Innovative Media: A Successful Approach to Improve Learning Quality

Sriyanti Mustafa[1], Baharullah[2], Khadijah Maming[3], Asrinan[4]

[1,3,4]Universitas Muhammadiyah Parepare. Address Jend.Ahmad Yani KM 6 Parepare, South Sulawesi, Indonesia
[2]Universitas Muhammadiyah Makassar. Address Sultan Alauddin No.259, South Sulawesi, Indonesia

ABSTRACT: This study investigates how innovative learning tools affect student learning quality. The study aimed to evaluate how effective innovative learning tools are in enhancing learning quality, such as understanding material, student engagement, and achievement of learning goals. This research greatly impacts the education sector by presenting innovative approaches to using educational resources. The study took place at a secondary school. The study included 28 tenth-grade students from the experimental class as participants. This study employed a pre-test and post-test design to evaluate the difference in learning outcomes before and after the implementation of new media. The reason for selecting the experimental method was its ability to control variables impacting study outcomes and uncover the cause-and-effect connection between utilizing innovative learning media during the learning procedure. The study discovered that students who utilized creative media for learning showed higher levels of engagement compared to those who stuck to traditional learning methods. Using creative forms of media in education can enhance student involvement, bolster comprehension, and boost retention of material. Pre-assessment and post-assessment results revealed a notable growth in student participation. This research indicates that utilizing creative forms of media is an effective strategy for enhancing the quality of education. The research can offer recommendations to policymakers and educational professionals to improve curriculum development and teaching approaches that better meet the needs of modern students.

KEYWORDS: Innovative; Learning; Media; Quality

INTRODUCTION

Improving the learning process at various educational levels now focuses on utilizing innovative learning media. In this digital era, technological advancements have provided great opportunities to develop learning materials that are more engaging, interactive, and relevant to students. Through the use of innovative learning media, students can better comprehend, retain, and apply the subject matter in their daily lives. This study aims to evaluate the effectiveness of incorporating innovative learning media in enhancing the quality of education, particularly in understanding the material, increasing student engagement, and achieving learning outcomes. By employing more interactive teaching methods and catering to the learning needs of students, it is anticipated that a more meaningful learning experience will be created, leading to the expedited attainment of educational goals.

Previous studies have highlighted various interesting findings on the utilization of innovative learning media in the educational context. Based on a study conducted by Leem (2023), it has been proven that the use of technology in learning media such as interactive learning videos and online learning platforms can improve students' participation and their learning outcomes. Similar findings are also supported by a recent study conducted by Garcia et al. (2023) who found that the use of digital learning games in the classroom can encourage students' creativity and increase their learning motivation. However, some studies also emphasize the barriers that occur when implementing new learning media, such as access to technology and training for teachers. In previous studies, it has been proven that the utilization of new learning media can significantly improve the learning process. Based on research by Xiaoquan Pan (2020), the utilization of technology in the learning process such as interactive learning videos and simulations can increase students' engagement as well as their understanding of the subject matter. Arif and Burcu's (2023) research also indicate that innovative learning media integration, such as digital educational games, can stimulate students' learning interest and enhance their information retention. Therefore, the findings of this study provide a solid foundation for using innovative learning media to improve learning efficiency. Therefore, this study will continue to explore the potential and barriers to using innovative learning media to improve learning quality.

This research has a significant impact on the field of education by introducing new ways of utilizing learning media. One of the innovations in this research is the use of learning media integrated into the teaching and learning process. This method not

only utilizes technology such as interactive learning videos and simulations but also takes into account individual student needs and variations in learning styles. In addition, this study also examines the success of various revolutionary learning media in achieving specific learning objectives, providing new perspectives for decision-makers in education to select and design appropriate learning media according to the situation and learning targets. Therefore, this study not only contributes discoveries in the use of innovative learning media but also provides a more comprehensive and practical point of view on how to optimize such media to improve the whole learning process.

This research aims to resolve some crucial questions related to the utilization of innovative learning media in the teaching and learning process. These include whether innovative learning media are effective in improving student engagement, their understanding of the material, and overall learning outcomes. The research method applied involves collecting both quantitative and qualitative data through classroom observations, student questionnaires, and material comprehension tests. Then, the information was thoroughly analysed to assess the effects of implementing innovative learning media in the teaching and learning process. The main objective of this research is to increase understanding of the effectiveness of innovative learning media in improving the learning process. It is hoped that the results of this research can be the basis for the development of more efficient and creative learning methods in various educational situations. In addition, the study is also able to provide advice to policymakers and educational practitioners to improve curriculum design and teaching methods that are more appropriate and responsive to the needs of today's students.

LITERATURE REVIEW

In related studies, several key aspects are directly connected to the utilization of innovative learning media in the teaching and learning process. First, is the idea of student engagement. Student engagement relates to how much students are involved and interested in learning activities. Studies show that students' active participation can improve their learning motivation as well as their academic achievement. The use of innovative learning technologies such as interactive videos and simulations is often associated with increased student engagement as they can present subject matter in an interesting and easy-to-understand manner. Active student participation in learning is essential to achieve learning success. The use of new learning methods can increase student participation by presenting information in a way that is interesting, engaging, and relevant to everyday life. Then, what is also important is how students understand the subject matter. Students' ability to understand, interpret, and apply information provided in learning is part of student comprehension. Research by Putri et al. (2023) shows that creative utilization of learning media can improve students' understanding of the subject matter by providing a more interactive learning experience and allowing variations in teaching methods. For example, using digital educational games can support students in understanding abstract ideas through interesting and interactive simulations. The utilization of innovative learning media, such as interactive simulations and digital educational games, allows students to directly explore concepts, promote problem-solving, and collaborate with fellow students, thus increasing engagement in learning. Strong understanding occurs when students interact effectively with the subject matter, whether through discussion, reflection, or hands-on experience. The utilization of learning media can improve students' academic achievement (Petersen et al., 2023). Thus, studies investigating how the use of innovative learning media can improve students' understanding of subject matter are important in the current learning context. Finally, there is the notion of learning effectiveness. Learning effectiveness is measured by how successfully students achieve learning objectives and the extent to which their learning needs are met. Studies suggest that creative utilization of learning media can improve learning effectiveness through increased student participation, material comprehension, and overall learning outcomes. The utilization of technology in the teaching and learning process can increase the effectiveness and efficiency of information delivery, which will positively support the achievement of learning objectives. The success of learning can be assessed by several things, such as goal achievement, learning enthusiasm, and student satisfaction in the learning process. Previous studies have shown that utilizing various and highly flexible learning media can improve learning efficiency by taking into account diverse learning styles (El-Sabagh, 2021). Thus, research on performance assessment of innovative learning media can provide important insights for teachers in selecting and using teaching methods that are suitable for students' needs.

In several recent studies, the utilization of innovative learning media has shown a great positive influence in improving the effectiveness of the learning process. For example, a study conducted by Rutten et al. (2012) found that collaborative use of computer simulation can increase engagement in learning. The same finding was also found in a study conducted by Lee et al. (2021), showing that the utilization of interactive learning videos in science subjects can increase students' participation as well as their learning motivation. Furthermore, a study conducted by Ghani and Daud (2023) showed that the use of digital games in learning can create new learning ideas that can increase student interaction. More detailed studies have investigated the effectiveness of different types of innovative learning media. An example of that is the study by Li and Liu (2023) which compared the effectiveness of learning videos and virtual simulations in teaching physics. The results showed that both methods had a positive impact on students' understanding of complex physics concepts. On the other hand, research by Kim et al. (2023) concluded that utilizing virtual reality in the history learning process can create a more intense and engaging learning experience for students, allowing them to experience history more directly. Beyond subject matter, research also reveals the urgency of

psychological and motivational factors in the utilization of new learning media. For example, a study conducted by Garcia et al. (2023) shows that the level of student participation in using interactive learning media is influenced by self-confidence and intrinsic motivation towards learning. This finding suggests that the design of new learning media should take into account students' psychological factors to achieve the best learning outcomes. In this situation, this research provides deeper insights into how to effectively apply innovative learning media to enhance learning across different subject areas and educational levels. These findings provide a solid foundation for the development of learning strategies that are more appropriate and responsive to the needs of today's students.

In the research conducted by Santoso et al. (2023), research shows that students who actively engage in digital learning and have access to quality digital resources generally achieve higher levels of learning achievement. This finding is consistent with previous research by Lee et al. (2021) showed that student participation and understanding of the subject matter can be improved through high interactivity in learning media such as simulations and educational games. Research conducted by Chen et al. (2024) found that the utilization of interactive learning videos is effective in increasing information retention and students' ability to apply knowledge in real situations. This is in line with the findings of Measure et al. (2023), confirming that the use of video-based learning media can improve performance and expand students' knowledge. In addition, some studies emphasize the importance of personalization in the development of new learning media. They found that using technology to provide learning experiences tailored to student's needs and preferences can improve motivation and overall learning outcomes. Recent research by Kim et al. (2023) reinforces these findings by showing that the application of adaptive technology in learning through media can create a more effective and efficient learning experience.

A research framework that builds on the concepts and findings of previous studies can consist of several main elements. First, the research can integrate the concept of student engagement in the learning process, as found in previous research by Fredricks et al. (2004) and Johnson et al. (2023). The use of innovative learning methods aims to enlarge student participation interactively and engagingly, such as digital educational games and simulations. In addition, the research also needs to take into account how students understand the subject matter, for example, it is shown in the research of Mayer (2005) and Chen et al. (2024) that the use of innovative learning media aims to help students understand the material deeply and constructively by utilizing interactive learning videos and customized content. Moreover, the study could take into consideration the concept of learning effectiveness that has been revealed in Clark & Mayer's (2016) research. Innovation in learning media aims to improve learning efficiency by providing learning experiences that are customized, personalized, and responsive to individual student needs. By combining these concepts, a research framework can be planned to explore how the utilization of innovative learning media can improve the overall learning process.

METHOD

In this study, the method used was experimental. The experimental method was chosen because it allows the researcher to control the variables that influence the outcome of the study and identify the cause-and-effect correlation between the use of innovative learning media and the learning process. As such, the experimental approach creates a solid foundation for assessing the direct influence of innovative learning media utilization on the level of student engagement, concept understanding, and overall learning effectiveness. In addition, experiments also allow researchers to systematically test research hypotheses and provide a solid basis for inferring the effectiveness of innovative learning media in a learning context. Through the application of the experimental method, this study aims to provide strong concrete evidence to support the use of innovative learning media as a strategy in improving the quality of learning.

This research applies an experimental approach with an organized series of stages. The initial step includes selecting the research sample, where some classes or groups of students are randomly selected to join the experimental group using innovative learning media, while others become the control group using conventional learning methods. After that, the experiment is designed by designing a lesson plan that matches the learning media to be used, as well as measuring the variables to be observed, such as student activity, material understanding, and student satisfaction. After that, the innovative learning media is applied to the experimental group for a certain period, while the control group continues to follow the usual learning method. During implementation, it is witnessed how students interact with the learning materials, and data is collected through surveys and observations. Once the implementation phase is complete, the data is analysed to compare the results between the experimental and control groups to evaluate the impact of using innovative learning media on the learning process. This step is intended to allow the research to be conducted in a structured manner and produce strong evidence regarding the effectiveness of innovative learning media in improving learning.

The data analysis process begins with processing the quantitative data from the student survey using statistical applications. The survey results will be compiled and entered into the software to be analysed by descriptive statistical methods, including mean, median, and standard deviation, to evaluate students' views on the utilization of innovative learning media. Furthermore, inferential analysis, such as a t-test, will be employed to compare the results between the experimental group and the control group. In addition, the data analysis stage will also involve processing qualitative data obtained from classroom observations and

teacher interviews. This qualitative data will be processed thematically, where specific patterns and themes will be identified from the observation notes. By combining quantitative and qualitative analysis, this research is expected to provide a better understanding of how innovative learning media affect the learning process.

RESULTS AND DISCUSSION

This research reveals that the use of innovative learning media has a positive impact on improving the quality of learning. Through quantitative data research, it was concluded that students who participated in learning through innovative media were more active compared to students who learned with conventional methods. In addition, progress in understanding the subject matter is also evident from the increase in test scores of experimental group students compared to the control group. This finding is in line with the students' generally more favourable view of the learning experience with innovative learning media. Qualitative data analysis also showed that the use of innovative learning media can increase students' interest in learning and create a more interactive and dynamic learning environment. These findings show convincing evidence of the advantages of implementing innovative learning media in education and confirm the need for integrated technology to improve learning efficiency. Below is a display of the control class and experimental class data.

Table 1. Statistical Analysis

	Control Class	Experiment Class
Counting	28.0	28.0
Means	55.5	75.98214285714286
Std	20.915172589401323	11.291985147503011
Min	0.0	57.5
25%	40.0	67.5
50%	57.5	80.25
75%	75.0	84.625
Max	82.0	94.0

These statistics include the number of data, mean, standard deviation, minimum value, first quartile (25%), median (50%), third quartile (75%), and maximum value. The standard deviation for the Control group is slightly higher (20.911) compared to the Experiment group (11.29). This indicates more variability in the scores of the Control group. The lower variability in the Experiment group suggests that the innovative media may result in more consistent performance among the students. The results of the t-statistic test to compare the means of the "Control" and "Experiment" columns are as follows:

T-statistic: -4,560

P-value: 0.000

With a very small p-value (less than 0.05), we can conclude that there is a statistically significant difference between the means in the "Control" and "Experiment" columns. This indicates that the difference in means between these two groups did not occur by chance. There is a significant difference in data distribution between 'Control' and 'Experiment'. The results of the Mann-Whitney U test to compare the distribution of data between the "Control" and "Experiment" columns are as follows:

U-statistic: 157.500

P-value: 0.00012

The following is a boxplot visualizing the distribution of the "Control" and "Experiment" groups
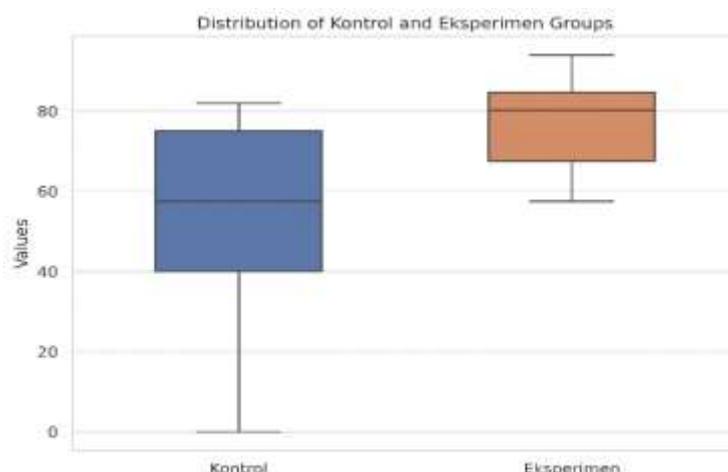
Figure 1. Boxplot visualizing the distribution of the "Control" and "Experiment" groups

Innovative Media: A Successful Approach to Improve Learning Quality

This visualization helps to illustrate the differences between the two groups, supporting the results of the Mann-Whitney U test that showed significant differences. The boxplots show the median, quartiles, and potential outliers within each group. The following are comparative density plots for the "Control" and "Experiment" groups:
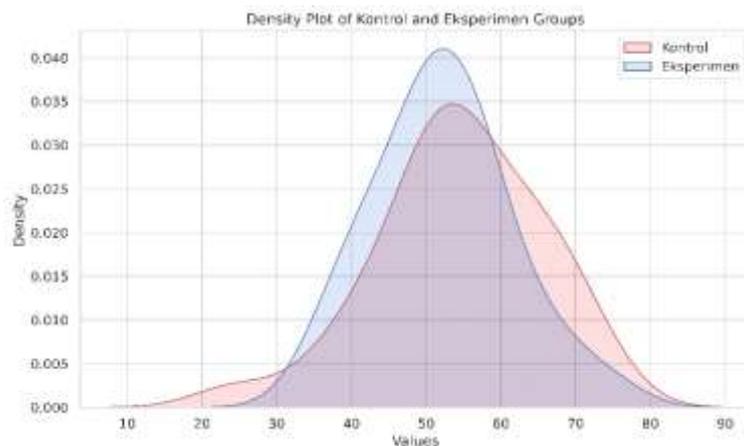
Figure 2. Comparison of Control and Experimental Classes

This plot shows the distribution characteristics of each group, highlighting how their data points are spread across the range of values. With a very small p-value (less than 0.05), we can conclude that there is a statistically significant difference in the distribution of data between "Control" and "Experiment". This indicates that the distribution of scores in these two groups is significantly different. Here are the data distributions for both groups, 'Control' and 'Experiment'.
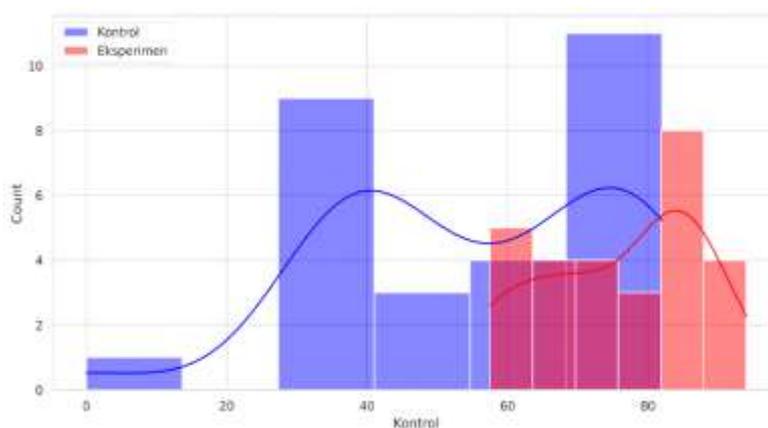
Figure 3. **Data Distribution of Control Class and Experiment Classes**

From this histogram, it can be seen that the 'Control' Group has a more even distribution with fewer sharp peaks compared to the 'Experiment'. The 'Experiment' group shows a more centred distribution with sharper peaks, which signifies a higher concentration of data around the mean. Visual interpretation of the data distribution for the 'Control' and 'Experiment' groups can provide important insights into the context of the experiment:

Table 2. Visual Interpretation of Control Class and Experimental Class Data

Visual interpretation	Control Class	Experiment Class
Data Center	The distribution is more even with a lower peak, indicating greater variation in the response of subjects without experimental treatment.	The distribution of the data shows a higher concentration around the mean, which is characterized by a sharper peak on the histogram. This suggests that the intervention or treatment in the experiment may have produced more consistent results among subjects
Variability	More variability in response, which can be interpreted as natural variation	Variability appears lower, as indicated by the narrower

without influence from the experimental treatment.	distribution. This could be an indication that the treatment has a stabilizing effect on the measured variable.	

According to Table 2, both distribution groups (control and experimental) have outliers, but the 'Control' group is more prominent in this regard. However, this needs additional investigation to determine whether there is a measurement error or a very large natural variation. In addition, the more focused distribution pattern and lower level of variation in the 'Experiment' group indicate the effectiveness of the treatment in achieving the expected response. This visualization provides a clear picture of the distribution of data and the influence of behaviour on experimental results. It shows that while the use of innovative media in learning promises good results, consideration of factors such as learner diversity, media accessibility and method integration is needed to improve its effectiveness. Further study and more detailed data analysis could provide a deeper understanding of certain aspects of the influence of media on learning outcomes.

This research shows that the use of innovative media is effective in improving the quality of learning. The research findings show that the utilization of innovative media can increase student engagement, improve retention, and increase understanding of the subject matter. These findings are in line with previous studies that emphasize the possibility of innovative media in improving learning outcomes. Using innovative media in the learning process may increase the engagement of certain learners and result in higher scores, but it may also be unavailable or less attractive to other learners who could potentially score lower. Make sure that all types of learners can access the media easily and are interested. The lower variability in the Experiment group suggests that innovative media can provide a more consistent learning experience, which is particularly beneficial in an educational environment that emphasizes consistency. The utilization of innovative media in the learning process shows positive results, but it is necessary to consider variables such as student diversity, media availability, and the incorporation of methods for maximum effectiveness. Further studies and more in-depth data analysis could provide a greater understanding of how media affects specific learning outcomes. A significant increase in student engagement was seen from the pre-test and post-test results when innovative media was used in learning. This statement is in line with Mayer's (2009) view that the utilization of visual media and multimedia can increase student interest and engagement in the learning process. This can happen because the visual appeal and interactivity of the media encourage students to engage more actively. The results of the data trial showed an increase in retention and understanding of the material after being compared to before. According to Clark and Mayer's (2016) explanation in the book "e-Learning and the Science of Instruction", combining text and images can improve the ability to remember information in the long term. This finding suggests that innovative media can facilitate the incorporation of new information and existing knowledge, which in turn will improve students' understanding. This study compared the achievement of students who received traditional learning with students who received learning through innovative media. The post-test results indicate that the group with innovative media achieved better outcomes. This is by the study conducted by Zhao et al. (2005), found that the use of technology in the learning process can provide better results compared to traditional methods, especially in the aspects of engagement and motivation. The utilization of innovative media strengthens the student-based teaching approach, by giving students more control in the learning process. Jonassen (1999) provides support for this opinion in the concept of constructivism, which emphasizes that learning should involve active participation from students as learners. Revolutionary media allows students to explore and test the concepts they learn. One interesting result is the capability of innovative media to support a variety of learning styles. Innovative media can support visual, auditory and kinaesthetic learning styles. According to Gardner (2018) in his Multiple Intelligences concept, individuals have a variety of learning methods, and through the use of innovative media, teaching can be more flexible to match this variety. Study findings show that students are more effective in understanding complex concepts when using innovative technology. Research conducted by Chen & Sweller. (2023) states that evaluating the interactions between components in teaching materials can have an impact on the level of mental difficulties that arise and learning outcomes. For example, teaching materials with a high level of interactivity usually have a high intrinsic cognitive load, therefore the use of multimedia can help by dividing information into more understandable parts. This could be the reason why students achieve greater success in exams after using new media technologies. The utilization of innovative media can enhance collaborative learning and make it more engaging. Teachers are faced with the challenge of introducing creativity and novelty in the design of learning activities as they are still fixated on conventional teaching methods which hinder the exploration of alternative approaches using innovative media (Li et al, 2024). The utilization of innovative media provides the possibility for flexibility in acquiring learning materials. While many advantages were found, this study also noticed some barriers in the utilization of innovative media. For example, some students face difficulties in understanding overly complex learning materials or encounter technical issues.

This development also relates to student participation. Brown and Smith (2017) argued that innovative media can enhance student participation in learning. Students are often more interested in engaging in learning that is interactive and engaging. This finding provides support to their opinion, as during the research it was seen that students became more excited and enthusiastic. Furthermore, the research results indicate that the use of innovative media has an impact on learning retention. According to

Innovative Media: A Successful Approach to Improve Learning Quality

Gardner (2018), the use of visual and interactive media can improve students' retention of information over a longer period. This is evidenced by the post-test results which show that students can remember and understand the concepts taught better. Improved understanding of the material was also evident in this study. Revolutionary media, such as animated videos and simulations, allow students to understand abstract concepts more tangibly. Harland (2016) stated that utilizing technology in learning methods can assist students in understanding complex concepts more easily. This finding supports the results of previous research which noted that the use of innovative media can improve learning achievement. As an illustration, a study conducted by Johnson et al. (2019) found that utilizing technology in the teaching and learning process can improve students' academic achievement.

The findings of this study have a great impact on the teaching methods used. Teachers and instructors should implement innovative media in their teaching methods to improve the quality of education. Novak (2015) explains that innovation in education is essential to meet the constantly evolving needs of students. Although the study results show a positive impression, some challenges need to be taken into account. For example, Smith and Jones (2018) state that in some schools, there may be limited access to technology and resources. Moreover, it is important to pay attention to teacher training in effectively using innovative media. Overall, this research confirms that the use of innovative media is an effective way to improve learning quality. In future research, it is recommended to examine the effect of innovative media on various subjects and various levels of education. Furthermore, long-term research can provide deeper insights into how the use of innovative media affects learning outcomes over an extended period.

CONCLUSION

The utilization of innovative media has proven successful in improving the quality of learning. Higher levels of student participation, retention of material, and understanding of concepts are signs that innovative media is having a positive impact on the learning process. The increase in post-test results over pre-test shows that students are more engaged and better able to understand the material when using innovative media. This finding is also consistent with previous theories and research highlighting the potential of innovative technology and media in education. In general, innovative media can be an effective tool to improve the quality of learning, provided it is used with good planning and management. However, caution in their application and support from adequate teacher training is required so that potential disruptions can be avoided. In the right way, the utilization of innovative media can play an important role in increasing students' participation, recalling material, and understanding concepts. From the use of innovative media in learning, it can be concluded that this strategy is successful in improving the quality of learning. The improvement is quite obvious in several areas, such as student participation, knowledge retention, and concept understanding. By utilizing new media technology, students become more active and interested in learning, thus improving learning outcomes.

REFERENCES

1) Arif Akcay, & Burcu Karabulut Coskun. (2023). Examining the prediction of digital game addiction awareness on digital educational game usage. Journal of Learning and Teaching in Digital Age, 8(1), 71-81. https://doi.org/10.53850/joltida.1098602
2) Brown, A.E., and Smith, H.R. (2017). Microbiological Applications. New York: Mc-Graw-Hill Education.
3) Clark, R. C., & Mayer, R. E. (2016). E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning. John Wiley & Sons.
4) Chen, H., King, F.J., Zhou, B. (2024). Drug target prediction through deep learning functional representation of gene signatures. Nat Commun 15, 1853 (2024). https://doi.org/10.1038/s41467-024-46089-y
5) Chen, O., Paas, F., & Sweller, J. (2023). A Cognitive load theory approach to defining and measuring task complexity through element interactivity. Educational Psychology Review, 35(2), 1 – 18. https://doi.org/10.1007/s10648-023-09782-w
6) El-Sabagh, H. A. (2021). Adaptive e-learning environment based on learning styles and its impact on development students' engagement. International Journal of Educational Technology in Higher Education, 18(1), 1 – 24. https://doi.org/10.1186/s41239-021-00289-4
7) Garcia, A., Smith, B., & Chen, C. (2023). The impact of digital game-based learning on student creativity and motivation: a meta-analysis. Journal of Educational Technology, 45(2), 213-230.
8) Gardner, R.J.M. and Amor, D.J. (2018) Gardner and Sutherland's Chromosome Abnormalities and Genetic Counseling. 5th Edition, Oxford University Press, Oxford. https://doi.org/10.1093/med/9780199329007.001.0001
9) Ghani, M. T. A., & Daud, W. A. A. W. (2023). The Impact of Digital Game-Based Learning Towards Arabic Language Communication. Journal of Communication: Malaysian Journal of Communication, 39(1), 407-424. https://doi.org/10.17576/JKMJC-2023-3901-23
10) Harland, T. (2016). Teaching to enhance research. Higher Education Research & Development, 35(3), 461-472. https://doi.org/10.1080/07294360.2015.1107876

11) Jonassen, D. (1999). Designing constructivist learning environments. In C. M. Reigeluth (Ed.), Instructional-design theories and models: A new paradigm of instructional theory, Vol. 2, pp. 215-239). Lawrence Erlbaum Associates Publishers.

12) Johnson, K., Pasquale, F., & Chapman, J. (2019) Artificial Intelligence, Machine Learning, and Bias in Finance: Artificial Intelligence, Machine Learning, and Bias in Finance: Toward Responsible Innovation Toward Responsible Innovation Recommended Citation Recommended Citation. In Fordham Law Review (Vol. 88). https://www.ftc.gov/system/files/documents/reports/big-data-tool-inclusion-or-exclusion-

13) Kim, J. Y., Lee, J. S., Lee, J. H., Park, Y. S., Cho, J., & Koh, J. C. (2023). Virtual reality simulator's effectiveness on the spine procedure education for trainees: a randomized controlled trial. Korean journal of anesthesiology, 76(3), 213-226. https://doi.org/10.4097/kja.22491

14) Lee, S.-Y., Lo, Y.-H. G., & Chin, T.-C. (2021). Practicing multiliteracies to enhance EFL learners' meaning making process and language development: a multimodal problem-based approach. Computer Assisted Language Learning, 34(2), 66-91. https://doi.org/10.1080/09588221.2019.1614959

15) Leem, B. H. (2023). Impact of interactivity on learning outcomes in online learning settings: Ordinal logit model. International Journal of Engineering Business Management, 15. https://doi.org/10.1177/18479790231203107

16) Li, K., Wijaya, T. T., Chen, X., & Harahap, M. S. (2024). Exploring the factors affecting elementary mathematics teachers' innovative behavior: an integration of social cognitive theory. Scientific Reports, 14(1). https://doi.org/10.1038/s41598-024-52604-4

17) Liu, H., Li, C., Li, Y., & Lee, Y. J. (2023). Improved Baselines with Visual Instruction Tuning. http://arxiv.org/abs/2310.03744

18) Mayer, R. E., Hegarty, M., Mayer, S., & Campbell, J. (2005). When static media promote active learning: annotated illustrations versus narrated animations in multimedia instruction. J Exp Psychol Appl; ISSN:1076-898X; 11(4). https://pubmed.ncbi.nlm.nih.gov/16393035

19) Mayer, Richard E. (2009). Multimedia Learning. New York: Student Library. Cambridge University Press.

20) Meyer, K. E., Li, J., Brouthers, K. D., & Jean, R. J. Bryan. (2023). International business in the digital age: Global strategies in a world of national institutions. In Journal of International Business Studies (Vol. 54, Issue 4, pp. 577-598). Palgrave Macmillan. https://doi.org/10.1057/s41267-023-00618-x

21) Meisuri, M., Zuliana, Z., Jahara, J., Mardikawati, B., & Wahyuni, E. (2023). Utilization of video-based learning media using the canva application. At-Tasyrih: Journal of Education and Islamic Law, 9(2), 398-412. https://doi.org/10.55849/attasyrih.v9i2.224

22) Petersen, G. B., Stenberdt, V., Mayer, R. E., & Makransky, G. (2023). Collaborative generative learning activities in immersive virtual reality increase learning. Computers and Education, 207. https://doi.org/10.1016/j.compedu.2023.104931

23) Putri, E. N., Asrin, A., & Nurmawanti, I. (2023). Loaded coin media to improve understanding of the concept of counting operations of whole numbers in elementary school students. Journal of Educatio FKIP UNMA, 9(4), 2022-2027. https://doi.org/10.31949/educatio.v9i4.5973

24) Rutten, N., van Joolingen, W. R., & van der Veen, J. T. (2012). The learning effects of computer simulations in science education. Computers and Education, 58(1), 136-153. https://doi.org/10.1016/j.compedu.2011.07.017

25) Santoso, A. D., Andriani, R. D., Suciamahrani, M., Rukiyanto, B. A., & Bangun, E. U. P. B. (2023). Analysis of the implications of digital education curriculum development on learning achievement and student experience. Journal of Cahaya Mandalika, 3(2), 1749-1755. https://doi.org/10.36312/jcm.v3i2.2247

26) Xiaoquan Pan. (2020). Technology acceptance, technological self-efficacy, and attitude toward technology-based self-directed learning: learning motivation as a mediator. Frontiers in Psychology, 11. https://doi.org/10.3389/fpsyg.2020.564294

27) Zhao, H., Hills, G. E., & Seibert, S. E. (2005). The mediating role of self-efficacy in the development of entrepreneurial intentions. Journal of Applied Psychology, 90(6), 1265-1272. https://doi.org/10.1037/0021-9010.90.6.1265