RISSEJ

Research and Innovation in Social Science Education Journal
Vol. 1 No. 1 June 2023 (1-9)
https://ejournal.ump.ac.id/index.php/rissej

ISSN: xxxx-xxxx

Gamification of Wordwall Maze Chase as a STEM-Based Learning Media to Improve Students' Creative Thinking Skills

Khuldiana Azizah Fauziyati[1*]
[1]Elementary School Education, Universitas Muhammadiyah Purwokerto

ARTICLE INFO

Keywords:

Word wall Maze Case;
Creative Thinking Skills;
STEM; Pandemic

ABSTRACT

This study aims to determine the influence of Wordwall Maze Chase gamification as a STEM-based digital learning medium on improving students' creative thinking skills. This research uses a quantitative type of research. The study subjects were grade 5 elementary school students; as many as 31 respondents were selected with purposive sampling techniques. The data collection instrument uses an online questionnaire via a google forms link. The Pearson's correlation test showed that STEM-based Wordwall Maze Chase gamification learning media affected students' creative thinking skills by 0.926, which means it has a perfect correlation. Based on research in the field, using Wordwall Maze Chase gamification media has problems with cellphone performance and student screen resolution; the smaller the screen, the smaller the display of images and writing is also tiny. Learning using STEM-based Wordwall Maze Chase gamification media can be implemented in science, language, social science, and mathematics learning materials.

DOI: 10.30595/rissej.v1i.xx

1. Introduction

The Industrial Revolution 4.0 is characterized by the existence of intelligent robots that have gone through the artificial intelligence (AI) programming process, so consciously, it must be addressed through changes in learning so that students can think globally (Mu'minah, I. H., & Aripin, 2019). It is undeniable that high-tech products control almost all humans as if humans cannot live without technology. This shows that science and technology are developing rapidly, so the impact is inevitable but must be faced wisely. The skills that must be mastered in the 21st century: problem-solving, critical and creative thinking skills, innovation, collaboration, communication, literacy of both information, media, and technology, flexibility in adapting, leader spirit, initiative, productive, accountability, and social interaction to cross-cultural (Archambault et al., 2014).

The world is shocked by one of the problems, namely Covid-19. Covid-19 significantly impacts human survival, one of which is education. Education is forced to adapt quickly to distance learning by implementing various digital features. This change is a new challenge for educators to continue learning even though it is remote but does not reduce learning effectiveness.

Educators, especially in this digital era, must be qualified to utilize online and offline digital facilities as a medium for learning activities. The proliferation of cell phones among students has become a means of transforming material from manual to virtual. The improvement of 21st-century skills in the world of education has been pursued. Education implemented this effort by changing the national curriculum to a 2013 curriculum based on 21st-century learning, which aims to create a global generation. Education is one of the factors that can alter human qualities to survive and compete against all changes. This is a challenge for educators in Indonesia to find solutions to these problems. Therefore, improving the skills of the 21st century is realized with Science, Technology, Engineering, and Mathematics (STEM).

[1] *Corresponding author. Elementary School Education, Universitas Muhammadiyah Purwokerto, Jl. KH. Ahmad Dahlan, Kembaran, Banyumas 53182, Indonesia.
E-mail address: khuldianazizah@gmail.com

Received 5 March 2023; Received in revised form 12 April 2023; Accepted 20 June 2023; Available online 25 June 2023
xxxx-xxxx/

STEM is an acronym for Science, Technology, Engineering, and Math. STEM education is not only a praxis activity in separate fields but also integrates the fields of science, technology, engineering, and mathematics into a learning process that focuses on everyday life in solving problems. STEM integrates the sciences of several subjects to solve complex problems (Capraro & Jones, 2013). So, STEM-based education is alternative learning that aims to grow a 21st-century generation ready for global challenges (Mulyani, 2019). So, from some of these opinions, if you take the common thread, implementing STEM-based learning is considered appropriate to meet the growing skills in the 21st century.

STEM education can shift learning methods from conventional, where students act as passive recipients of information and only rely on one-way knowledge transfers, to student-centered learning methods by involving students to be active and collaborative. Apart from Indonesia, primary and secondary education is only science and mathematics subjects that are part of the conventional curriculum; technology and engineering are not included in the curriculum. Therefore, STEM Education integrates four fields of study: science, technology, engineering, and mathematics (Firman, 2017). Based on previous research, the researcher found that STEM is closely related to technology (Hermansyah, 2020). Technology-assisted Science, Technology, Engineering, and Mathematics (STEM) based learning can grow a capable generation in 21st-century skills (Mu'minah, I. H., & Aripin, 2019).

For example, gamification is the design of games (games) with a non-game context (Robson et al., 2015). Gamification then becomes an alternative learning medium that is appropriate to be applied based on STEM principles. Gamification is the application of video games that aim to be used together with other fields. Since 2011, research discussing gamification has soared significantly, as evidenced by publications in various reputable international journals (Hamari, 2017).

Various applications are developed for gamification, one of which is Wordwall. Wordwall is a digital media or application designed as a learning medium as well as the availability of a variety of game features, namely a total of 18 (eighteen) features for free (Sun'iyah, 2020). One of the features that Wordwall provides is the Maze Chase feature. Maze Chase is a game that runs on a maze to get the correct answer in a box without hitting the enemy. Research suggests that educators can use gamification to create creative thinking skills (Schulz et al., 2015).

Integrating creative thinking skills and STEM-based Wordwall Maze Chase gamification media in learning will be integrated between science and technology learning. The benefits of using a gamification approach to learning are increased student engagement, motivation, and the effectiveness of the learning process (Muna, 2019). Educators can get Wordwall media Maze Chase to feature easily and for free. To start the quiz, the teacher can choose the desired game template. Then write down the questions and determine the various options for the activity. When ready, the teacher can share the link with students. For example, in the maze chase feature, students will play a PacMan-like game where students point the cursor at the correct answer box without hitting the enemy (Khairunisa, 2021).

The problem in the field in early March 2020 was that Corona Virus Disease began to spread in several places in Indonesia. After a long time, the government immediately decided to implement Distance Learning (PJJ) which aims to minimize people's exposure to the virus. PJJ causes a lack of effectiveness in the learning process, resulting in decreased student creativity. Therefore, educators have challenges re-fostering student creativity by utilizing technology-based digital media. However, the reality is that as evidenced in research by (Putria et al., 2020), teachers revealed that in elementary school children during online learning, there are still many obstacles to student attendance in online education does not reach 100%, monitoring of mentoring is limited through Whatsapp groups, and grade 5 teachers find it challenging to teach the material. The teacher must resolve these problems immediately to prevent students from experiencing further difficulties while studying. Teachers must use media that are easy to understand and attract students' attention, one of which is digital-based learning media. Creating digital-based learning media for students will help them stay interested in their learning activities.

Several studies on the digitization of STEM-based learning have been carried out in various countries, especially Indonesia. First, (Anita et al., 2021) the focus of their research is to develop a digital pocketbook based on science, technology, engineering, and mathematics (STEM). (Dewi et al., 2021) The development of Digital Teaching Materials (BAD) using STEM approaches and eco-spatial behavior on Population material with product development trials carried out in class XII IIS MA AlIttihad Poncokusumo with results very suitable for use in Geography learning. (Suryani et al., 2020) in their research on STEM-based learning digital modules in operating system courses with the results obtained that stem-based Operating System digital modules are very valid and practical so that they can be used in the learning process. (Handayani, 2021) regarding the development of STEM-based digital comic media to improve students' science literacy skills, especially process, content, and context dimensions. Based on the test, it is stated that STEM-based digital comic media is categorized as very practical and worthy of use for learning.

Finally, (Pixyoriza et al., 2022) about STEM-based digital modules to develop problem-solving capabilities with valid, practical, and effective results.

Based on the explanations from some of these studies, if the common thread is taken, the digitization of STEM-based learning has been widely carried out in various countries, especially in Indonesia. However, little research discusses gamification as a form of digitizing education in general, aiming to improve students' creative thinking skills. So, based on this background, this study aims to test the influence of Wordwall Maze Chase gamification as a STEM-based digital learning media on improving students' creative thinking skills. STEM-based Wordwall Maze Chase gamification learning media can be utilized wherever students are by involving them. Students will be actively engaged and think creatively, starting from working on works and playing exciting and challenging games. This research will be beneficial to advancing the quality of education, including creating exciting and innovative learning and having an excellent opportunity to cultivate students' creative thinking skills in the 21st century.

2. Method

This research uses quantitative research methods. The study subjects were grade 5 students of SD Negeri 2 Pekaja for the 2020/2021 School Year, totaling 31 students selected by purposive sampling. In this study, the instrument used was a questionnaire distributed through google forms, then given in the form of links to students. The questionnaires were distributed to determine students' responses to the influence of STEM-based Wordwall Maze Chase gamification learning media to improve students' creative thinking skills. The researcher chose Wordwall Maze Chase in this study because of its popularity as an easy and open educational platform for all levels of education, including primary schools. What's more, Wordwall Maze Chase has many free game features for users that teachers can use freely to teach. Teachers or students can find the Wordwall Maze Chase collection used in this study at this link: https://wordwall.net/. The procedure in this study can be shown in Figure 1.

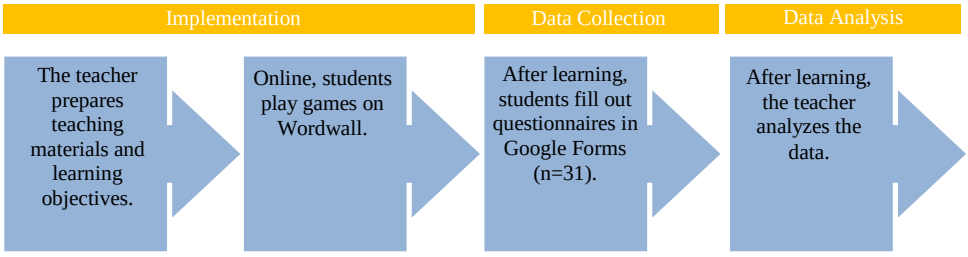

Figure 1. Research Procedure

The teacher collected the research data with feedback through asynchronous. The Google Forms application facilitates the immediate responses received during learning. First, as shown in Figure 1, the teacher prepares learning tools such as teaching materials and objectives to deliver the learning material. Second, students play games on Wordwall Maze Chase that have been shared online through links. Then, they fill out a questionnaire. Finally, the teacher analyzes the data obtained. They judged their views on the Likert scale on a four-point span, one to strongly disagree and four to strongly agree. Data collection through filling out an online questionnaire containing closed-ended questions. Closed-ended questions are students' preference for interpreting experiences during learning using STEM-based Wordwall Maze Chase gamification learning media.

Stem-based Wordwall Maze Chase learning media contains science material on theme 6 Energy and Its Displacement. Wordwall gamification is accessible to anyone, both teachers and students. Wordwall Maze Chase is a digital learning medium in the form of a website-based application that contains quizzes, matchmaking partners, anagrams, random words, word searches, grouping, etc. This product is used for practice questions that students can use to train and hone their skills. The material developed in this gamification is based on teacher books and books for grade 5 students of SD /MI, as well as The Minister of Education and Culture Regulation Number 22 of 2016 concerning Primary and Secondary Education Standards to remain by student needs.

Here are the stages of making Wordwall Maze Chase gamification. First, open a search engine such as google chrome or Mozilla Firefox, then type https://wordwall.net/ searched, then sign up at the top right corner using a google account if you have never registered or log in immediately if you have registered. Follow the registration steps and check “I accept the terms of use privacy policy”, then click “sign up”.
Second, “Create Creativity” on the top right, which is blue. After clicking create activity, various template options will appear after clicking make activity, both in the free and paid versions. Then choose the Maze Chase template.

Third, enter the content to be presented, such as keywords, game titles, descriptions, questions, and answers.

Fourth, Share. After finishing creating the content, click done and automatically save the activity. The next step is to set the theme and options such as timer, lives, difficulty, random, and end of the game. The timer helps set the length of time the fun lasts, and there is a choice of forwarding count or countdown. Lives are the life controls that players have during the game. The difficulty is the organizer of the number of enemies that attack players. Random is the choice of whether the questions that arise will be random or in order. End of game is an option at the end of which the answer is displayed whether it is correct or not. At the bottom, there is a leaderboard, which is a ranking based on the most and fastest correct answers. When finished, click share, which will be addressed to students as a link. If you want to give it to students, click set assignment on the box on the right. After that, there are settings again. If it is finished, then click start. Next, a link will appear to be shared with students to work on, done.

Below is an example of using gamification with Wordwall Maze Chase. Before learning, the teacher has prepared teaching materials first, then conveys the learning objectives to be carried out. When finished, the teacher asks students to open the link that has been shared through the WhatsApp group. Before starting the quiz, students are given instructions for the work and the conditions that need to be prepared.

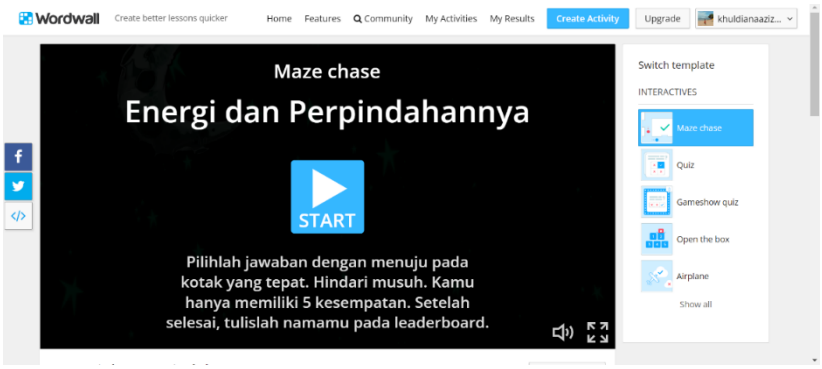

Figure 2. Wordwall Maze Chase initial view

Students do quizzes as directed by the teacher, such as playing games with the click of start.

Figure 3. Wordwall Maze Chase game view

Students take the game quiz by entering the correct answer box through a maze-shaped road and avoiding enemies chasing them. Lives will be reduced by one if the student is hit by an enemy or chooses an answer. The time given is for 7 minutes with five lives.

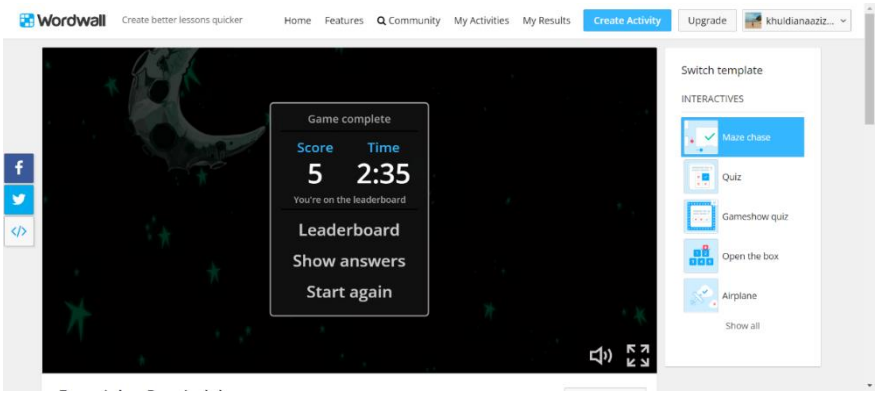

Figure 4. Wordwall Maze Chase final view

After the student has done the game quiz, then the student must write his name on the leaderboard or show answers to see the correct answer and start again to restart the game.

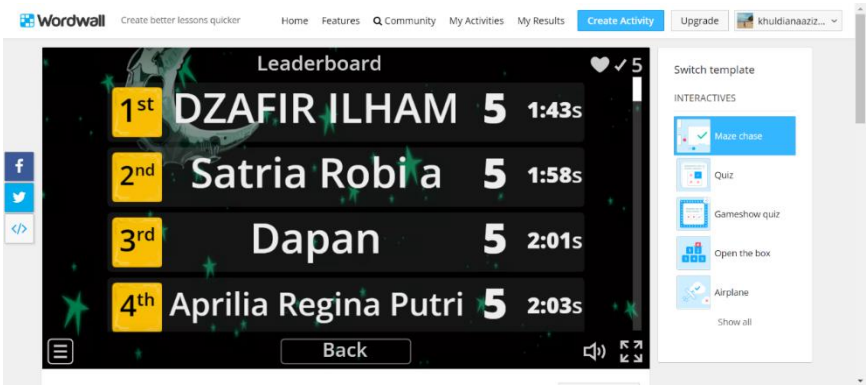

Figure 5. Learderboard menu

It is found in my result if you want to see the results of the student's score recap or score and the timer as a whole.

After applying Wordwall Maze Chase to students, then students were given questions in the form of a questionnaire 23 through google forms. The questionnaire is in the form of student responses after using Wordwall Maze Chase on learning.

The data collection technique in this study was to use the questionnaire method. The tool used in data collection is to use a questionnaire that is distributed online as a link through a Whatsapp group. The use of questionnaires in this study determined the influence of Wordwall Maze Chase learning media on improving students' creative thinking skills based on student objectivity. Operationalization of STEM-based Wordwall Maze Chase gamification learning media variables as independent variables to determine the implementation of learning digitization developed into four sub-variables: ease of access, new learning, implementation in other learning, and suitability of the 2013 and 21st-century curricula. Meanwhile, the operationalization of the variables of creative thinking skills as dependent variables to determine the increase influenced by independent variables developed into four sub-variables: flexibility, originality, elaboration, and fluency. According to (Tsaniyah, A. B., & Poedjiastoeti, 2017), indicators of creativity are fluency, flexibility, originality, and elaboration. Variable measurements of STEM-based Wordwall Maze Chase learning media and students' creative thinking skills used the Likert scale with a score range of 1-4.

The survey data was processed and analyzed using IBM SPSS Statistics 25.0 software to find the validity of the data. The instruments in this study have passed the validity and reliability test. The validity test is used to find out whether a question or statement in a research instrument is valid or not. The validity test used is Pearson product-moment (Hidayat, 2015).

The basis for taking the Pearson product-moment validity test:

Compare the r_{count} value with the rtable.

Table 1. Product Moment "r" Correlation Index Criteria

r_{count} Value	Criteria
$r_{count} > r_{table}$	Valid
$r_{count} > r_{table}$	Invalid

Reliability is measured using the alpha coefficient through the use of SPSS software with an item validity program. Reliability is used to see how far the results of a measurement can be trusted. According to (Sujarweni, 2014), the questionnaire is reliable if the alpha Cronbach value > 0.6. Based on the results of instrument trials conducted in two schools with the number of respondents, each school of 30 students and 31 students, it produced valid questionnaire data, namely with a significance value of < 0.05 or $r_{count} > r_{table}$ and reliably with a Cronbach alpha > value of 0.6.

In this study, data analysis techniques were carried out quantitatively with correlation tests. The data was processed based on the results of filling out questionnaires by students regarding STEM-based Wordwall Maze Case learning media to improve students' creative thinking skills. Data were analyzed using Pearson Product Moment Correlation. Pearson correlation is a simple correlation test that involves only one dependent variable and one independent variable (Safitri, 2016). Pearson Product Moment correlation signifies the strength of a linear relationship between two variables. If the relationship between two variables is not linear, then the Pearson Product Moment correlation coefficient does not indicate the strength of the relationship between the two variables (Firdaus, 2009). In this case, the dependent variable is stem-based Wordwall Maze Chase learning media, and the independent variable is creative thinking skills. The basis for making the Pearson correlation test decision is if the significance value < 0.05, it has a relationship (correlation). On the contrary, if the signification value > 0.05, it has no relationship (correlation).

3. Results and Discussion

The instruments tested for validity and reliability were distributed to 31 respondents, grade 5 students of SD Negeri 2 Pekaja, for the 2020/2021 School Year. The questionnaire is distributed through a personally administered questionnaire. This technique is used so students can return the distributed questionnaire 100% because the respondent fills in directly and returns. After the entire questionnaire has been collected, the next step is to process the data using the help of Pearson's correlation test SPSS software.

The basis for the Pearson correlation test decision-making is if the significance value < 0.05, then correlated. On the contrary, if the signification value > 0.05, it is not correlated.

Table 2. Relationship Degree Guidelines

Pearson Correlation Value	Criteria
0,00 – 0,20	No correlation
0,21 – 0,40	Weak correlation
0,41 – 0,60	Moderate correlation
0,61 – 0,80	Strong correlation
0,81 – 1,00	Perfect correlation

Table 3. Pearson Correlation Test Results

		WORDWALL MAZE CHASE MEDIA	CREATIVE THINKING SKILLS
WORDWALL MAZE CHASE MEDIA	Pearson Correlation	1	.926**
	Sig. (2-tailed)		.000
	N	31	31
CREATIVE THINKING SKILLS	Pearson Correlation	.926**	1
	Sig. (2-tailed)	.000	
	N	31	31

Based on the calculation results using the Pearson correlation test, it can be seen that the Pearson Correlation value of STEM-based Wordwall Maze Chase learning media and creative thinking skills is 0.926, which means that according to Table 3, has a perfect correlation. The results of the correlation test between STEM-based Wordwall Maze Chase learning media and creative thinking skills can be seen that the probability of 0.000 < 0.50 (significant level of 5%) then Ho was rejected so that it can be concluded that there is a relationship (correlation) between STEM-based Wordwall Maze Chase learning media and creative thinking skills.

Teaching and learning activities in the world of education are certainly not far from a problem, especially during the pandemic, which began to emerge new issues. However, please note that every situation must have a solution. Therefore, competent and initiative teachers must develop their skills to solve problems. In the 21st-century today, the development of technology has penetrated the world of education. One of the applications of skills that teachers must possess by the current 21st century is to apply various methods and learning media using digital technology by utilizing Wordwall Maze Chase gamification.

Game-based digital technology using the Wordwall Maze Chase website application is one alternative learning media used during the pandemic to improve students' creative thinking skills. Furthermore, a survey was carried out by distributing questionnaires to analyze the improvement of students' creative thinking skills through STEM-based Wordwall Maze Chase gamification learning media. The statistical test results stated that the Wordwall Maze Chase learning media hypothesis based on STEM (Science, Technology, Engineering, and Math) improved creative thinking skills.

Their research revealed the use of Wordwall learning media to increase students' interest and motivation in thematic learning in elementary schools. The results showed that there was a change in attitude after learning using Wordwall media. These changes can be seen from the aspects of student activity and observation assessment criteria measured through several indicators, (Faizatun et al., 2021), including:

a. Student activity online is evidenced by attendance.
b. Student activity when collecting assignments.
c. Dare to ask questions.

This study concludes that using Wordwall media in class II thematic learning can increase students' interest and motivation in education.

In line with the research by (Gandasari, P., & Pramudiani, 2021) with a sample of 54 students, analyzed using a normality test with the Liliefors test, a homogeneity test using the Fisher test, and a hypothesis test using a t-test. The results of the t-test analysis for both classes obtained a calculated value>t_{tabel} = 7.79 > 2.0084. It can conclude that H0 was rejected, which means that the Wordwall application influences the learning motivation of class V students at SDN Bojong Rawalumbu VI.

Gamification works by integrating more exciting technologies. The success of the gamification system comes from the players. Therefore, gamification involves the player manipulating the player's emotions. Research suggests that gamification is one way to foster creativity in learning (Schulz et al., 2015).

Such as research by (Purwanti, R., & Habibi, 2022), regarding the development of game-based learning modules to improve critical thinking and creative thinking skills in science maples for students with disabilities in class XII SMA LB Negeri Jambi city using the type of R&D research through the ADDIE (Analysis-Design-Development-Implementation-Evaluation) model with results that are developed both, interesting, meet feasible criteria, and can be suggested to be used in classroom learning face-to-face and face-to-face used independently by educators and students of class XII Tunadaksa to improve critical and creative thinking skills for students.

As stated above, learning using Wordwall Maze Chase media can stimulate ideas/ideas initially and differently from before, making it easier to understand and remember material by integrating education and games. In the end, students' creative thinking skills will improve.

4. Conclusion

The influence of STEM-based Wordwall Maze Chase gamification learning media on students' creative thinking skills has a Pearson correlation result of 0.926, which means it has a perfect correlation. Using STEM-based Wordwall Maze Chase learning media can make it easier for students to improve and understand science material on theme 6, Energy and Its Displacement. This media is a means for teachers to carry out online learning by utilizing gamification to improve the creative thinking skills of grade 5 elementary school students. The Wordwall application has various advantages, such as being easily accessible without downloading, free, and having multiple features. With gamification, the teaching and learning process becomes more fun and exciting. More than that, playing games requires concentration so that students' attention is focused on the material presented. Teachers can analyze student needs before students apply this gamification method to get more effective results.

Acknowledgment

Praise my gratitude to the presence of Allah SWT who has provided convenience. I am especially grateful for Dr. Sriyanto, M.Pd. for advice in this jurnal. Special thanks to Ida Astuti, M.Pd. as head of SDN 2 Pekaja. Last but not least thanks to my parent for the support.

References

Anita, Y., Thahir, A., Komarudin, K., Suherman, S., & Rahmawati, N. D. (2021). Buku Saku Digital Berbasis STEM: Pengembangan Media Pembelajaran terhadap Kemampuan Pemecahan Masalah. *Mosharafa: Jurnal Pendidikan Matematika*, *10*(3), 401–412. https://doi.org/10.31980/mosharafa.v10i3.1004

Archambault, L., Wetzel, K., Foulger, T. S., & Kim Williams, M. (2014). Professional Development 2.0. *Http://Dx.Doi.Org/10.1080/21532974.2010.10784651*, *27*(1), 4–11. https://doi.org/10.1080/21532974.2010.10784651

Capraro, M. M., & Jones, M. (2013). Interdisciplinary STEM project-based learning. *STEM Project-Based Learning an Integrated Science, Technology, Engineering, and Mathematics (STEM) Approach*, 51–58. https://doi.org/10.1007/978-94-6209-143-6_6

Dewi, K., Sumarmi, & Putra, A. K. (2021). Pengembangan Bahan Ajar Digital Berbasis STEM dengan Pendekatan Eco-Spatial Behavior Materi Kependudukan Development of STEM-Based Digital Teaching Materials with an Eco- Spatial Behavior Approach for Population Materials. *JPIPS : Jurnal Pendidikan Ilmu Pengetahuan Sosial*, *7*(2), 92–102. https://doi.org/10.15548/jpips.v7i2.11960

Faizatun, S., 1□, N., & Renoningtyas, N. (2021). Penggunaan Media Pembelajaran Wordwall untuk Meningkatkan Minat dan Motivasi Belajar Siswa pada Pembelajaran Tematik di Sekolah Dasar. *EDUKATIF : JURNAL ILMU PENDIDIKAN*, *3*(5), 2854–2860. https://doi.org/10.31004/EDUKATIF.V3I5.880

Firdaus, Z. (2009). Korelasi antara Pelatihan Teknis Perpajakan, Pengalaman dan Motivasi Pemeriksa Pajak dengan Kinerja Pemeriksa Pajak pada Kantor Pelayanan Pajak di Jakarta Barat. *Fakultas Ekonomi Dan Ilmu Sosial Universitas Islam Negeri Syarif Hidayatullah Jakarta*.

Firman, H. (2017). *PENDIDIKAN STEM: APA, MENGAPA, DAN BAGAIMANA?*

Gandasari, P., & Pramudiani, P. (2021). Pengaruh Aplikasi Wordwall terhadap Motivasi Belajar IPA Siswa di Sekolah Dasar. *Edukatif: Jurnal Ilmu Pendidikan*, *3*, 6. https://www.edukatif.org/index.php/edukatif/article/view/1079/pdf

Hamari, J. (2017). Do badges increase user activity? A field experiment on the effects of gamification. *Computers in Human Behavior*, *71*, 469–478. https://doi.org/10.1016/J.CHB.2015.03.036

Handayani, T. (2021). Pengembangan Media Komik Digital Berbasis STEM untuk Meningkatkan Literasi Sains Siswa Sekolah Dasar. *Jurnal Didaktika Pendidikan Dasar*, *5*(3), 737–756. https://doi.org/10.26811/didaktika.v5i3.343

Hermansyah. (2020). Pembelajaran Ipa Berbasis Stem Berbantuan Ict Dalam. *Jurnal Ilmiah Profesi Pendidikan*, *5*, 129–132.

Hidayat, A. A. (2015). Metode Penelitian Kesehatan Paradigma Kuantitatif. In *Health Book Publishing*. https://books.google.co.id/books?hl=id&lr=&id=voATEAAAQBAJ&oi=fnd&pg=PA26&dq=Hidayat,+A.+A.+(2015).+Metode+Penelitian+Paradigma+Kuantitatif.+Surabaya:+Health+Book+Publishing.&ots=s9V_SvYsP3&sig=ViJsnCXs-VkV4Sv2zKdOUSMtrbI&redir_esc=y#v=onepage&q&f=false

Khairunisa, Y. (2021). Pemanfaatan Fitur Gamifikasi Daring Maze Chase–Wordwall Sebagai Media Pembelajaran Digital Mata Kuliah Statistika Dan Probabilitas. *Mediasi*, *2*(1), 41–47. https://doi.org/10.46961/mediasi.v2i1.254

Mu'minah, I. H., & Aripin, I. (2019). *IMPLEMENTASI STEM DALAM PEMBELAJARAN ABAD 21 | Prosiding Seminar Nasional Pendidikan*. *1*, 1495–1503. https://prosiding.unma.ac.id/index.php/semnasfkip/article/view/219

Mulyani, T. (2019). Pendekatan Pembelajaran STEM untuk menghadapi Revolusi Industri 4.0. *Seminar Nasional Pascasarjana 2019*, *7*(1), 455.

Muna, N. (2019). *GAMIFIKASI DAN BLEISURE SEBAGAI STRATEGI MANAJEMEN SUMBER DAYA MANUSIA UNTUK MENINGKATKAN KECERDASAN KREATIF - Unissula Repository*. http://repository.unissula.ac.id/15361/

Pixyoriza, P., Nurhanurawati, N., & Rosidin, U. (2022). Development of Digital Modules Based on STEM to Develop Problem Solving Ability. *Edumatica : Jurnal Pendidikan Matematika*, *12*(01), 76–87. https://doi.org/10.22437/EDUMATICA.V12I01.17541

Purwanti, R., & Habibi, A. (2022). *Pengembangan Modul Game Based Learning untuk meningkatkan Kemampuan*

Berfikir Kritis dan Kreatif Mapel IPA bagi Peserta Didik Tunadaksa Kelas XII SMA LB Negeri Kota Jambi - Repository Unja. https://repository.unja.ac.id/36417/

Putria, H., Maula, L. H., & Uswatun, D. A. (2020). Analisis Proses Pembelajaran dalam Jaringan (DARING) Masa Pandemi Covid- 19 Pada Guru Sekolah Dasar. *Jurnal Basicedu*, *4*(4), 861–870. https://doi.org/10.31004/BASICEDU.V4I4.460

Robson, K., Plangger, K., Kietzmann, J. H., McCarthy, I., & Pitt, L. (2015). Is it all a game? Understanding the principles of gamification. *Business Horizons*, *58*(4), 411–420. https://doi.org/10.1016/J.BUSHOR.2015.03.006

Safitri, W. R. (2016). Analisa korelasi pearson dalam menentukan hubungan antara kejadian demam berdarah dengue dengan kepadatan penduduk di kota Surabaya pada tahun 2021-2014. *Jurnal Kesehatan Masyarakat*, *16*, 21–29. https://journal.stikespemkabjombang.ac.id/index.php/jikep/article/view/23

Schulz, K. P., Geithner, S., Woelfel, C., & Krzywinski, J. (2015). Toolkit-Based Modelling and Serious Play as Means to Foster Creativity in Innovation Processes. *Creativity and Innovation Management*, *24*(2), 323–340. https://doi.org/10.1111/CAIM.12113

Sujarweni, V. W. (2014). *Penelitian: Lengkap, Praktis, dan Mudah Dipahami*. Pustaka Baru Press.

Sun'iyah, S. L. (2020). Media Pembelajaran Daring Berorientasi Evaluasi Pembelajaran Pada Mata Pelajaran Pai Di Tingkat Pendidikan Dasar. *Jurnal Studi Keagamaan, Pendidikan Dan Humaniora*, *7*(1), 1–18. https://doi.org/https://doi.org/10.52166/dar%20el-ilmi.v7i1.2024

Suryani, K., Utami, I. S., Khairudin, K., Ariska, A., & Rahmadani, A. F. (2020). Pengembangan Modul Digital berbasis STEM menggunakan Aplikasi 3D FlipBook pada Mata Kuliah Sistem Operasi. *Mimbar Ilmu*, *25*(3), 358–367. https://doi.org/10.23887/MI.V25I3.28702

Tsaniyah, A. B., & Poedjiastoeti, S. (2017). oge Learning Model To Improve Creative Thinking Skills. *International Journal of Education and Research*, *5*(1), 165–172.