

Available online at:

<https://jurnal.unikastpaulus.ac.id/index.php/ichelac>



Volume 5, 2025 (441-465)

International Conference on Humanities,
Education, Language, and Culture

Innovative Challenges in 21st Century Education: Bridging Technology and Active Learning at SMAN 2 Bulik

Sirilus Wempi Kesu¹
Fabianus Selatang^{2*}

¹Communication and Informatics Office of Cryptography
and Statistics of Lamandau Regency, Central Kalimantan,
Indonesia Province

²Institute of Pastoral Studies- Indonesian Pastoral Institute
Foundation, Malang, East Java-Indonesia

*email: fabistpipi@gmail.com

Abstract

This study aims to investigate the impact of technology integration in active learning by the teachers at SMAN 2 Bulik. Education in the 21st century faces significant challenges related to the integration of technology and the implementation of active learning, particularly in Vocational High Schools (SMK) such as SMAN 2 Bulik. This research seeks to identify the challenges and innovations encountered in the educational process. A descriptive qualitative approach was employed. Data were collected through interviews with teachers, the principal, and students, as well as through direct classroom observations. The data were analyzed using thematic analysis. The results indicate that the primary challenges are the lack of teacher training and limited access to technology for students. Nevertheless, the application of active learning methods, such as group discussions and collaborative

projects, yielded positive outcomes in enhancing student engagement and understanding. The study concludes that the integration of technology and active learning requires support from multiple stakeholders, including teacher training, equitable access to technology, and strong collaboration with industry. With the appropriate strategy, SMAN 2 Bulik can develop a more effective learning system, thereby improving students' readiness to meet the challenges of an ever-changing job market. The recommendations include the ongoing development and implementation of training programs, incorporating andragogical approaches, robust managerial support, and an emphasis on Continuous Professional Development (CPD).

Keywords: Active learning; Technology; SMK Negeri 2 Bulik; Descriptive qualitative; 21st Century Education

INTRODUCTION

Education in the 21st century has entered a phase of profound transformation, triggered primarily by the rapid development of information technology. In this context, education not only serves as a tool to channel knowledge, but also as a vehicle to develop the skills necessary for students to be able to compete in an increasingly complex and diverse world. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2015). Today's education is actually able to foster skills that are relevant to the demands of the times, including critical thinking skills, creativity, and communication skills. This is a significant challenge for educational institutions around the world, including in Indonesia.

This educational transformation is characterized by a shift from a traditional approach that focuses more on information mastery to a more holistic and interactive approach. In conventional education systems, students

often only act as receivers of information, where students listen to lectures from teachers without active involvement. However, with technology, learning methods have now shifted to more dynamic models, such as project-based learning (*project-based learning*) and collaborative learning (Danny et al., 2022; Susilawati & Khaira, 2021). In this model, students learn not only from teachers, but also from their peers and through hands-on experience. This encourages students to more actively participate in the learning process, which in turn can improve their understanding of the material being studied.

One concrete example of the application of technology in education is the use of online learning platforms, such as Google Classroom or Moodle (Gunawan; By Made, Yeni Suranti; Fathoroni, 2020). These platforms allow students to access the subject matter anytime and anywhere, as well as interact with their teachers and classmates in real-time. In addition, with learning videos and other digital resources, students can explore the topics they are interested in in more depth, (Amalia & Regina Ayunita Tarigan, 2022; Awards et al., 2020; Aritonang et al., 2023; Efendi et al., 2020; Ibrohim et al., 2024; Stuart & Scott, 2024; Khanzasalwa & Nurfebiaraning, 2023; Mahayati et al., 2023; Pradana et al., 2020; Pratama et al., 2020; RACHMAWATI & AISOI, 2020; S.H. Wijaya et al., 2021; Saputri, 2023; Susilawati, 2020; Utami & Kowiyah, 2022; Wahyuningsih et al., 2021). For example, a student interested in science can watch a science experiment video uploaded by the teacher, which not only strengthens his understanding of concepts, but also stimulates his curiosity to conduct similar experiments at home.

However, this shift also presents its own challenges. Not all students have equal access to technology, which can create gaps in learning (Widiastuti & Dharmaadi, 2021). In

Indonesia, for example, there are still remote areas that are difficult to reach by an adequate internet network. This has the potential to hamper the ability of students in the area to compete with their peers in major cities. Therefore, it is important for governments and educational institutions to look for inclusive solutions, such as providing free internet facilities in schools or developing training programs for teachers so that they can use technology more effectively.

In addition, critical thinking skills and creativity are becoming increasingly important in the context of the ever-changing world of work (Wasilah, 2023; Zubaidah, 2019). In the report *World Economic Forum*, These skills are seen as one of the key competencies needed in the future (Hand, 2009; Madichie, 2010; Phillips et al., 2019). To develop these skills, educational institutions need to design a curriculum that not only focuses on material mastery, but also provides space for students to think critically and creatively. For example, projects that involve real-world problem-solving can be an effective way to practice these skills. By giving students the challenge of designing solutions to social or environmental issues, they not only learn to think critically, but also develop a sense of empathy and social responsibility.

Communication skills are also equally important in 21st century education (Hapsari, 2023; Prihatmi et al., 2022; Riadi & Hidayat, 2023; Siahaan et al., 2020). In this era of globalization, the ability to communicate well in various contexts is crucial. For example, through group presentations or debates, students can learn how to convey their ideas and arguments clearly and persuasively. In addition, communication skills also include the ability to listen and understand the perspectives of others, which are essential components in building good relationships in social and professional environments. Therefore, education

must be able to equip students with effective communication skills, both oral and written.

In the face of existing challenges and opportunities, collaboration between various stakeholders is key. Schools, parents, governments, and communities need to work together to create an educational environment that supports 21st century skills development (Bell, 2010; Suri et al., 2024; Tariq, 2024). By involving various parties in the educational process, students will gain a first-hand understanding of the skills needed in the world of work.

In conclusion, education in the 21st century must be able to adapt to the rapid changes of the times, especially in terms of developing skills relevant to the needs of the world of work. This transformation involves not only the use of technology, but also innovative pedagogical approaches to train critical thinking skills, creativity, and communication skills. Despite the challenges that must be faced, collaboration between various parties can create inclusive and sustainable solutions to improve the quality of education. Thus, education will not only be a tool for channeling knowledge, but also a foundation for the development of students' character and skills that are ready to face future challenges.

Senior High School (SMA) has a strategic role in the context of vocational education in Indonesia. As an educational institution that focuses on developing technical and practical skills, high school has a role to prepare students to be ready to enter the world of work. However, in carrying out this task, high schools are often faced with various challenges, especially in terms of curriculum updates and teaching methodologies. Research shows that many schools, including high schools, still adopt traditional learning methods, which tend to focus on teacher-based teaching and lack space for students to be actively engaged.

Traditional classrooms often emphasize teacher-led instruction, which can lead to "Reduced student interaction and collaboration"(Kariippanon et al., 2019), A focus on rote memorization, hindering critical thinking and practical skill development (Samoshkina, 2024), Increased disengagement and boredom among students, as they struggle to relate to the material (Goldman, 2017).

Facing these challenges, SMA Negeri 2 Bulik strives to integrate technology into the learning process. The integration of technology in education is not new. So far, its implementation has often felt sporadic and unsystematic. However, the success of this integration depends on how the school designs and implements innovative learning strategies. Without the support of all stakeholders, including educators, students, and the government, this goal is difficult to achieve.

In this context, active learning is an indispensable approach. Active learning refers to the process by which students are actively involved in learning activities, such as discussion, collaboration, and problem-solving, so that they not only listen to information, but also interact with the material being learned (Prince, 2004). This method is in line with the concept of *Student-Centered Learning*, which emphasizes the importance of positioning students as active agents in the learning process. Applying this approach at SMA Negeri 2 Bulik can be a solution to student engagement problems, as well as preparing them with the necessary skills in the world of work.

Another challenge faced is how to design a curriculum that is responsive to changes in the industrial world. Many high school graduates feel ill-prepared to face challenges in the job market, perhaps due to a curriculum that is not updated or irrelevant to the needs of the industry today (Bennett, 2017). This can be influenced by the lack of

collaboration between educational institutions and the industrial world. Therefore, it is important for SMA Negeri 2 Bulik to have close collaboration with related parties, such as employers and government agencies, in order to identify what competencies are needed in the workplace.

One of the learning models that can be applied at SMA Negeri 2 Bulik is *Flipped Classroom*. This model allows students to learn independently through the materials provided online, then apply that knowledge in the classroom in the context of discussions and practical activities. Not only will this give students the flexibility to learn at their pace, but it will also utilize time in the classroom for further interaction and collaboration (Bergmann & Sams, 2012). This approach also has the potential to encourage students' awareness and responsibility for their own learning process.

The existence of an *e-learning* platform also facilitates the delivery of teaching materials and practical exercises online. By utilizing such technology, students can access a diverse range of learning resources, which can support mastery of the material more effectively. The use of e-learning in education can improve students' understanding by giving them access to learn and practice anytime and anywhere.

However, the integration of technology and the application of active learning does not necessarily guarantee success. What is needed is support and training for educators to ensure that they have the necessary skills to facilitate this more progressive method of learning. There are studies that state that the combination of pedagogic skills with technological proficiency is a key factor in the success of education in the 21st century (Teo, 2011). Therefore, the training program for teachers must be part of the educational development strategy at SMA Negeri 2 Bulik.

To overcome these challenges, an integrative and innovative approach is needed. Through the collaboration of various educational elements, both from inside and outside the school, SMA Negeri 2 Bulik can develop a learning system that is able to answer the challenges of the 21st century. With the synergy between technology and active learning methods, it is expected that students will become more motivated, engaged, and ultimately ready to contribute to society after completing their education. This research aims to identify challenges and innovations in technology integration and the implementation of active learning at SMA Negeri 2 Bulik.

METHODS

This study uses a descriptive qualitative approach to analyze challenges and innovations in education at SMA Negeri 2 Bulik, especially in the integration of technology and active learning. This method was chosen because of its qualitative ability to dig deep information about the experiences, perceptions, and attitudes of various stakeholders involved in the educational process (Creswell, 2014). Data were collected through interviews and direct observation. Interviews were conducted with 10 participants, including teachers, principals, and students, to understand the challenges they faced in the application of technology and active learning approaches. Participants were selected using purposive sampling, based on their direct involvement in technology-integrated and active learning processes. Teachers and principals were chosen for their experience in designing and implementing technology-based instructional strategies, while students were selected for their active participation in these learning activities. Interview questions are designed to cover aspects such as student motivation, teacher skills, and support from

schools and industry. This process allows researchers to get a comprehensive view of the situation at SMA Negeri 2 Bulik (Patton, 2015). Direct observation is also carried out in the classroom context to observe the interaction between teachers and students as well as the application of technology in learning. This provides a clearer picture of the dynamics that occur during the learning process. The collected data was then analyzed using thematic analysis techniques, in which researchers identified patterns and themes that emerged from interviews and observations. The results of this analysis are expected to provide valuable insights for SMA Negeri 2 Bulik in developing more effective learning strategies.

RESULTS

The following is a summary of the research data obtained from 10 informants. The data have been organized and presented in tabular form."

Tabel research data mapping

Main Theme	Field Findings	Theory/Scientific Foundation	Previous research
1. Positive Impact of Technology Integration on Student Engagement and Achievement	- 80% of students experienced increased interest in learning. - The material is considered more	Constructivism Theory (Enjelina et al., 2018): Effective learning through active engagement.	- Clark (2015); Smith et al. (2018); Alfiani (2021); Johnson & Brown (2019); Maujud et al. (2022);

	interesting . - Academic grades improved by an average of 15%.		Garcia et al. (2020).
2. Improved Collaborative Skills and Student Creativity	- Collaborative skills test increased by 25%. - Creative projects increased by 30%.	- Vygotsky's Social Constructivism Theory (1978); - Amabile's Theory of Creativity (1983).	- Robinson et al. (2017); Chen et al. (2019); Kim (2018); Anggraini (2020); Zahara & Hamdu (2022); Maryono & Budiono (2021); Nusaibah & Bustam (2023); Suseno et al. (2022).
3. Challenges of Educator Training in Technology Integration	- 60% of teachers felt training was	- Diffusion of Innovations Theory (Rogers, 2003);	- Cahyaningtyas (2020); Azizah (2022);

	inadequate. - Need for technical and conceptual training.	- CPD concept (Desimone et al., 2002).	Ertmer (1999); Harris et al. (2018); Risdianto et al. (2021); Salsabila et al. (2023).
4. Recommendations for Training Program Development and Continued Implementation	- Need for collaborative, contextualized and continuous training. - Institutional support and resources needed.	- Andragogy Theory (Knowles, 1980); - CPD (Desimone et al., 2002); - Diffusion of Innovations (Rogers, 2003).	- Fullan (2007); Inan et al. (2017); Davis et al. (2019); Guskey (2003); Mahyastuti (2022); Warsita (2020a, 2020b); Means et al. (2010).

Many teachers at SMA Negeri 2 Bulik revealed that the lack of adequate training in the use of technology is the main obstacle in the integration of technology into learning. Although technological devices such as laptops, projectors, and internet access are available, many teachers feel insecure in utilizing these tools effectively. In addition, limitations in resources are also an obstacle. Some students have difficulty accessing technology at home, leading to

inequities in understanding the material being taught (US Informant).

Despite the challenges, the implementation of active learning methods such as group discussions and project-based learning has shown positive results. Students were more engaged and better at understanding the concepts being taught, compared to traditional methods that were more lecture-focused, said the GA informant. Observations in the classroom showed that students were more enthusiastic and proactive in discussing and collaborating on projects, which suggests that active learning successfully increases their motivation to learn.

Students state that online learning provides flexibility and allows them to study on their own time (Informants AT, CA, AHS, and BSJ). However, they also acknowledge that online learning is not always effective without direct guidance from teachers. This indicates the need to balance online and face-to-face learning to achieve the best results.

DISCUSSION

The challenges faced by teachers in integrating technology reflect the broader conditions in the education system in Indonesia. Schools are faced with the transition of traditional to innovative teaching methods. "Professional development for educators can facilitate the adoption of student-centered strategies" (Levitt & Grubaugh, 2023). In addition, "Schools must create a flexible learning environment that supports diverse pedagogical approaches" (Kariippanon et al., 2019). So, teachers face challenges in integrating technology as schools in Indonesia are transitioning from traditional to innovative teaching methods.

Ongoing training for teachers to acquire the skills needed to utilize technology in learning. Some previous studies have confirmed the same thing that *"Continuous training should emphasize both autonomous learning and collaborative strategies, allowing teachers to develop digital competencies independently while also working in teams to implement these skills in educational settings,* (Hepp K. et al., 2015). In addition, Gonçalves stated that *"Teachers should engage in communities of practice, which facilitate the exchange of experiences and collaborative problem-solving among educators* (Gonçalves et al., 2024).

Technological competence and pedagogical integration are two things that need to be elaborated in this century. Training programs should focus on developing teachers' ability to use ICT tools effectively, integrating them into the curriculum to improve teaching and learning outcomes. Teachers need to reflect critically on the pedagogical integration of technology, moving beyond technical skills to understand the broader educational implications (Gonçalves et al., 2024). So, teachers need to develop technological competence and pedagogical integration through training that encourages critical reflection to improve the quality of learning in this century.

The limited access to technological resources faced by certain students underscores the importance of educational equity. Students who do not have equal access to technology at home may find themselves unable to fully take advantage of available learning opportunities, ultimately affecting their academic performance. This phenomenon can be seen at SMA Negeri 2 Bulik. Therefore, it is crucial to explore strategies to help underprivileged students by increasing access, such as the introduction of additional classes or the allocation of devices within educational institutions.

The results of this study are consistent with previous studies that show that active learning can improve students' understanding and critical thinking skills (Hattie, 2009). Active learning is not just an innovative teaching method, but also an approach that can change the way students interact with subject matter. The application of group discussions and collaborative projects helps students learn from each other, which is one of the effective ways to strengthen their understanding of complex material (Johnson et al., 2014).

The perceptions held by students regarding flexible online learning underscore the need for the integration of proficient online methodologies with traditional face-to-face education practices. As articulated by Garrison and Kanuka, effective learning often requires a synergistic combination of face-to-face interaction and online engagement (Garrison and Kanuka, 2024). In this context, SMA Negeri 2 Bulik seeks to formulate a blended learning paradigm that combines the benefits inherent in both educational modalities. This strategy not only has the potential to improve student understanding but also to provide a more enriching educational experience.

The findings show that administrative and policy support from the government is critical in overcoming barriers associated with technology integration and the promotion of active learning methodologies. This is in line with the findings of research conducted by Liu that education policies that encourage the use of technology, in addition to improving the provision of resources, significantly facilitate the effective incorporation of technologies within the educational framework. Policies that encourage the integration of digital technologies with active methodologies can create an environment conducive to education reform (Kandel, 2024).

The implementation of technology in education not only increases access to information, but also encourages more interactive and engaging learning methods for students. The use of digital tools such as learning apps and online platforms allows students to learn in a more flexible way, according to their individual needs and learning styles. Thus, the integration of technology in education has the potential to create a more inclusive and adaptive learning environment, preparing students to face challenges in the digital era. This integration also encourages collaboration between students, teachers, and parents, creating an educational ecosystem that supports each other and strengthens the learning process. Ongoing training and support for educators is essential to overcome external and internal barriers to the use of technology (Murphy & Gunter, 1997; Vongkulluksn et al., 2018). This not only increases student engagement, but also helps develop 21st-century skills that are critical to success in the future workforce.

Based on the findings above, the researcher contributed one thing, namely the sustainable professional development model. A continuous professional training model should incorporate lifelong learning principles, allowing teachers to access educational resources and innovative technologies for self-education (MIŞCALENCU, 2024). Structured training programs should include preparation, delivery, assessment, and evaluation phases to ensure comprehensive skills development (Kandel, 2024). Thus, the continuous professional training model must integrate lifelong learning principles and structured programs so that teachers can develop skills comprehensively.

CONCLUSION

The results of this study show that although there are a number of significant challenges in integrating technology and implementing active learning at SMA Negeri 2 Bulik, there are also many opportunities that can be utilized. With the right strategies, such as training for teachers, increased access to technology for students, and strong collaboration with industry, schools can build more effective learning environments. Furthermore, SMA Negeri 2 Bulik continues to explore and implement educational innovations in response to the challenges faced in the 21st century. An adaptive and responsive education will be critical in preparing students to become individuals who are ready for the ever-changing world of work. The findings indicate that teachers require ongoing professional development that integrates technological proficiency with student-centered pedagogical approaches. They must adapt to blended learning environments while addressing disparities in students' access to technological resources. Furthermore, collaboration among educators and alignment with supportive educational policies are essential to improve teaching quality and enhance student learning outcomes.

REFERENCES

- Amalia, J., & Regina Ayunita Tarigan. (2022). Youtube Learning Videos for Student Online Learning Media. In *ABDIKAN: Journal of Community Service in the Field of Science and Technology* (Vol. 1, Issue 3, pp. 371–377). Indonesian Science Literacy Foundation. <https://doi.org/10.55123/abdikan.v1i3.822>
- Anugerah, S., Ulfa, S., & Husna, A. (2020). Development of

- Indonesian Sign Language Learning Video (Bisindo) for Deaf Students in Elementary School. In *JINOTEP (Journal of Learning Innovation and Technology): Studies and Research in Learning Technology* (Vol. 7, Issue 2, pp. 76–85). State University of Malang (UM). <https://doi.org/10.17977/um031v7i22020p076>
- Aritonang, R., Desak Putu Parmiti, & I Komang Sudarma. (2023). Microlearning-Based Learning Videos on Social Science Content. In *Journal of Educational Media and Technology* (Vol. 3, Issue 2, pp. 75–83). Ganesha University of Education. <https://doi.org/10.23887/jmt.v3i2.63538>
- Bell, S. (2010). Project-Based Learning for the 21st Century: Skills for the Future. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 83(2), 39–43. <https://doi.org/10.1080/00098650903505415>
- Bergmann, J., & Sams, A. (2012). Flip your classroom: Reach every student in every class every day. International Society for Technology in Education.
- Bennett, N. (2017). The changing landscape of education: Innovation and effectiveness in schools. *International Journal of Educational Management*, 31(2), 233–249. <https://doi.org/10.1108/IJEM-09-2016-0102>
- Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.). Sage Publications.
- Danny, G., Yuliati, T., & Pratiwi, M. (2022). Social Science Interactive Learning Media Application (IPS). In *Jutekinf (Journal of Computer and Information Technology)* (Vol. 10, Issue 1, pp. 1–5). UNITEK

- Journal, Dumai College of Technology.
<https://doi.org/10.52072/jutekinf.v10i1.352>
- Efendi, Y., Adi, E., & Sulthoni, S. (2020). Development of Motion Graphics Animation Video Media in Science Subjects at SDN Pandanrejo 1, Malang Regency. In *JINOTEP (Journal of Learning Innovation and Technology): Studies and Research in Learning Technology* (Vol. 6, Issue 2, pp. 97–102). State University of Malang (UM).
<https://doi.org/10.17977/um031v6i22020p097>
- Goldman, D. (2017). Cultivating Engagement Through Student-Centered Learning in a High School Media Art Class [Dominican University of California]. In *Graduate Master's Theses, Capstones, and Culminating Projects*.
<https://doi.org/10.33015/dominican.edu/2017.edu.08>
- Gonçalves, A. C. S., Mol, G. M. dos S. A., & Arantes, S. da S. F. (2024). FORMAÇÃO DE PROFESSORES POR MEIO DA SEQUÊNCIA DIDÁTICA E TECNOLOGIAS DIGITAIS. *Ft Magazine*, 29(140), 52–53.
<https://doi.org/10.69849/revistaft/ch10202411302152>
- Gunawan; By Made, Yeni Suranti; Fathoroni. (2020). Variations of Models and Learning Platforms for Prospective Teachers During the COVID-19 Pandemic Period. *Ndonesian Journal of Teacher Education*, 1(2), 61–70.
- Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, 7(2), 95–105.

- <https://doi.org/10.1016/j.iheduc.2004.02.001>
- Hattie, J. (2009). Visible learning: A synthesis of over 800 meta-analyses relating to achievement. Routledge.
- Hand, S. (2009). *Emmanuel Levinas*. Routledge 2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN.
<https://doi.org/10.7146/sl.v0i27.103883>
- Hapsari, N. D. (2023). Student Perception: Application of Project-Based Learning to Applied Biochemistry Learning. In *Justek : Journal of Science and Technology* (Vol. 6, Issue 1, p. 179). University of Muhammadiyah Mataram.
<https://doi.org/10.31764/justek.v6i1.14031>
- Hepp K., P., Prats Fernández, M. A., & Holgado García, J. (2015). Teacher training: technology helping to develop an innovative and reflective professional profile. *RUSC. Universities and Knowledge Society Journal*, 12(2), 30.
<https://doi.org/10.7238/rusc.v12i2.2458>
- Abraham, B. F. M., Agustiansyah, D., Almas, N. A., & Sari, R. P. (2024). Creation of Video Profile as Promotional and Information Media of the Nahdlatul Ulama Khadijah Education and Social Park Foundation Surabaya. In *DIGICOM : Journal of Communication and Media* (Vol. 4, Issue 3, pp. 329–336). Institute for Research and Community Service, College of Communication Sciences - AWS.
<https://doi.org/10.37826/digicom.v4i3.830>
- Indrayuda, A. N., & Novalia, N. (2024). Social Media User Interaction Cooking Tutorial Video in Youtube Devina Hermawan Account. In *Harmony: Journal of Communication and Social Sciences* (Vol. 2, Issue 4, pp. 81–91). Faculty of Law, Widya Karya Catholic

University Malang.
<https://doi.org/10.59581/harmoniwidyakarya.v2i4.4101>

- Johnson, D. W., Johnson, R. T., & Smith, K. A. (2014). Cooperative learning: Improving university instruction by basing practice on validated theory. *Journal of Excellence in College Teaching*, 25(3), 85-118.
- Kandel, D. (2024). Lifelong Learning Process in Human Brain. In *Researchgate* (Issue March, pp. 0–8). BENTHAM SCIENCE PUBLISHERS.
<https://doi.org/10.2174/9789815165494124010010>
- Kariippanon, K. E., Cliff, D. P., Lancaster, S. J., Okely, A. D., & Parrish, A. M. (2019). Flexible learning spaces facilitate interaction, collaboration and behavioural engagement in secondary school. *PLoS ONE*, 14(10), e0223607.
<https://doi.org/10.1371/journal.pone.0223607>
- Khanzasalwa, K., & Nurfebiaraning, S. (2023). The influence of video and audio elements on Sasa ads on Twitter on audience attitudes. In *Communicology: Journal of Communication and Social Science Development* (Vol. 6, Issue 2, p. 103). UIN North Sumatra Medan.
<https://doi.org/10.30829/komunikologi.v6i2.11707>
- Levitt, G., & Grubaugh, S. (2023). Teacher-centered or Student-centered Teaching Methods and Student Outcomes in Secondary Schools: Lecture/Discussion and Project-based Learning/Inquiry Pros and Cons. *EIKI Journal of Effective Teaching Methods*, 1(2).
<https://doi.org/10.59652/jetm.v1i2.16>
- Madichie, N. (2010). Global Marketing Management. In

- Management Decision* (Vol. 48, Issue 8).
<https://doi.org/10.1108/00251741011076816>
- Mahayati, E., Atok, K. K., Firmansyah, F. A., Ariyanto, S. R., & Rozi, F. (2023). The Effectiveness of Animated Videos as an Information Technology-Based Learning Medium. In *Journal of Innovation and Learning in Physics* (Vol. 10, Issue 1, pp. 102–108). Sriwijaya University - Unsri Learning Innovation Center.
<https://doi.org/10.36706/jipf.v10i1.20170>
- MIŞCALENCU, M. (2024). Continuous professional training of teaching staff – a condition of the quality of education. *Acta et Commentations: Ştiinţe Ale Educaţiei*, 37(3), 211–215.
<https://doi.org/10.36120/2587-3636.v37i3.211-215>
- Murphy, D. T., & Gunter, G. A. (1997). Technology integration: The importance of administrative support. *International Journal of Phytoremediation*, 21(1), 136–139. <https://doi.org/10.1080/0952398970340306>
- Phillips, P., Schiefelbein-Guerrero, K., & Kurlberg, J. (2019). Defining Digital Theology: Digital Humanities, Digital Religion and the Particular Work of the CODEC Research Centre and Network. *Open Theology*, 5(1), 29–43. <https://doi.org/10.1515/opth-2019-0003>
- Pradana, D., Abidin, Z., & Adi, E. (2020). Development of Learning Animation Videos Subtheme of Character Building for Deaf SDLB Students. In *JINOTEP (Journal of Learning Innovation and Technology): Studies and Research in Learning Technology* (Vol. 7, Issue 2, pp. 96–106). State University of Malang (UM).
<https://doi.org/10.17977/um031v7i22020p096>
- Pratama, A., Ulfa, S., & Praherdhiono, H. (2020).

- Development of Reog Ponorogo Cultural Animation Video as a Supplement to Extracurricular Activities for Elementary School Students. In *JINOTEP (Journal of Learning Innovation and Technology): Studies and Research in Learning Technology* (Vol. 7, Issue 1, pp. 9–17). State University of Malang (UM).
<https://doi.org/10.17977/um031v7i12020p009>
- Prihatmi, T. N., Istiqoma, M., & Anjarwati, R. (2022). Technology-Based Speaking Learning for Adult Learners. In *SEMSINA Proceedings* (Vol. 3, Issue 2, pp. 275–278). LPPM ITN Malang.
<https://doi.org/10.36040/semsina.v3i2.5151>
- Patton, M. Q. (2015). *Qualitative research and evaluation methods* (4th ed.). Sage Publications.
- Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education*, 93(3), 223-231. <https://doi.org/10.1002/j.2168-9830.2004.tb00809.x>
- RACHMAWATI, R., & AISOI, L. E. (2020). The Influence of Critical Video Active Learning Strategies on Students' Attention and Learning Outcomes on Global Warming Subject Matter. In *Indonesian Journal of Education* (Vol. 8, Issue 1, pp. 29–36). Cendrawasih University.
<https://doi.org/10.31957/jipi.v8i1.1133>
- Riadi, S., & Hidayat, T. W. (2023). Interactive Communication Model in the Plantation Work World of PTPN II North Sumatra. In *Communicology: Journal of Communication and Social Science Development* (Vol. 6, Issue 2, p. 170). UIN North Sumatra Medan.
<https://doi.org/10.30829/komunikologi.v6i2.14553>
- S.H. Wijaya, I.M. Tegeh, & I.K.Suartama. (2021).

- Development of Science Lesson Content Learning Videos for Grade IV Elementary School Students in *Indonesian Journal of Learning Technology* (Vol. 11, Issue 1, pp. 61–71). Ganesha University of Education. https://doi.org/10.23887/jurnal_tp.v11i1.644
- Samoshkina, I. (2024). Applied Learning in Higher Education: Bridging the Gap Between Theory and Practice. *Proceedings of The International Conference on Modern Research in Education, Teaching and Learning*, 3(1), 25–34. <https://doi.org/10.33422/icmetl.v3i1.271>
- Saputri, D. P. (2023). Application of Hijaiyah Alphabet Interactive Learning Video in Early Childhood. In *Indonesian Journal of Education and Technology* (Vol. 3, Issue 8, pp. 329–336). Infinite Corporation. <https://doi.org/10.52436/1.jpti.95>
- Siahaan, K. W. A., SINABUTAR, A. T., & Haloho, U. N. (2020). The Influence of Quantum Teaching Method in Creating Active and Fun Learning in Elementary School Children. In *Journal of Elementary Education* (Vol. 3, Issue 2). University of Majalengka. <https://doi.org/10.31949/jee.v3i2.2381>
- Suri, C. S., Suri, I. S., & Kumari, M. (2024). An Integrated Approach to Developing Essential 21st Century Skills in Modern Education. *IGI Global Scientific Publishing*, 19–42. <https://doi.org/10.4018/979-8-3373-1692-5.ch002>
- Susilawati, E. (2020). Efforts to increase student activeness in analyzing learning videos through webinar learning strategies. In *Journal of Educational Technology (JTP)* (Vol. 13, Issue 2, p. 145). State University of Medan.

- <https://doi.org/10.24114/jtp.v13i2.20149>
- Susilawati, E., & Khaira, I. (2021). HIGHER ORDER THINKING SKILL (HOTS) AND THE TPACK LEARNING MODEL AND ITS APPLICATION TO THE PPKn. In *Journal of Educational Technology (JTP)* (Vol. 14, Issue 2, p. 139). State University of Medan.
<https://doi.org/10.24114/jtp.v14i2.28338>
- Tariq, M. U. (2024). Enhancing Students and Learning Achievement as 21st-Century Skills Through Transdisciplinary Approaches. *IGI Global Scientific Publishing*, 220–257. <https://doi.org/10.4018/979-8-3693-3699-1.ch007>
- Teo, T. (2011). Technology acceptance in education: A meta-analysis. *Computers & Education*, 57(5), 577–591. <https://doi.org/10.1016/j.compedu.2011.01.001>
- Utami, F., & Kowiyah, K. (2022). The Influence of Animated Video Media on Initial Reading Ability. In *Journal of Educational Technology: Journal of Learning Research and Development* (Vol. 7, Issue 2, p. 138). LPPM IKIP Mataram.
<https://doi.org/10.33394/jtp.v7i2.5415>
- Vongkulluksn, V. W., Xie, K., & Bowman, M. A. (2018). The role of value on teachers' internalization of external barriers and externalization of personal beliefs for classroom technology integration. *Computers and Education*, 118, 70–81.
<https://doi.org/10.1016/j.compedu.2017.11.009>
- Wahyuningsih, D., Anisah, A., & Kirana, C. (2021). Training on making RPPs and learning videos at SLB Negeri Pangkalpinang. In *Jurnal Abdimastek (Technology-Based Community Service)* (Vol. 2, Issue 2,

- pp. 11–16). Atma Luhur College of Informatics & Computer Management.
<https://doi.org/10.32736/abdimastek.v2i2.1270>
- Wasilah, K. (2023). The application of the pakem method (active, creative, effective, fun learning) in madrasahs. In *Journal Creativity* (Vol. 1, Issue 1, pp. 29–40). Madrasah Aliyah Mambaul Ulum Bata-Bata.
<https://doi.org/10.62288/creativity.v1i1.6>
- Widiastuti, N. M. D., & Dharmadi, I. P. A. (2021). Classification of technology in the network to support the learning process in the era of independent learning. In *Journal of Technology and Vocational Education* (Vol. 18, Issue 2, p. 195). Ganesha University of Education.
<https://doi.org/10.23887/jptk-undiksha.v18i2.34166>
- Zubaidah, S. (2019). 21st century skills: skills taught through learning. *National Seminar on Education with the theme "Strategic Issues of Mathematics and Natural Sciences Learning in the 21st Century, December, 1–17.*