

Opportunities and Student Responses to Audio Visual-Based Learning Media for Learning in Vocational High Schools

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ABSTRACT

This study aims to describe student responses to the opportunity to use audio-visual-based learning media for learning fashion. This research method is a descriptive qualitative method. The research subjects consisted of 20 students of vocational high school and 1 teacher of fashion. Data were collected using non-test techniques, namely observations and questionnaires with the instruments consisting of questionnaire items and Observation Sheets. The results of the data obtained from this study will be analyzed descriptively and for the questionnaire will be analyzed using percentages. The results of the study identified that so far teachers have only used presentation-based learning media, the learning method used is dominated by the lecture and demonstration method, which then causes students to tend to be less motivated and this can be seen from the results of the questionnaire distributed to students. In fact, the student response to the development of an audio-visual-based learning media innovation is quite high, so that through this research it appears that the audio-visual-based learning media is large enough to be developed and applied in the hope of facilitating practical learning in vocational high schools, especially material on Clothing.

Keywords: Learning Media, Audio Visual, Clothing, Vocational High School

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INTRODUCTION

The development of information technology is increasingly rapid and advanced which is now often known as the industrial revolution 4.0 or the digital era. This of course also has an influence on the world of education, especially in terms of the use of learning media which is also developing (Suryanti & Wijayanti, 2018; Indartiwi et al., 2020). With the current digitalization process, learning media are no longer only conventional or manual, but the use of learning media in the teaching and learning process has shifted to more modern learning media, for example online or online learning media. Technology is used as a means to assist and facilitate in solving problems (Dron, 2022; Marangunić & Granić, 2015). So to overcome the educational challenges of the digital technology era in the 21st century, schools and teachers must become facilitators for students to have international, multicultural, and

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interconnected competencies (Sun & Pan, 2021; Önür & Kozikoğlu, 2020; Hollman et al., 2019).

In the current development of education 4.0, teachers need to have the ability to manage information (Har et al., 2019). The use of media, the selection of methods, the assessment system and the use of appropriate facilities and infrastructure are urgently needed. Each teaching and learning activity has a different purpose, therefore a different method is needed in the teaching and learning process, namely the use of media (Asmara, 2015; Almekhlafi, 2021). The teacher's lack of ability in making media can make students indifferent to the learning material provided, and as a result students are passive. Learning media can be presented textually, animations, videos, and images, the combination of these presentations is expected to motivate students more and not be boring for students (Junaidi, 2019). In carrying out the learning process, it is necessary to pay attention to the use of media. Currently computer technology, internet communication, websites, and social networks have a role in helping learning in various aspects (Makarova & Makarova, 2018; Ghavifekr & Rosdy, 2015). The use of appropriate learning media is more necessary because the media will help the learning process to be more effective.

Media is used so that the message is clearer and overcomes the limitations of space, energy, time and senses so that student learning motivation arises. With the media there is a direct interaction between students and learning resources and students can learn independently according to their abilities (Sousa & Rocha, 2019). The benefits of learning media are that it can make students interested in learning and students are motivated so that it is easy to understand the material, and students do not feel bored with variations in teaching methods (Sarsar et al., 2021).

At present, it can be assumed that most schools have facilities for the use of digital learning media (Fletcher et al., 2020). Based on the results of observations that have been carried out, it was found that most vocational high schools currently have computer and internet facilities which are also in the form of a wifi network so that they can be accessed by teachers and students, besides that schools also have projectors and LCD projectors for displaying material in front of the class. However, it was also found that the teachers did not take full advantage of the facilities provided. In fact, most of the learning media used are still conventional media.

Thus, the use of learning media needs to be implemented to increase low student scores. Changes in learning media can be made by creating new media or developing existing media. The development of learning media is considered important because students need learning media that supports independent learning so that they are no longer dependent on the location or place of learning (Amelia & Harahap, 2021; Roemintoyo & Budiarto, 2021). The development of learning media must be able to present material and make students not limited in learning (Sariyatun et al., 2018). So that learning can be done anytime and anywhere. With the media is expected to minimize failure in practice and improve student learning outcomes.

Digital learning media in video or audio-visual format can make students interested in participating in a series of lessons in class (Styowati & Utami, 2022; Sert & Boynueğri, 2017). With learning videos, students can carry out learning activities anywhere and anytime without being limited by space and time (I Made Mahendra Saputra & Ida Bagus Surya Manuaba, 2021; Giannakos et al., 2014). Learning videos or audio-visual media in several studies have been used for the practicum learning process, because with a well-combined visual and audio component it can lead students to more easily when going to do practicum

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activities both independently and in groups (Widarti, Rokhim, and Syafruddin 2020; Nashar et al. 2020). In addition, the advantage of video learning media is that it has the ability to present material more attractively and interactively, in which there are audio, visual, and even text components (Widarti, Rokhim, and Syafruddin 2020; Giannakos et al. 2014).

Based on several descriptions and brief analysis, innovation is the key to solving problems faced by teachers to make the learning process successful. One of the innovations can be realized through the development of digital learning media in audio-visual or video media formats. Therefore, this study aims to identify and analyze the needs of learning media innovation as the first step to realize digital learning media innovation in video format in order to optimize the role of teachers as facilitators and optimize ICT tools to support the learning process.

METHOD

The type of research used is qualitative research with descriptive type (Sugiyono, 2018). This research has a focus on several aspects of needs analysis, especially regarding the needs from the student's point of view of digital learning media innovation. The data collected in this research consists of; 1) learning conditions that are currently taking place, 2) students' needs for digital learning media innovations to facilitate the learning process both in theory and practice.

The number of samples in this study consisted of 20 vocational high school students, and 1 subject teacher in the fashion department. Meanwhile, the data collection method used in this research is the non-test method, namely questionnaires and interviews, followed by data collection instruments consisting of a needs analysis questionnaire and question guidelines (Oducado, 2021). Regarding the research data, the results of the interviews will be described while the questionnaire data will be analyzed descriptively by converting them into percentages to make it easier to interpret the data/student responses (Miles et al., 2014).

FINDING

Referring to the results of interviews with teachers of fashion design subjects in vocational high schools, it is known that the learning media currently available in schools and quite often used are modules and printed material books, meanwhile sometimes teachers also deliver material in the form of presentations that are displayed in front of the class. Meanwhile, teachers are still not able to develop video learning media, considering that this course requires moving illustrations in the form of audio-visual or video to make it easier for students to understand material related to pattern-making practices. Besides that, it was also identified that so far teachers have used learning methods that are limited to lectures and discussions, this of course will have little or much impact on students' learning motivation to take part in learning fashion in the classroom. The results of this interview also emphasize that until this research is carried out the use of learning media is still not optimal, this can be seen from the answers to questions given to teachers regarding the use of learning media commonly used when carrying out the learning process which is still limited to modules and material books. print.

The use of optimal learning media and according to student needs will greatly assist students in practical activities at school because it is equipped with animations, pictures, and tutorials. Therefore, this study not only identifies field facts sourced from teachers, but also students as learning subjects to find out how their needs for digital learning media

innovations are. The results of the response of 20 students to the questionnaire given to them will be described as follows.

Table 1 The Validation Result from Expert 1

No.	Question / Statement	Student Response (%)	
		Yes	No
1.	I feel happy to learn about Dressmaking materi [<i>Saya merasa senang mempelajari materi Tata Busana</i>]	85%	15%
2.	I have high motivation to study the material of Dressmaking [<i>Saya memiliki motivasi tinggi untuk mempelajari materi Tata Busana</i>]	45%	55%
3.	I feel like I don't have enough time to master the material of Dressmaking [<i>Saya merasa kekurangan waktu dalam menguasai materi Tata Busana</i>]	95%	5%
4.	I need media in learning in the form of theory and practice [<i>Saya membutuhkan media dalam pembelajaran berupa teori maupun praktis</i>]	90%	10%
5.	I find it easy with media that contains or formats audio, visual, video and animation [<i>Saya merasa mudah dengan media yang berisikan atau berformat audio, visual, video dan animasi</i>]	85%	15%
6.	I need media updates in learning Dressmaking [<i>Saya membutuhkan keterbaharuan media dalam pembelajaran Tata Busana</i>]	90%	10%
7.	I find it easier if there is media to learn practical activities [<i>Saya merasa dimudahkan apabila terdapat media untuk mempelajari kegiatan Praktik</i>]	85%	15%
8.	I have an android based smartphone [<i>Saya memiliki smartphone berbasis android</i>]	100%	-
9.	I have the ability to operate a computer [<i>Saya memiliki kemampuan dalam mengoperasikan computer</i>]	95%	5%
10.	I agree if there is video-based learning media containing material related to Dressmaking [<i>Saya setuju apabila tersedia media pembelajaran berbasis video berisi materi terkait Tata Busana</i>]	90%	10%

Referring to the table above, information is obtained that basically 85% of students quite like the materials in the fashion department, however they do not have high motivation to learn this may be caused by several things such as boring learning methods or the use of learning media that students find unattractive and unable to facilitate them to understand the material.

The results of student responses also show that they need learning media to support learning both theoretically and practically. Where as many as 85% of students stated that they found it easier to understand the material presented, if the teacher used learning media that included sound, video, and even animation. In line with the next student's opinion that they wanted novelty in terms of the use of learning media used in the fashion department considering that so far teachers were still limited to using print-based and not dynamic media. It is undeniable that at several meetings, students are asked to be able to do practical work, students tend to have difficulty implementing theory into practice or practical assignments

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so they need learning media that can support and make it easier for students to understand the steps in carrying out practical activities in the fashion department. Even though 100% of students have Android-based smartphones and 95% of students also have the ability to operate computers, this can certainly be the basis for optimizing the use of digital-based learning media. 90% of students also agreed with the presence of one of the digital learning media with video format to support learning activities, both theory and practice in the fashion department, which they would use as an alternative learning resource in addition to modules or printed books provided by the school.

DISCUSSION

The results of this study indicate that students are interested in digital learning media innovations in audio-visual or video formats. This learning video is in demand by students not without reason, but because the learning video media has characteristics including: 1) Clarity of Message With video media students can understand learning messages more meaningfully and information can be received as a whole so that information will automatically be stored in long-term memory and retention, 2) Stand-alone Videos developed do not depend on other teaching materials or do not have to be used together with other teaching materials, 3) Familiar with users of video media using simple, easy-to-understand language, and using common language, 4) Representation of the Core The material must be truly representative, for example, simulation or demonstration material. Basically, both social and scientific subject matter can be made into video media, 5) Visualization of the material is packaged in multimedia which includes text, animation, sound, and video according to the demands of the material, 6) High Resolution Quality Display in the form of video media graphics made with digital engineering technology with high resolution but support for each speech computer system, 7) Can be Used Individually Learning videos can be used by students individually, not only in learning at school, but also at home (Okta Priantini 2021; Irwandani, Iqbal, and Latifah 2019).

Given the characteristics inherent in learning videos, it is hoped that their presence in the learning process can attract the interest and attention of students through the presentation of structured and interactive material (Wisada, Sudarma, and Yuda S 2019; Nurani, Masruhim, and Palenewen 2016). By using this media too, learning activities can take place anywhere and anytime (Abidin, 2016). It is still a fact that learning media plays a very important role in facilitating student learning, without exception the audio-visual format learning media (Bustanil S, Asrowi, and Adianto 2019; Prehanto et al. 2021). It is proven from various studies that have also succeeded in showing that through the use of learning videos can improve critical thinking skills, student character, student literacy in various aspects, motivation and student learning outcomes (Utami and Utami 2020; Rahmawati and Ramadan 2021; Hapsari et al. 2019; Yip et al. 2019; Nugroho and Surjono 2019). However, in the development process it is necessary to pay attention to the characteristics of users, as happened in this research, student opinions are one of the contributing factors related to the type and format of innovation of the learning media that will be developed so that there is an alignment between the characteristics of potential media users and the characteristics of the material (Wulandari et al., 2021; Budiarto et al., 2021; Hanif et al., 2018).

Through the results of this study, it was also found that students' interest in video-based learning media was quite high, considering that almost all of them agreed with the development of digital media. However, it should be noted that this research is still limited to the needs analysis process whose information is obtained from one class and one subject

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teacher which of course the results of this study cannot be generalized as a whole. learning videos that will be developed by other researchers in the future. Thus, students will be able to benefit from the presence of video-based digital learning media to facilitate their practice.

CONCLUSION

Through the results of this study, it can be seen that basically students like learning in the fashion department, but students have a fairly low learning motivation, this is possible because the use of learning methods and learning media that have been used so far is still limited. Even though students in the digital era like today need to be facilitated in accordance with the times through innovation of learning media that is in accordance with the needs and characteristics of the material. Where the characteristics of the material, the practicum portion is larger than the theoretical portion so that students have a lot of difficulty understanding the material if what is delivered by the teacher is still limited to non-dynamic learning media. The learning video in this research is one of the solutions offered and has a great opportunity to be applied to facilitate learning, especially in practicum in the fashion department. Researchers provide solutions to develop learning videos as a learning resource that can be used by students, of course by making the results of this research as a basis for product development.

REFERENCES

- Abidin, Z. (2016). Penerapan Pemilihan Media Pembelajaran. *Edcomtech*, 1(1), 9–20.
- Almekhlafi, A. G. (2021). The effect of E-books on Preservice student teachers' achievement and perceptions in the United Arab Emirates. *Education and Information Technologies*, 26(1), 1001–1021. <https://doi.org/10.1007/s10639-020-10298-x>
- Amelia, D. P., & Harahap, A. (2021). Application of Interactive Multimedia-Based Mathematics Learning Media to Increase Students' Interest in Learning. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences*, 4(2), 3153–3161. <https://doi.org/10.33258/birci.v4i2.2040>
- Asmara, A. P. (2015). Pengembangan media pembelajaran berbasis audio visual tentang pembuatan koloid. *Jurnal Ilmiah Didaktika*, 15(2), 156. <https://doi.org/10.22373/jid.v15i2.578>
- Budiarto, M. K., Rejekiingsih, T., & Sudiyanto, S. (2021). Students' opinions on the need for interactive multimedia development for entrepreneurship learning. *International Journal of Evaluation and Research in Education (IJERE)*, 10(4), 1290–1297. <https://doi.org/http://doi.org/10.11591/ijere.v10i4.21411>
- Bustanil S, M., Asrowi, & Adiarto, D. T. (2019). Pengembangan Media Pembelajaran Interaktif Berbasis Video Tutorial Di Sekolah Menengah Kejuruan. *JTP - Jurnal Teknologi Pendidikan*, 21(2), 119–134. <https://doi.org/10.21009/jtp.v21i2.11568>
- Dron, J. (2022). Educational technology: what it is and how it works. *AI and Society*, 37(1), 155–166. <https://doi.org/10.1007/s00146-021-01195-z>
- Fletcher, J., Everatt, J., Mackey, J., & Fickel, L. H. (2020). Digital Technologies and Innovative Learning Environments in Schooling: A New Zealand Experience. *New Zealand Journal of Educational Studies*, 55(1), 91–112. <https://doi.org/10.1007/s40841-020-00156-2>
- Ghavifekr, S., & Rosdy, W. A. W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *International Journal of Research in Education and Science*. <https://doi.org/10.21890/ijres.23596>

Available online at <https://www.elitejournal.org/index.php/ELITE>

- Giannakos, M. N., Chorianopoulos, K., Ronchetti, M., Szegedi, P., & Teasley, S. D. (2014). Video-Based learning and open online courses. *International Journal of Emerging Technologies in Learning*, 9(1), 4–7. <https://doi.org/10.3991/ijet.v9i1.3354>
- Hanif, M., Asrowi, A., & Sunardi, S. (2018). Students' Access to and Perception of Using Mobile Technologies in the Classroom: the Potential and Challenges of Implementing Mobile Learning. *Journal of Education and Learning (EduLearn)*, 12(4), 644–650. <https://doi.org/10.11591/edulearn.v12i4.8398>
- Hapsari, A. S., Hanif, M., Gunarhadi, & Roemintoyo. (2019). Motion graphic animation videos to improve the learning outcomes of elementary school students. *European Journal of Educational Research*, 8(4), 1245–1255. <https://doi.org/10.12973/eujer.8.4.1245>
- Har, E., Khairi, A., & Roza, W. (2019). Teachers' skills and ICT facilities for science learning at senior high school in Padang city. *Australian Educational Computing*, 34(1). <https://journal.acce.edu.au/index.php/AEC/article/view/177>
- Hollman, A. K., Hollman, T. J., Shimerdla, F., Bice, M. R., & Adkins, M. (2019). Information technology pathways in education: Interventions with middle school students. *Computers & Education*, 135, 49–60. <https://doi.org/10.1016/j.compedu.2019.02.019>
- I Made Mahendra Saputra, & Ida Bagus Surya Manuaba. (2021). Media Video Animasi Berbasis Project dalam Muatan Materi Kenampakan Alam Mata Pelajaran IPS. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 5(1), 10–16. <https://ejournal.undiksha.ac.id/index.php/JJL/index>
- Indartiwi, A., Wulandari, J., & Novela, T. (2020). Peran Media Interaktif Dalam Pembelajaran Di Era Revolusi Industri 4.0. *Prosiding Konferensi Pendidikan Nasional "Strategi Dan Implementasi Pendidikan Karakter Pada Era Revolusi Industri 4.0,"* 2(1), 28–31. <https://bit.ly/3vhcWFW>
- Irwandani, I., Iqbal, M., & Latifah, S. (2019). Pengembangan Video Blog (Vlog) Channel Youtube Dengan Pendekatan Stem Sebagai Media Alternatif Pembelajaran Daring. *Inovasi Pembangunan : Jurnal Kelitbangan*, 7(2), 135. <https://doi.org/10.35450/jip.v7i2.140>
- Junaidi, J. (2019). Peran Media Pembelajaran Dalam Proses Belajar Mengajar. *Diklat Review : Jurnal Manajemen Pendidikan Dan Pelatihan*, 3(1), 45–56. <https://doi.org/10.35446/diklatreview.v3i1.349>
- Makarova, E. A., & Makarova, E. L. (2018). Blending pedagogy and digital technology to transform educational environment. *International Journal of Cognitive Research in Science, Engineering and Education*, 6(2), 57–65. <https://doi.org/10.5937/ijcrsee1802057M>
- Marangunić, N., & Granić, A. (2015). Technology acceptance model: a literature review from 1986 to 2013. *Universal Access in the Information Society*, 14(1), 81–95. <https://doi.org/10.1007/s10209-014-0348-1>
- Miles, H. ., Huberman, A. ., & J, S. (2014). *Qualitative Data Analysis, A. Methods Sourcebook, Edition 3*. Sage Publication.
- Nashar, N. A. B., Jumintono, Pudyastuti, R. R., Handayani, E., Indarto, M. R., Sunardi, J., Retnowati, N. D., & Sawitri, S. (2020). Increasing understanding of general knowledge of plastics with video-based learning. *Universal Journal of Educational Research*, 8(11), 5913–5917. <https://doi.org/10.13189/ujer.2020.082225>
- Nugroho, I. A., & Surjono, H. D. (2019). Pengembangan multimedia pembelajaran interaktif berbasis video materi sikap cinta tanah air dan peduli lingkungan. *Jurnal Inovasi Teknologi Pendidikan*, 6(1), 29–41. <https://doi.org/10.21831/jitp.v6i1.15911>

Available online at <https://www.elitejournal.org/index.php/ELITE>

- Nurani, I., Masruhim, M. A., & Palenewen, E. (2016). Analisis Kebutuhan Pengembangan Media Audio Visual Pokok Bahasan Sintesis Protein Untuk Sma. *Jurnal VARIDIKA*, 28(1), 90–95. <https://doi.org/10.23917/varidika.v28i1.1961>
- Oducado, R. M. (2021). Survey Instrument Validation Rating Scale. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3789575>
- Okta Priantini, D. A. M. M. (2021). The Development Of Teaching Video Media Based On Tri Kaya Parisudha In Educational Psychology Courses. *Journal of Education Technology*, 4(4), 448. <https://doi.org/10.23887/jet.v4i4.29608>
- ÖNÜR, Z., & KOZİKOĞLU, İ. (2020). The Relationship between 21 st Century Learning Skills and Educational Technology Competencies of Secondary School Students. *Journal of Theoretical Educational Science*, 13(1), 65–77. <http://dergipark.gov.tr/akukegDOInumber:http://dx.doi.org/10.30831/akukeg.535491>
- Prehanto, A., Aprily, N. M., Merliana, A., & Nurhazanah, M. (2021). Indonesian Journal of Primary Education Video Pembelajaran Interaktif-Animatif sebagai Media Pembelajaran IPS SD Kelas Tinggi di Masa Pandemi Covid 19. *Indonesian Journal of Primary Education*, 5(1), 32–38.
- Rahmawati, F., & Ramadan, Z. H. (2021). Improving High-Level Thinking Skills in Students Through Powtoon-Based Animation Video Media. *Journal of Education Technology*, 5(4), 654. <https://doi.org/10.23887/jet.v5i4.41037>
- Roemintoyo, & Budiarto, M. K. (2021). Flipbook as Innovation of Digital Learning Media : Preparing Education for Facing and Facilitating 21st Century Learning. *Journal of Education Technology*, 5(1), 8–13. <https://doi.org/https://doi.org/10.23887/jet.v%25vi%25i.32362>
- Sariyatun, Joebagio, H., & Akhyar, M. (2018). Teachers' perception on digital teaching material development in social science education. *Journal of Turkish Science Education*, 15(Special Issue), 13–21.
- Sarsar, F., Kale, Ö. A., Andiç-Çakır, Ö., Gueorguiev, T., Evstatiev, B., Georgieva, T., Kadirova, S., Mihailov, N., Rózewski, P., Kieruzel, M., Lipczyński, T., Prys, M., & Leeuwen, M. (2021). Multicultural investigation of the students' acceptance of using digital learning materials in laboratory classes. *Computer Applications in Engineering Education*, 29(4), 883–896. <https://doi.org/10.1002/cae.22322>
- Sert, N., & Boynueğri, E. (2017). Digital technology use by the students and english teachers and self-directed language learning. *World Journal on Educational Technology: Current Issues*, 9(1), 24. <https://doi.org/10.18844/wjet.v9i1.993>
- Sousa, M. J., & Rocha, Á. (2019). Digital learning: Developing skills for digital transformation of organizations. *Future Generation Computer Systems*, 91, 327–334. <https://doi.org/10.1016/j.future.2018.08.048>
- Styowati, E., & Utami, F. (2022). Pengembangan Video Pembelajaran Sains Berbasis Problem Based Learning. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 6(4), 2472–2482. <https://doi.org/10.31004/obsesi.v6i4.1970>
- Sugiyono, D. (2018). Metode penelitian kuatintatif , kualitatif dan R & D. In *Bandung: Alfabeta*.
- Sun, L., & Pan, C. E. (2021). Effects of the Application of Information Technology to E-Book Learning on Learning Motivation and Effectiveness. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.752303>
- Suryanti, & Wijayanti, L. (2018). Literasi Digital : Kompetensi Mendesak Di Era Revolusi Industri 4.0. *Jurnal Pendidikan Dasar*.

Available online at <https://www.elitejournal.org/index.php/ELITE>

- <https://doi.org/https://doi.org/10.26740/eds.v2n1.p1-9>
- Utami, S., & Utami, P. (2020). Peningkatan Partisipasi Belajar dan Hasil Belajar Peserta Didik Teknik Audio Video di Masa Pandemi Covid-19 dengan WhatsApp Group. *ELINVO (Electronics, Informatics, and Vocational Education)*, 5(1), 75–88.
- Widarti, H. R., Rokhim, D. A., & Syafruddin, A. B. (2020). The development of electrolysis cell teaching material based on stem-pjbl approach assisted by learning video: A need analysis. *Jurnal Pendidikan IPA Indonesia*, 9(3), 309–318. <https://doi.org/10.15294/jpii.v9i3.25199>
- Wisada, P. D., Sudarma, I. K., & Yuda S, A. I. W. I. (2019). Pengembangan media video pembelajaran berorientasi pendidikan karakter. *Journal of Education Technology*. <https://doi.org/10.23887/jet.v3i3.21735>
- Wulandari, F., Yogica, R., & Darussyamsu, R. (2021). Analisis manfaat penggunaan e-modul interaktif sebagai media pembelajaran jarak jauh di masa pandemi covid-19. *Khaṣanah Pendidikan*, 15(2), 139. <https://doi.org/10.30595/jkp.v15i2.10809>
- Yip, J., Wong, S.-H., Yick, K.-L., Chan, K., & Wong, K.-H. (2019). Improving quality of teaching and learning in classes by using augmented reality video. *Computers & Education*, 128, 88–101. <https://doi.org/10.1016/j.compedu.2018.09.014>

