indonesia	Find diversity in environment around (C4) Conclude benefit diversity social culture public Indonesia (C5)
3.4.1 Mention diversity socialcommunity culture Indonesia	4.3.1 Develop activities associated with socio- cultural diversity public Indonesia (P4)
Social Sciences	
3.3.1 Read about types businessin surrounding environment	Compare types business in environment around Which process source Power natural in a way group (C5) Identify types business and activity economy public (C4)
4.3.1 Mention the diversity of types type of business and economic activity public Indonesia	4.3.1 Develop types business activity economy public (P5)
Language Indonesia	
3.8.1 Reading the text aboutdiversity culture in Indonesia	Identify text about diversity culture in Indonesia (C4) Conclude text about diversity culture in Indonesia in reading correctly (C5)
4.8.1 Explain the sequence of eventsin reading	4.8.1 Identifying sequences events in the reading correctly (P3)



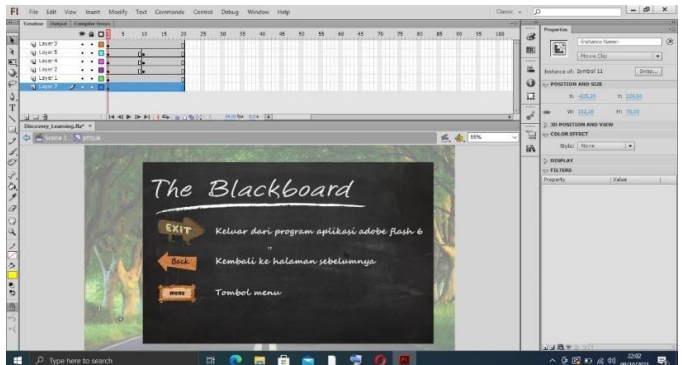
(a)



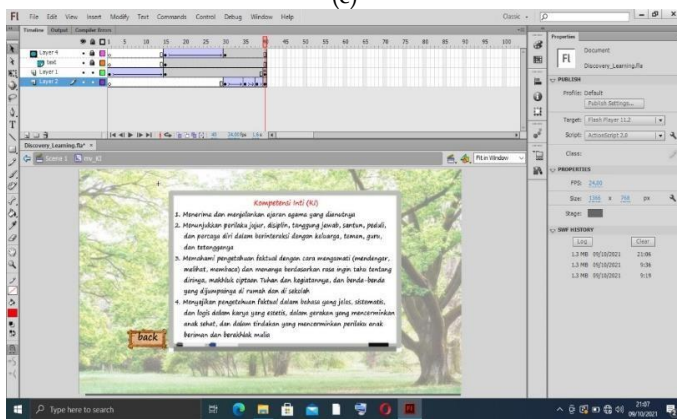
(b)



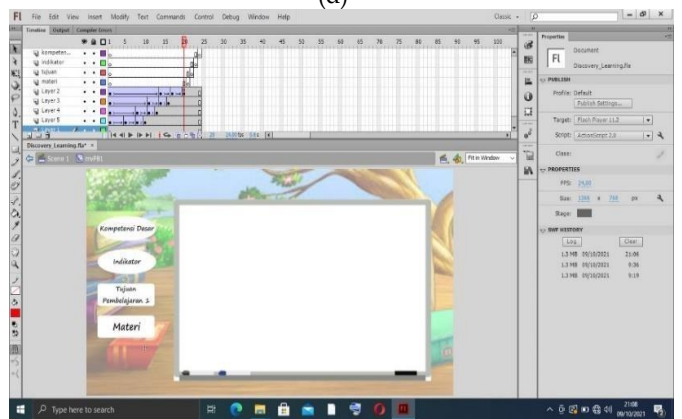
(c)



(d)



(e)



(f)



(g)

Figure 1. Storyboarding from material teach model discovery learning: (a) Homepage; (b) Cover page; (c) Menu page; (d) Page instruction; (e) KI page; (f) Appearance learning 1-9; (g) Page evaluation

*Validation by Expert Material*

Validation carried out by material experts related to the material which served on multimedia learning. Expert material Which validate multimedia learning This there are three person that is Mrs Drs. Syafri Ahmad, M.Pd., Ph.D is expert education Teacher school base at a time lecturer program postgraduate education base in University Padang State; Mr Prof. Yalvema Miaz, M.A., Ph.D., is expert education Teacher school base at a time lecturer program postgraduate education base in University Padang State; and Mrs. Silvia Handayani, M.Pd is an elementary school teacher Already own experience teach more from five years. As for results validation by validator expert material seen on Table 3.

**Table 3.** Results Validation by Validator Expert Material

Validator	Results evaluation	Percentage %	Information
Validator 1	106	96.36	Very valid
Validator 2	97	88.18	Very valid
Average		91.81	Very valid

Based on the results of validation by material experts, it is obtained average as big as 91.81% with category very valid and can tested with revisions according to suggestions from the validator. As for suggestions and comments provided by material expert validators.

*Validation by Expert Media*

Validation carried out by media experts is related to aspects suitability media, design and layouts and convenience in operation. Expert media Which validate multimedia This lesson is Mr. Dr. Darmansyah, ST, M.Pd. He is an expert in Educational Technology at Padang State University. As for results validation expert media Which complete by expert media can shown in Table 4.

**Table 4.** Validation by Expert Media

Aspect Which assessed	Results Evaluation
Appearance	80
Programming	29
Average	90.83
Category	Very Valid

Based on the validation results by media experts, the average value was obtained an average of 90.83% is in the very valid category, this is significant that the teaching materials developed contain appropriate designs attractive and proportional and easy to use by students (Sukariasih et al., 2019), so that student can use material teach in a way independent.

*Validation by Expert Language*

Data validity Language obtained from expert Faculty Knowledge Education namely Mrs. Dr. Nur Azmi Alwi, SS, M.Pd by means provide an assessment sheet as shown in Table 5.

**Table 5.** Results Validation by Expert Language

Validator	Results evaluation
Validator Expert Language	96
Average	96
Category	Very Valid

*Implementation*

At this stage, limited testing was carried out on teachers and student. Trials Which intended. The level practicality and effectiveness material teach Which developed in increase motivation and results study student. Trials limited This consists from 1 person teacher and 15 person student class V SDN 09 Selayo, 1 person teacher and 15 students class V SDN 09 Selayo.

*Results Test Practicality Material Teach to Teacher*

The level practicality material teach Which developed, a practicality test is carried out on teachers. On The practicality test stage for teachers is carried out by asking teacher to fill out a practicality questionnaire sheet regarding teaching materials which was developed as shown in Table 6.

**Table 6.** Results test practicality by Teacher

Teacher	School	Score
NR	SDN 09 Selayo	10
M.S	SDN 24 Selayo	9
Average		95%
Category		Very Practical

*Results Test Practicality Material Teach to student*

The level practicality material teach Which developed, so done test practicality to student. On stage test practicality to student done with method request students to fill out a practicality questionnaire sheet regarding teaching materials which was developed. The results of the practicality tests carried out to students can seen on Table 7.

**Table 7.** Results Test Practicality to Student

Amount Student	School	Amount Acquisition Mark
15	SDN 09 Selayo	130
15	SDN 24 Selayo	128
Total Acquisition Mark		258
Results Practicality		86%

*Evaluation Aspect Knowledge*

In the knowledge aspect, a pre-test and post-test were carried out form question objective for know level

success material teach Which developed in increase results Study student. Based on the results of students'

answers, results are obtained recapitulation pretest scores and posttest Which served on Table 8.

**Table 8.** Results Recapitulation Aspect Knowledge

School	Amount Participant	Pretest value	Predicate	Posttest value	Predicate
SDN 09	15	58.66	D (Not enough)	82.66	B (Good)
SDN 24	15	60	D (Not enough)	85.33	B (Good)

After all stages have been completed and declared feasible and can be used as a learning resource, furthermore is stage evaluation. Evaluation is stages which final after the product to be developed goes through the analysis stage, stage planning, and stage development Which Where onstage development includes feasibility tests, group trials (both small nor test try group big) and test try educator. On stage this researcher spread or promote product end form multimedia interactive *Adobe Flash CS6* On stage This researcher insert multimedia into CD-Interactive which is then distributed in a way on line in web. Matter This done so that product Which has developed can be used as a learning medium and can continued by future researches.

## Conclusion

Development of integrated thematic teaching materials with the Discovery Learning model using interactive multimedia *Adobe Flash CS6* for class V Elementary School in theme 8 subthemes 1 and 2 shows excellent validity, high practicality, and effectiveness in increasing student motivation and learning outcomes. This teaching material is proven to be very valid because the material is in accordance with basic competencies and learning objectives. Apart from that, this teaching material is very practical to use with navigation buttons that are easy for students to operate. The use of interactive multimedia in this teaching material is effective in increasing student learning motivation through attractive visuals and animations.

## Acknowledgments

The author team would like to thank all parties who have contributed to the implementation of this research.

## Author Contributions

This article was prepared by six authors, namely H, A.S, D, R.A, and D. All author members carried out each stage together.

## Funding

This research received no external funding.

## Conflicts of Interest

The authors declare no conflict of interest.

## References

- Afifah, D. S. N., Nafi'an, M. I., & Manggar, D. A. (2023). The Development of *Adobe Flash CS6*-Based Interactive Media to Improve Numerical Literacy Skills for Madrasah Ibtidaiyah Students. *Kreano, Jurnal Matematika Kreatif-Inovatif*, 14(1), 75–85. Retrieved from <https://journal.unnes.ac.id/nju/kreano/article/view/38825>
- Alam, M. K. (2021). A systematic qualitative case study: questions, data collection, NVivo analysis and saturation. *Qualitative Research in Organizations and Management: An International Journal*, 16(1), 1–31. <https://doi.org/10.1108/QROM-09-2019-1825>
- Albana, I., & Hartayu, W. (2023). E-learning as a Learning Media in the Form of Educational Games for Elementary School Students. *Journal of Multimedia Trend and Technology*, 2(1), 1–9. Retrieved from <https://journal.educollabs.org/index.php/JMTT/article/view/20>
- Alfieri, L., Brooks, P. J., Aldrich, N. J., & Tenenbaum, H. R. (2011). Does discovery-based instruction enhance learning? *Journal of Educational Psychology*, 103(1), 1. Retrieved from <https://psycnet.apa.org/buy/2010-23599-001>
- Arifin, M. B. U. B., Rais, P., & Nurdyansyah, N. (2018). An Evaluation of Graduate Competency in Elementary School. *Universitas Muhammadiyah Sidoarjo*, 125, 95–97. Retrieved from <http://eprints.umsida.ac.id/2605/>
- Dahlia, S., Anggraini, I., & Aini, N. (2023). Faktor yang Memengaruhi Stres Kerja Pekerja Perempuan di Dinas Kesehatan Kabupaten Aceh Selatan Tahun 2023. *Jurnal Pendidikan Tambusai*, 7(3), 32540–32557. <https://doi.org/10.31004/jptam.v7i3.12318>
- Desyandri, D., Muhammadiyah, M., Mansurdin, M., & Fahmi, R. (2019). Development of integrated thematic teaching material used discovery learning model in grade V elementary school. *Jurnal Konseling Dan Pendidikan*, 7(1), 16–22. <https://doi.org/10.29210/129400>
- Fahmi, F., Setiadi, I., Elmawati, D., & Sunardi, S. (2019). Discovery learning method for training critical thinking skills of students. *European Journal of Education Studies*.

- <https://doi.org/10.46827/ejes.v0i0.2540>
- Haj, M. I., Fauzi, A., & Budiawanti, S. (2024). Newton's Law Learning Transformation: Interactive Android Application with Adobe Flash Professional CS6. *Jurnal Materi Dan Pembelajaran Fisika*, 14(1), 20-30. <https://doi.org/10.20961/jmpf.v14i1.72586>
- Irsyad, M. (2020). Media Interaktif Adobe Flash CS6 dengan Model Dart dalam Pembelajaran Bahasa Arab Di Era Pandemi Covid-19. *Thawalib: Jurnal Kependidikan Islam*, 1(2), 103-130. Retrieved from <https://jurnal.staithawalib.ac.id/index.php/thawalib/article/download/14/27>
- Lena, M. S., Hilmi, N., Zekri, N. E., Netriwati, N., & Amini, R. (2019). Students' Learning Outcomes Using Problem-Based Learning and Discovery Learning Models in Thematic Integrated Learning. *International Journal of Innovation, Creativity and Change (IJICC)*, 5(5), 448-457. Retrieved from <http://repository.unp.ac.id/41751/>
- Magda, A. J., Capranos, D., & Aslanian, C. B. (2020). Online college students 2020: Comprehensive data on demands and preferences. *Louisville, KY: Wiley Education Services*. Retrieved from <https://www.voced.edu.au/content/ngv:97257>
- Melindawati, S. (2020). Development of integrated thematic student worksheets (LKPD) using the discovery learning model in class IV Elementary Schools. *International Journal of Educational Research & Social Sciences*, 1(1), 7-15. <https://doi.org/10.51601/ijersc.v1i1.4>
- Mubarok, I. (2022). Media Audiovisual Pada Pembelajaran IPA Tema Peduli Terhadap Makhhluk Hidup Siswa Kelas IV Sekolah Dasar. *Edukasiana: Jurnal Inovasi Pendidikan*, 1(4), 208-218. <https://doi.org/10.56916/ejip.v1i4.200>
- Putra, A. P., Andajani, K., & Pratiwi, I. (2020). Development of Interactive Multimedia based on Adobe Flash in Thematic Learning in Elementary Schools. *1st International Conference on Information Technology and Education (ICITE 2020)*, 603-607. <https://doi.org/10.2991/assehr.k.201214.305>
- Rahmatina, R., Elyasni, R., & Habibi, M. (2019). The Implementation of Discovery Learning Model for Improving Thematic Integrated Learning in Primary School. *5th International Conference on Education and Technology (ICET 2019)*, 430-432. <https://doi.org/10.2991/icet-19.2019.108>
- Ratnaningsih, N., Santika, S., Hidayat, E., & Nuraeni, R. (2022). Development of interactive multimedia using Adobe Flash based on problem solving in trigonometry learning. *AIP Conference Proceedings*, 2575(1). <https://doi.org/10.1063/5.0111919>
- Rostyawati, R., Bandarsyah, D., & others. (2021). Analytical Effectiveness using Adobe Flash in Learning Energy Source at Primary School. *Journal of Physics: Conference Series*, 1783(1), 12125. <https://doi.org/10.1088/1742-6596/1783/1/012125>
- Rudiansyah, A. A., Hadromi, H., & Yudiono, H. (2021). Use of Adobe Flash CS 6 Media in Learning Design Skills Competence Modeling and Building Information. *Journal of Vocational and Career Education*, 6(1). Retrieved from <https://journal.unnes.ac.id/nju/jvce/article/view/33151>
- Sari, L. I. (2023). The development of Adobe Flash media uses the guided discovery learning model for learning activities and learning outcomes in the buffer solution material. *Cendikia: Media Jurnal Ilmiah Pendidikan*, 14(1), 57-69. <https://doi.org/10.35335/cendikia.v14i1.4163>
- Siburian, S., Hutagalung, S. M., & Daulay, S. (2020). Development of Adobe Flash CS6 Learning Media in Short Story-Based on Learning Text of Advanced Local Community of Batak Toba Students in Tanjungmorawa. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, 3(1), 591-599. <https://doi.org/10.33258/birle.v3i1.855>
- Sitompul, H. (2021). Development of Media Using Adobe Flash CS6 With a Learning by Doing Approach Sewing Technology in the Student Grade X Vocational High School of Fashion Design. *6th Annual International Seminar on Transformative Education and Educational Leadership (AISTEEL 2021)*, 608-618. <https://doi.org/10.2991/assehr.k.211110.151>
- Suchyadi, Y., & Suharyati, H. (2021). *The Use Of Multimedia As An Effort To Improve The Understanding Ability Of Basic School Teachers 'Creative Thinking In The Era 'Freedom Of Learning.'* Yogyakarta: Zahir Publishing.
- Sukariasih, L., Erniwati, E., & Salim, A. (2019). Development of interactive multimedia on science learning based adobe flash CS6. *International Journal for Educational and Vocational Studies*, 1(4), 322-329. <https://doi.org/10.29103/ijevs.v1i4.1454>
- Suyono, H. (2015). *Implementasi belajar dan pembelajaran*. Bandung: PT Remaja Rosdakarya.
- Syafriatma, W., & Amini, R. (2021). Pengembangan Bahan Ajar Tematik Terpadu Berbasis Adobe Flash CS6 Menggunakan Model Discovery Learning di Kelas V SD. *Jurnal Pendidikan Tambusai*, 5(1), 1127-1134. <https://doi.org/10.31004/jptam.v5i1.1069>
- Trisnawati, T., Puastuti, D., & Sholeha, L. (2020). Pemilihan media pembelajaran terbaik sebagai sarana pembelajaran yang efektif menggunakan metode SAW. *Jurnal Penelitian Ilmu Pendidikan*, 13(1), 72-84.



- <https://doi.org/10.21831/jpipfip.v13i1.30474>  
Wahyuni, N., & Ananda, L. J. (2021). Development of thematic teaching materials based on discovery learning in elementary school. *Journal of Teaching and Learning in Elementary Education*, 4(1), 122–130. <https://doi.org/10.33578/jtlee.v4i1.7861>
- Winarni, E. W., Hambali, D., & Purwandari, E. P. (2020). Analysis of language and scientific literacy skills for 4th grade elementary school students through discovery learning and ict media. *International Journal of Instruction*, 13(2), 213–222. <https://doi.org/10.29333/iji.2020.13215a>
- Zulfadewina, Z., Sucipto, A., Iba, K., & Zulherman, Z. (2020). Development of Adobe Flash CS6 multimedia-based learning media on science subjects animal breeding materials. *Jurnal Basicedu*, 4(4), 1308–1314. <https://doi.org/10.31004/basicedu.v4i4.551>