IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 5, No. 1, January 2024
Page 117-127

Development of Digital Comic Interactive Media Toward Primary Students' Understanding of Concepts

Dhiva Hafiluddin Al-Ghifary[1*], Waspodo Tjipto Subroto[2], Mustaji[3]
[1,2,3]Universitas Negeri Surabaya, Surabaya, Indonesia

DOI: https://doi.org/10.46245/ijorer.v5i1.439

Sections Info

Article history:
Submitted: November 6, 2023
Final Revised: December 19, 2023
Accepted: December 20, 2023
Published: January 07, 2024

Keywords:
Digital Comics;
Elementary school;
Interactive media;
Multimedia learning;
Understanding the context.

ABSTRACT

Objective: The use of interactive media to understand the concept of material is a stimulation of the integration of all the senses in students, where the media will provide freedom to explore the material that is available in it freely, utilizing several unique features in Microsoft PowerPoint which the researchers then turned into an interactive learning tool for students, in its implementation students will be presented with learning media that integrates audio, video and visual components. **Method:** This research uses quantitative research with experimental methods. The population in this study was class VI students as experimental class research and VI B students as control class research, with a sample of class VI C students totaling 30 students for each sample on geographical characteristics and life in the ASEAN region. **Results:** This research produced media products in the form of interactive comics, which are proven to be able to increase students' conceptual understanding of material on geographical characteristics and life in the ASEAN region, as proven by the results of data processing using which proves that there is a significant influence. **Novelty:** There is a significant impact of the development of Digital Comic Interactive Media on Students' Conceptual Understanding of Elementary school is seen from the pretest and post-test results, which show that Ho is rejected and Hα is accepted. By rejecting Ho, it means that in this research, it is proven that the conceptual understanding of students who are given action is significantly different.

INTRODUCTION

In this era of digitalization, our generation's challenge lies in the rapid progress of technology, so the implications are needed in the form of a balance of learning styles provided in an educational institution (Onuora et al., 2021). The massive conventional learning style, the main threat to students, must be balanced by collaboration with modern media (Ru'iya et al., 2021). Collaboration from one media concentration will increase the possibility of creating an interactive and supportive learning atmosphere. (Rachmavita, 2020) Students today are in an era filled with images, considering that effective communication relies heavily on the visual component (Kędra & Žakevičiūtė, 2019). This fact strengthens the argument that the world consisting of texts is slowly dying, consumed by time's progress. Today's students are exposed to digital technology and are accustomed to various media for fun or learning (Mamolo, 2022). Throughout students' education, they engage with images and visuals.

An article or advertisement's attractive point of view depends on the images available because posts from a page with visuals impact 94.00% more interaction for visitors. Visual images in the teaching and learning process are vital in achieving the learning objectives set for a particular lesson because of the need to provide more efficient and effective analogies (Thompson, 2019). The main thing is teaching or strengthening visual literacy for students to utilize and evaluate images in the current era (Vidakis et al., 2020). Visually literate people can understand visual information, a skill necessary for

communication in the 21st century. In the classroom, technology for visual tools is most widely used (Katsaris & Vidakis, 2021)

As educators, teachers must be proactive and progressive in determining teaching techniques. Especially when it comes to learning activities outside the classroom, a learning method must be applied to challenges from real life so that students can explore, study, interpret, and produce out-of-the-box thinking. Students in the 21st century no longer focus on the 'concept of bribery' from teachers alone, but teachers only transition to the teaching and learning process, for example, using multimedia to warm up the atmosphere in learning (Komalasari, 2019)

Learning success is determined by various factors, including the teacher. In the learning process, teachers must make various preparations and select learning tools so that students can understand the material quickly, learning becomes exciting, and students can apply interactive active learning. For all these purposes, teachers must choose various strategies, methods, and innovative learning models that can meet the needs of students. Some innovative learning models include: Make A Match Cooperative Model, Think Pair Share, Discovery Learning (Puspitasari & Nurhayati, 2019), Flipped Classroom (Purwitha, 2020), Student Teams Achievement Division, and Blended Learning (Setiawan et al., 2019).

In the spirit of realizing first-class education in the world, especially in our country's education field, we continue to face various challenges and transformations from time to time (Kellner & Share, 2019). Effective teaching pedagogy can be achieved if the education system focuses on the proliferation of students' critical and lateral thinking by not turning them into lab rats. Among the scope of 21st Century Learning that teachers often use are discussion techniques, demonstrations, simulations, presentations, entertainment, and so on. A teacher's readiness to combine teaching aids and learning resources in the learning process depends on the multimedia transformation he can have in today's world. An authoritative teacher sensitive to transformation will attract students' interest with popular teaching methods and creative exploration of relevant multimedia technology (Mohd, 2020).

The rapid development of information technology and multimedia is one of the main demands in the education sector so that they can immediately adapt and take anticipatory steps starting from the basic level, namely elementary school education. So, students from the elementary school level have the character capable of facing 21st-century life, namely being critical, creative, communicative, and collaborative human beings, as well as having strong positive character following the expected moral and spiritual values (Wong & Cheung, 2020). Therefore, through its learning implementation, the education sector has demanded that adequate learning experiences be produced for its students (Akcanca, 2020).

These significant changes take place in everyday life by following the existing flow. Education in Indonesia has a relatively low quality compared to other countries. This indicates that education in Indonesia has a comprehensive scope. Education in Indonesia must be immediately improved to increase the birth of a generation that has excellence in various fields because the fundamentals of education open up opportunities for the Indonesian nation to compete with other nations so that it does not fall further behind due to fast-paced global flows (Jager et al., 2020). Various technological updates have begun to be implemented in education, one of which is to accommodate more efficient learning, such as using technology for distance learning facilities, and so on. In education, technology plays a vital role in 21st-century learning (Syakur, 2020). Technological

progress must be balanced with improving the quality of human resources through educational pathways starting from primary and secondary education to tertiary education, which is the key to keeping up with the development of the Industrial Revolution 4.0. (Lase, 2019)

The success of a country in facing the Industrial Revolution 4.0 cannot be separated from the level of quality of educators, such as teachers who are figures who are in direct contact with cultivating character for the new generation (Murtikusuma et al., 2019). Teachers must have standard expertise and the ability to adapt to new technology and global challenges. In this situation, every educational institution must have an identity that can be a means of adaptation and new literacy in the field of education (Havrilova et al., 2022). Old literacy, which relies on reading, writing, and mathematics, must be integrated with the current context of educational development, starting from preparing new literacy, namely data literacy, technology, and human resources (Yi et al., 2019). Data literacy is the ability to read, analyze, and use information from data in the digital world (Tohara, 2021). Technological literacy is the ability to understand mechanical and technological systems in work. Meanwhile, human resource literacy is the ability to interact well, not be rigid, and have character (Hermann et al., 2019)

Education in the 21st century should refer to the process of activities that can create students who face various problems regarding the environment, the era of globalization, technological improvements, and the impact of scientific technology. In line with the statement above, scientific literacy, mathematics, and reading abilities should be considered (Yuniarti & Radia, 2020). Using interactive media to understand physics concepts is an effort that uses all students' senses (Marcano-Olivier et al., 2020). In this media, students will be free to explore the material provided there. This media uses several unique features of Microsoft PowerPoint, which the researchers then turned into a student learning tool (Nicolaou et al., 2019). When deployed, students will receive a display that integrates audio, video, and image components, forming a system that operates simultaneously (Nadirah et al., 2020).

This media also takes the context of the child's world because it contains visual images that will guide students in applying this media (Purwanto, 2020). This media also uses the CorelDraw 2019 application as the media design application, which is then imported into the Microsoft PowerPoint application. For audio, the author uses Google Assistant Voice as the voice actor. In each figure, with several applications mentioned, researchers look forward to integrating the worlds of technology and education to increase educational modernization.

RESEARCH METHOD

This research uses quantitative research with experimental methods. The population in this study was class VI students as experimental class research and VI B students as control class research, with a sample of class VI C students totaling 30 students for each sample on geographical characteristics and life in the ASEAN region.

Data collection techniques in this research used observation, interviews, and tests. Research instruments include interactive comic validation sheets, learning implementation sheets, and test sheets. Validation of interactive comics was carried out by one lecturer and two social studies subject teachers, which can be seen in Table 1 for validity criteria, three people assessed the practicality of interactive comics as observers and the effectiveness of interactive comics using a test, namely the post-test only control design which consists of 15 questions with details of 10 multiple choice questions and

five description questions to find out the extent of students' conceptual understanding of the teaching material that will be taught.

This research was conducted at Elementary School Dukuh Menanggal 01 Surabaya class IV at the same time as the Internship 3 program, which was implemented for two months from September to November. Data analysis in this study aims to determine the influence of the application of interactive comic media on students' understanding of concepts. This research was analyzed using the t-test statistical formula to prove the hypothesis and assisted with Microsoft Excel software to provide more accurate calculations in data processing. We are usually familiar with inferential statistics. It has elements of normality test and homogeneity test and three elements in it, namely normality test, balance test, and hypothesis test.

Table 1. Validation results evaluation and practicality assessment criteria.

Validity Score	Validity Category
85.01% < x ≤ 100.00%	Very Valid
70.01% < x ≤ 85.00%	Valid
50.01% < x ≤ 70.00%	Invalid
25.00% < x ≤ 50.00%	Very Invalid

RESULTS AND DISCUSSION

Results

The final result of the research is students' understanding of concepts in the material on geographical characteristics and life in the ASEAN region because we all know that social studies material has a broad knowledge structure. Students must memorize the existing concepts individually, so it is necessary. There is an alternative way to get around this, namely by making them understand the concept of the material so that they will quickly develop the material they are studying. This is also based on Bloom's statement, which reveals that conceptual understanding is grasping meanings, such as expressing material presented in a better-understood form, providing interpretations, and applying them. In this research, students' conceptual understanding was measured using research instruments that had been designed with the formulation of indicators of conceptual understanding presented by (Sanjaya, 2019):

1. Define the meaning of certain concepts.
2. Classify certain material concepts.
3. Provide examples and non-examples of a concept
4. Able to apply the relationship between concepts and procedures;
5. Able to develop the concepts that have been learned.
6. Able to apply concepts systematically in problem-solving
7. Select and utilize concepts in certain situations

Table 2 shows the results of the validation scores from 3 validators who have tested interactive media from several aspects that are considered.

Table 2. Validation value results.

Rated Aspect	Validator 1	Validator 2	Validator 3	Average
Content aspect	81.00%	97.00%	99.00%	92.00%
Material aspect	85.00%	97.00%	98.00%	93.00%
Serving aspect	94.00%	95.00%	95.00%	95.00%
Evaluation aspect	89.00%	95.00%	95.00%	93.00%

Rated Aspect	Validator 1	Validator 2	Validator 3	Average
	Average presentation			**93.00%**
	Score criteria			**Very valid**

Based on Table 2, the results from the three validators obtained an average of 93.00%, which is included in the very valid category. This is in line with the opinion of Putri (2021) that a comic is considered valid if the validator's score is between 81.00%-100.00%. At this stage, interactive e-comics are very valid. However, e-comics still receive notes from validators that need to be revised because there are still typing errors. The editorial must be replaced with sentences that are easier to understand (Mayo & Agirre, 2019).

This trial stage aims to measure practicality in learning. The subjects of this development test were 42 students in class VI A and B at ES Labschool Unesa 1. Learning was carried out in two meetings. When learning using interactive e-comics, students show high enthusiasm in applying the media, and the media also provides the freedom to learn what they want. Evaluation sessions measure the breadth of students' understanding to make it more exciting and comprehensive. Interactive comics are also very easily accessible to students. Implementation data was obtained through three observers during teaching and learning activities. The results of the implementation of learning are shown in Table 3.

Table 3. Validation value results.

Meetings	Observer 1	Observer 2	Observer 3	Average
Content aspect	84.00%	97.00%	97.00%	93.00%
Material aspect	85.00%	97.00%	98.00%	93.00%
	Average presentation			**93.00%**
	Score criteria			**Very Practical**

Based on Table 3, the average practicality score from the two observers was 93.00% and fell into the convenient category. The practicality of this interactive e-comic is also in line with the opinion that the practicality of e-comics is a minimum score of 81.00% so that they can be used in learning.

After evaluating conceptual understanding questions presented at the end of the media session, the results were obtained in the control class, which was carried out without using interactive comic media, and the experimental class, which used interactive comic media. There were differences in the students' average scores, which can be seen in Table 4. This research involves data processing stages using statistical methods and inferential statistics. For this experimental research, the conditions need to carry balance tests and t-test prerequisite tests, which contain elements of the normality test and homogeneity test, where the normality test is used to find out whether the sample comes from a population with a normal distribution or not, with the statistical hypothesis used being H0 (The sample comes from a population with a normal distribution) and H1 (The sample does not come from a population with a normal distribution) and all test processes use SPSS. The following prerequisite test stage in this research is the balance test, carried out on both populations, namely the experimental and control class samples that have yet to be treated. This is used to find out whether the initial abilities of the two populations are in balance or not; the hypothesis used is H0 : $\mu 1=\mu 2$ (both samples come from populations that have the same initial abilities) and H1

: μ1≠μ2 (both samples come from populations that have abilities, and this balancing test uses the t-test.

Table 4. Experimental class student learning results in test data.

No.	Pretest	Post-test
1.	17	77
2.	34	89
3.	12	90
4.	12	66
5.	21	93
6.	60	82
7.	29	74
8.	16	62
9.	26	82
10.	10	93
11.	4	89
12.	22	93
13.	58	73
14.	15	64
15.	48	65
16.	11	78
17.	62	77
18.	25	80
19.	9	80
20.	16	90
21.	16	85
Amount	**523**	**1682**
Average	**24.90**	**80.10**

Based on Table 4 on experimental class students' learning outcomes, the results showed that the average post-test score was higher, with an average of 80.10, compared to the average pretest score, with an average of 24.90. Furthermore, test data for control class student learning results are likely in Table 5.

Table 5. Test data for control class student learning results.

No.	Pretest	Post-test
1	33	48
2	38	53
3	14	33
4	55	92
5	4	47
6	60	75
7	50	47
8	55	36
9	6	57
10	62	82
11	17	54
12	45	61
13	25	84
14	9	73
15	65	69

No.	Pretest	Post-test
16	61	63
17	50	63
18	49	73
19	65	84
20	39	93
21	10	73
Amount	**812**	**1360**
Average	**38.67**	**64.76**

Based on Table 5 test data on control class students' learning outcomes, the results showed that the average post-test score was 64.76 compared to the average pretest score with an average of 38.67.

Table 6. Research post-test results values.

No	Class	Average value
1	Experiment	80.00
2	Control	65.00

Meanwhile, based on Table 6, the results of data analysis were carried out to determine how much influence the treatment in the experimental group had, namely using interactive comic media on students' understanding of concepts. The following are the results of calculating increases in student learning outcomes using statistical formulas with the t-test. The average score of the experimental class is 85, and that of the control class is 76. The results also show that the average score of the experimental class is better than that of the control class. The influence of media use is also supported by the results of hypothesis testing, which shows the calculated result = 8.28 and t table = 2.00; if t calculated = 8.28 > t table = 2.00, then H0 is rejected and H1 is accepted while H1 is evidence of the influence of interactive media use on students.

Discussion

This research produces teaching material in the form of interactive comics, which are used to provide students with an understanding of the concepts in geographic characteristics and life in the ASEAN region, considering that the coverage of the material is comprehensive. The use of interactive media to understand the concept of material: In this interactive comic media, students will be free to explore the material provided; this media utilizes several unique features in Microsoft PowerPoint, which researchers then use as a learning tool for students. In its implementation, students will be given a display that integrates audio, video, and visual components, forming a system that runs simultaneously. This media also carries the context of the child's world. This principle was taken because of other research considerations; Herliana and Anugraheni (2020) stated in their research results that implementing methods and media that are contextual to the level of learning development increases the success of achieving learning outcomes. Therefore, in this media, there are visual figures that will guide students in applying this media. This media also uses the Corel Draw 2020 application as a media design application, which is then imported into the Microsoft PowerPoint application, and for audio, it uses Google Assistant. Voice is the voice of each character, and with

several applications that have been mentioned, researchers want integration between the worlds of technology and education to increase education's modernization level.

This research aims to provide understanding to students. Understanding concepts through synchronization of interactive approach methods with technological advances as a form of application of modern learning and always involving technology as a supporting tool will provide an extraordinary learning experience and atmosphere. We know that competition for the quality of education in the current era must be balanced with increasingly high technological advances. This means that the continuity of education is always required to involve technology because of the many conveniences that can be obtained from using technology. This research utilizes technology as a source for creating interactive media. If we look at the research results above, we can see the influence of interactive media on student performance. We understand the concept of the distribution of natural resources in Indonesia. In this research, t-test analysis was used by the rules written in (Jaya & Warti, 2022).

The use of interactive media in this research also follows the principles of media use, namely, interactive comic media is used and directed to make it easier for students to understand the concept of learning material; interactive comic media that teachers will use must be appropriate and directed to achieve learning objectives, comic media is interactive media that used must be following the learning material, interactive comic media must be by interests, needs, and conditions. In the use of interactive media, attention must be paid to effectiveness and efficiency to be right on target (Prehanto et al., 2021). Therefore, this interactive comic media suits the teacher's ability to operate it. This is implemented in the data collection process and compiled in a learning implementation plan. The preparation of learning implementation plans using this media is also always integrated with the 21st-century learning base, which contains the 4Cs (Critical, Creative, Collaborative, and Communicative), which follow the general objectives of the curriculum so that students can construct their thinking and knowledge independently, this can be seen in the Media concept This uses an interactive basis as a learning method so that students can freely find out what they want but remain in the context of the material that must be achieved. The critical role of 21st-century learning as a form of adaptation to modernization of learning should be present in every learning process (Wong & Cheung, 2020).

CONCLUSION

Fundamental Finding: Based on the research results regarding "Development of Interactive Media Digital Comics on Elementary Students' Understanding of Concepts," which was carried out by administering learning outcomes tests, it can be concluded that there is a significant impact from the development of Digital Comic Interactive Media on Elementary School Students' Understanding of Concepts seen from the pretest and post-test results, which show that Ho is rejected and Hα is accepted. By rejecting Ho, it is proven in this research that the conceptual understanding of students who are given action is significantly different. **Implication:** Understanding concepts is essential in learning because it will be related to other models of material development so that students get used to understanding concepts, which will improve the quality of learning. This research shows that interactive comic media is highly effective and efficient and can be a solution for student learning styles that suit the digitalization era. Of course, there is great hope that the creation of this media can significantly improve the quality of education. **Limitation:** There are limitations in this research due to the equal distribution

of school facilities and infrastructure in Indonesia, so not all schools can utilize this application at this time. **Future Research:** Further research is needed to determine the grasping power of subjects in varying educational demographic conditions so that it can be used as material for evaluating media development.

REFERENCES

Akcanca, N. (2020). An alternative teaching tool in science education: Educational comics. *International Online Journal of Education and Teaching (IOJET), 7*(4). 1550-1570.

Havrilova, L., Beskorsa, O., Oriekhova, V., & Khmarna, L. (2022). Transmedia educational project as a method of developing music teacher'transmedia competence. *Music Education Research, 24*(3), 393-404. https://doi.org/10.1080/14613808.2022.2053508

Herliana, S., & Anugraheni, I. (2020). Pengembangan media pembelajaran kereta membaca berbasis kontekstual learning siswa sekolah dasar. *Jurnal Basicedu, 4*(2), 314–326. https://doi.org/10.31004/basicedu.v4i2.346

Hermann, M., Pentek, T., & Otto, B. (2016). Design principles for industrie 4.0 scenarios: A literature review. *2016 49th Hawaii International Conference on System Sciences (HICSS),* 1-9. https://doi.org/10.13140/RG.2.2.29269.22248

Jager, L. De, Rwodzi, C., & Mpofu, N. (2020). The innovative use of social media for teaching English as a second language. *The Journal for Transdisciplinary Research in Southern Africa, 16*(1), 1-23. https://doi.org/10.4102/td.v16i1.702

Jaya, A., & Warti, R. (2022). *Statistik pendidikan: Teori dan aplikasi SPSS*. Penerbit NEM.

Katsaris, I., & Vidakis, N. (2021). Adaptive e-learning systems through learning styles: A review of the literature. *Advances in Mobile Learning Educational Research, 1*(2), 1-20. https://doi.org/10.25082/AMLER.2021.02.007

Kędra, J., & Žakevičiūtė, R. (2019). Visual literacy practices in higher education: What, why and how? *Journal of Visual Literacy, 38*(2), 1–7. https://doi.org/10.1080/1051144X.2019.1580438

Kellner, D., & Share, J. (2019). *The critical media literacy guide: Engaging media and transforming education.* Brill Sense.

Komalasari, K. (2019). Living values based interactive multimedia in civic education learning. *International Journal of Instruction, 12*(1), 113-126. https://doi.org/10.29333/iji.2019.1218a

Lase, D. (2019). Pendidikan di era revolusi industri 4.0. *Jurnal Sundermann, 1,* 28–43. https://doi.org/10.36588/sundermann.v1i1.18

Mamolo, L. (2022). Students' evaluation and learning experience on the utilization of digital interactive math comics (DIMaC) mobile app. *Advances in Mobile Learning Educational Research, 2*, 375–388. https://doi.org/10.25082/AMLER.2022.02.006

Marcano-Olivier, M. I., Horne, P. J., Viktor, S., & Erjavec, M. (2020). Using nudges to promote healthy food choices in the school dining room: A systematic review of previous investigations. *The Journal of school health*, *90*(2), 143–157. https://doi.org/10.1111/josh.12861

Mayo, M. P. G., & Agirre, A. I. (2019). Task modality and pair formation method: Their impact on patterns of interaction and LREs among EFL primary school children. *System, 80,* 1-12. https://doi.org/10.1016/j.system.2018.11.011

Mohd, N. (2020). Transformasi pengajaran dan pembelajaran multimedia dalam pendidikan islam: Satu perbincangan. *Transformation of Multimedia Teaching and Learning in Islamic Education: A Discussion,* 7, 14–26. https://doi.org/10.6084/m9.figshare.12444275.v1

Murtikusuma, R. P., Fatahillah, A., Oktavianingtyas, E., Hussen, S., & Lailiya, N. (2019). The development of interactive mathematics learning media based on schoology and visual basic through industrial revolution 4.0. *IOP Conference Series: Earth and Environmental Science, 243,* 1-6. https://doi.org/10.1088/1755-1315/243/1/012137

Nadirah, N., Asrifan, A., Vargheese, K. J., & Haedar, H. (2020). Interactive multimedia in EFL classroom: a study of teaching reading comprehension at junior high school in Indonesia.

Journal of Advanced English Studies, 3(2), 131-145. http://dx.doi.org/10.47354/jaes.v3i2.92

Nicolaou, C., Matsiola, M., & Kalliris, G. (2019). Technology-enhanced learning and teaching methodologies through audiovisual media. *Education Sciences, 9*(3), 1-7. https://doi.org/10.3390/educsci9030196

Onuora, C., Obasi, N. T., Ezeah, G. H., & ... (2021). Effect of dramatized health messages: Modelling predictors of the impact of COVID-19 YouTube animated cartoons on health behaviour of social media users in Nigeria. *International Sociology, 36*(1), 124-140. https://doi.org/10.1177/0268580920961333

Prehanto, A., Aprily, N. M., Merliana, A., & ... (2021). Interactive-Animative Learning Videos as an Instructional Medium for Social Studies Learning for Elementary School During the COVID 19 Pandemic. *Indonesian Journal of Primary Education, 5*(1), 1-10. https://doi.org/10.17509/ijpe.v5i1.33696

Purwanto, A. (2020). University students online learning system during COVID-19 pandemic: Advantages, constraints and solutions. *SSRN*, *11*(7), 570-576.

Purwitha, D. G. (2020). Model pembelajaran flipped classroom sebagai pembelajaran inovatif abad 21. *Jurnal Pendidikan Dasar, 5*(1), 49–55. https://doi.org/10.25078/aw.v5i1.1307

Puspitasari, Y., & Nurhayati, S. (2019). Pengaruh model pembelajaran discovery learning terhadap hasil belajar siswa. *Jurnal Pendidikan dan Kewirausahaan, 7*(1), 93–108. https://doi.org/10.47668/pkwu.v7i1.20

Putri, P. (2021). Pengembangan media e-comic pada materi gaya dan gerak kelas IV sekolah dasar. *Jurnal Penelitian Pendidikan Guru Sekolah Dasar, 9*(1), 1-12.

Rachmavita, F. P. (2020). Interactive media-based video animation and student learning motivation in mathematics. *Journal of Physics: Conference Series,* 1-8. https://doi.org/10.1088/1742-6596/1663/1/012040

Ru'iya, S., Kistoro, H. C. A., Sutarman, S., & Maulana, L. A (2021). The effort to increase the students' interest in learning during the COVID-19 pandemic through comic media. *Community Empowerment, 6*(6), 1-12. https://doi.org/10.31603/ce.4914

Sanjaya, W. (2019). *Strategi pembelajaran berorientasi standar proses pendidikan*. Kencana.

Setiawan, R., Mardapi, D., Pratama, A., & Ramadan, S. (2019). Efektivitas blended learning dalam inovasi pendidikan era industri 4.0 pada mata kuliah teori tes klasik. *Jurnal Inovasi Teknologi Pendidikan, 6*(2), 148–158. https://doi.org/10.21831/jitp.v6i2.27259

Syakur, A. (2020). The effectiveness of english learning media through google classroom in higher education. *Britain International of Linguistics Arts and Education Science Journal, 2*(1), 218-226. https://doi.org/10.33258/biolae.v2i1.218

Thompson, D. (2019). Teaching students to critically read digital images: a visual literacy approach using the DIG method. *Journal of Visual Literacy, 38*, 1–10. https://doi.org/10.1080/1051144X.2018.1564604

Tohara, A. J. T. (2021). Exploring digital literacy strategies for students with special educational needs in the digital age. *Turkish Journal of Computer and Mathematics Education, 12*(9), 3345–3358. https://doi.org/10.17762/turcomat.v12i9.5741

Vidakis, N., Barianos, A. K., Trampas, A. M., Papadakis, S., Kalogiannakis, M., & Vassilakis, K. (2020). *In-Game Raw data collection and visualization in the context of the "thimeledu" educational game*. Springer International Publishing.

Wong, G. K. W., & Cheung, H. Y. (2020). Exploring children's perceptions of developing twenty-first century skills through computational thinking and programming. *Interactive Learning Environments, 28*(4), 438-450. https://doi.org/10.1080/10494820.2018.1534245

Yi, Y., Shin, D., & Cimasko, T. (2019). Multimodal literacies in teaching and learning English in and outside of school. *The Handbook of TESOL in K-12.* Wiley Library. https://doi.org/10.1002/9781119421702.ch11

Yuniarti, A., & Radia, E. H. (2020). Development of comic mathematics teaching materials on flat-building material to increase reading interest in class IV elementary school students. *Journal of Education Technology*, *4*(4), 415–423. https://doi.org/10.23887/jet.v4i4.30034

***Dhiva Hafiluddin Al Ghifary, S.Pd (Corresponding Author)**
Surabaya State University
Jl. Lidah Wetan, Lidah Wetan, Surabaya, East Java,60213, Indonesia
Email: dhiva.22035@mhs.unesa.ac.id

Prof. Dr. Waspodo Tjipto Subroto, M.Pd.
Surabaya State University
Jl. Lidah Wetan, Lidah Wetan, Surabaya, East Java,60213, Indonesia
Email: waspodosubroto@unesa.ac.id

Prof. Dr. Mustaji, M.Pd
Surabaya State University
Jl. Lidah Wetan, Lidah Wetan, Surabaya, East Java,60213, Indonesia
Email: mustaji@unesa.ac.id