



Wordwall-Based Educational Games to Stimulate Symbolic Thinking Abilities Child

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Abstrak

Kemampuan kognitif berpikir simbolik ini sangat penting bagi perkembangan anak, namun masih banyak guru yang kurang memberikan stimulasi pada kemampuan kognitif berpikir simbolik kepada anak usia dini. Tujuan penelitian ini yaitu untuk mengembangkan media Game Edukatif Berbasis Wordwall serta menguji kelayakannya sebagai media pembelajaran untuk menstimulasi kemampuan berpikir simbolik anak. Penelitian ini menggunakan metode Research and Development (R&D) dengan model pengembangan dari Borg and Gall. Subjek penelitian yaitu ahli media pembelajaran dan ahli materi pembelajaran serta guru TK. Subjek uji coba yaitu uji coba terdiri dari 9 anak. Metode yang digunakan untuk mengumpulkan data yaitu angket dan observasi. Instrumen yang digunakan dalam mengumpulkan data yaitu lembar kuesioner dan lembar observasi. Teknik yang digunakan untuk menganalisis data yaitu analisis deskriptif kualitatif dan kuantitatif. Hasil penelitian yaitu hasil penilaian dari ahli media, ahli materi, dan penilaian guru memperoleh tingkat kevalidan dengan kategori sangat layak. Hasil observasi anak juga menunjukkan bahwa media permainan edukatif berbasis wordwall ini efektif untuk menstimulasi perkembangan kognitif bagi anak usia 5-6 tahun. Disimpulkan bahwa media Game Edukatif Berbasis Wordwall dapat menstimulasi kemampuan berpikir simbolik anak. Implikasi penelitian yaitu memberikan kontribusi bagi bidang pendidikan anak usia dini, khususnya dalam mengembangkan metode pembelajaran yang inovatif dan efektif untuk menstimulasi kemampuan berpikir simbolik.

Kata Kunci: Game Edukasi, Wordwall, Kemampuan Berpikir, Anak

Abstract

The cognitive ability to think symbolically is essential for children's development. However, many teachers still need to provide more stimulation to young children's cognitive ability to think symbolically. This research aims to develop Wordwall-based educational game media and test its suitability as a learning medium to stimulate children's symbolic thinking abilities. This research uses the Research and Development (R&D) method with the development model from Borg and Gall. The research subjects were learning media experts, learning material experts, and kindergarten teachers. The test subjects, namely the trial, consisted of 9 children. The methods used to collect data are questionnaires and observations. The instruments used to collect data were questionnaire sheets and observation sheets. The techniques used to analyze data are qualitative and quantitative descriptive analysis. The research results, namely the results of assessments from media experts, material experts, and teacher assessments, obtained a level of validity in the very appropriate category. The results of child observations also show that this word wall-based educational game media effectively stimulates cognitive development for children aged 5-6 years. It was concluded that Wordwall-based educational game media can boost children's symbolic thinking abilities. The implications of the research are to contribute to the field of early childhood education, especially in developing innovative and effective learning methods to stimulate symbolic thinking abilities.

Keywords: Educational Games, Wordwall, Thinking Skills, Children

1. INTRODUCTION

Early childhood education is a coaching effort aimed at children from birth to six years of age, and it is carried out by providing stimulation (Amelia & Aisyah, 2021; Anhusadar & Islamiyah, 2021). Early childhood education aims to help physical and spiritual

History:

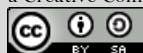
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growth and development so that children are ready to enter further education. Apart from that, children's education services aim to develop children's potential to become human beings who believe and are devoted to God Almighty, healthy, knowledgeable, capable, critical, creative, innovative, independent, self-confident, as well as democratic and responsible citizens (Azmita & Mahyuddin, 2021; Hasbi, 2017; Husain & Kaharu, 2021). One of the levels of mental development achieved by children aged 5-6 years is symbolic thinking. Symbolic thinking includes recognising, talking about, and using the concepts of numbers and letters to draw various objects and imagine them (Siahaan et al., 2023; Zahwa et al., 2018). Children aged 5-6 years have a more advanced development of symbolic thinking and can use symbols in everyday thinking. Children must learn number and letter symbols to count and read.

Children aged 5-6 can count several objects gradually and say numbers correctly when recognizing number symbols (Furima et al., 2023; Rekysika & Haryanto, 2019; Wahyuni, 2022). Introducing letter symbols aims to support children's ability to read. Reading in early childhood is related to letters and their sounds (Furima et al., 2023; Winarti & Suryana, 2020). However, recognizing pictures of letters and their sounds is one of the stages that children can read (Azis, 2019; Sopiah, 2021). Children can develop symbolic thinking when drawing houses, people, cars, clouds, or other objects that do not exist. Children who play with dirt to make food or imagine themselves as other people or animals by drawing, writing, singing, or talking can display objects that do not exist and stimulate symbolic thinking abilities in young children.

However, the current problem is that many teachers still need help developing symbolic thinking skills in children. Other research findings also confirm that less innovative learning activities can affect children's development (Susilawati & Satriawan, 2018; Swari & Ambarawa, 2022). Other research also reveals that children's symbolic thinking abilities could be higher due to a lack of learning activities that can stimulate children's symbolic thinking abilities (Awan, 2020; Zahwa et al., 2018). The observations at Kemala Bhayangkari Kindergarten 26, Bengkulu City, showed that several children experienced obstacles in developing their cognitive abilities to think symbolically. In this case, the child struggles to understand and use symbols to represent objects, ideas or concepts. For example, some children have difficulty connecting numbers with the quantities they represent or interpreting pictures as symbols of actual objects. These limitations impact children's development, including their ability to read, write and solve mathematical problems. The results of interviews with teachers also show a need for more learning media to stimulate children's symbolic thinking abilities.

Based on these problems, the solution is to develop innovative learning media that can stimulate symbolic thinking abilities in children. One learning media that can be used is digital game-based technology media. The phenomenon of digital games, better known as games, has proliferated in the last two decades (Humaida & Suyadi, 2021; Putri et al., 2020). Digital games are digital devices that allow users to have fun with rules that have been designed and can be used as learning media for educational functions (Crisdiana, 2021; Ghani et al., 2022; Humaida & Suyadi, 2021). Games have various benefits, including helping to stimulate students' active participation in the learning process and increasing students' understanding and retention of knowledge. Educational games are fun and can be an innovative learning approach (Del Moral Pérez et al., 2018; Kavak, 2022; Wardani et al., 2017). One of the digital game media that can be used is Wordwall. Wordwall is a computerized network gamification application that provides various games and tests teachers can use to deliver material assessments. The educational game Wordwall is an exciting web application (Hidayaty et al., 2022; Nisa & Susanto, 2022). This app is intended to be a fun learning resource, media tool, and assessment tool for students. This application

contains images, audio, animation and interactive games that can attract students' attention, and students can play these games at home via their laptop or cellphone (Anindyajati & Choiri, 2017; Nisa & Susanto, 2022). This game allows students to compete so that students are more motivated to learn.

Previous research findings confirm that digital media can increase enthusiasm for learning in students so that it has an impact on student learning outcomes (Astutik et al., 2021; Megantari et al., 2021; Pinatih et al., 2021). Other research also reveals that educational games can improve the learning atmosphere to be more enjoyable (Anggraeni et al., 2023; Rahayu et al., 2019). Other research findings also reveal that using Wordwall can increase student motivation and learning outcomes (Agusti & Aslam, 2022; Nurdin et al., 2023). However, there has yet to be a study regarding developing word wall-based educational games to stimulate children's symbolic thinking abilities. Based on this, this research aims to develop a word wall-based educational game to stimulate children's symbolic thinking abilities. It is hoped that children can use the word wall-based educational game developed to play while learning anywhere.

2. METHOD

This type of research is development research. This research method is used to produce specific products and test their effectiveness (Sugiono, 2015). Research and Development (R&D) is a research approach that produces innovations for new and existing products to make them more attractive and valuable. This research uses Borg and Gall development procedures, which include potential problems, data collection, product design, design validation, design revision, product trials, product revisions, usage trials, product revisions and mass production. At the potential problem stage, it assesses the possibility of research and current environmental problems. This stage aims to gather information about the requirements necessary for the planning and product development stages and provide guidelines for advanced design. The data collection stage is an essential step in product planning and development. This is done to collect data about the needs of research institutions and problems in the field before deciding which product to develop.

The product design stage is the execution stage of the concept map created at the data collection point. The design validation stage is an activity process to assess whether the product design is feasible. Product validation is done to determine the assessment and validation from media validators. Design revision stage After the design of this word wall-based educational game has been validated by media experts and material experts in learning activities to improve children's cognitive aspects, researchers carry out revisions to the product design that the directions given by these experts have made. Product trial stage Product trials are carried out to determine the effectiveness of the product that has been developed. This trial was carried out on a small, limited group. The product revision stage is necessary when the media has shortcomings and weaknesses.

This research was carried out at Kemala Bhayangkari 26 Kindergarten, Bengkulu City. The research subjects were learning media experts, learning material experts, and kindergarten teachers. The test subjects, namely the trial, consisted of 9 children from group B1 at Kindergarten Kemala Bhayangkari 26, Bengkulu City. The methods used to collect data are questionnaires and observations. Using a checklist format, the questionnaire was used to measure the relationship of indicators to the content and appearance of word wall-based educational games to stimulate children's cognitive development. The questionnaire method is also used to collect data regarding media development through assessments given by experts and students. In observation, the researcher is involved with the daily activities of the person being observed or used as a research data source. In this case, the researcher used

the Participant Observation data collection technique (participant observation). The instruments used to collect data were questionnaire sheets and observation sheets. The instrument grid is presented in Table 1.

Table 1. Research Instrument Grid

No	Instrument	Keterangan	Indikator
1	Learning Media Expert	Physical aspect	The attractiveness of the wordwall game
		In terms of utilization	The wordwall game is easy to use for children aged 5-6 years
		Illustrative aspect	Clarity of the letters and numbers used/clarity of the games presented
		Color wise	The colors used are appropriate and attract children's attention
2	Learning Media Expert	Design aspect	Games are made according to the child's age
		Contents of the material	Wordwall-based educational games according to the child's level of cognitive development achievement
		Suitability	The wordwall-based educational game model is in accordance with the characteristics of group B children
		Writing format	The appearance of the wordwall-based educational game is attractive.

The technique used to analyze data is qualitative and quantitative descriptive analysis. Qualitative descriptive analysis is used to manage data in the form of input provided by experts regarding wordwall-based educational games. Quantitative descriptive analysis is used to manage data in the form of scores given by experts regarding wordwall-based educational games. Quantitative analysis is used to test the effectiveness of wordwall-based educational games to stimulate children's symbolic thinking abilities.

3. RESULTS AND DISCUSSION

Results

Using the Borg and Gall development model, this research aims to use a word wall-based educational game to stimulate children's symbolic thinking abilities. The research results are presented as follows. First, potential and problems. The observations show that word wall-based educational games have never been used as learning media in Kemala Bhayangkara 26 Kindergarten, Bengkulu City. Based on the potential and problems identified, researchers intend to develop word wall-based educational games as learning media that can stimulate cognitive development for children aged 5-6 years in kindergarten. Most teachers' efforts when stimulating cognitive development in learning are still not exciting and only use classical methods; this is shown by children only doing activities such as writing, colouring, counting and drawing, and the media used is also not varied, such as pictures, books, magazines, books. Without other media, stories and blocks can increase children's interest and curiosity in learning. With this word wall-based educational game media, it can stimulate the cognitive development of children aged 5-6 years.

Second, data collection. At this stage, data is collected through analysis of relevant research studies. Conduct direct observations and literature studies to obtain theories regarding educational game media as a learning medium that stimulates children's cognitive

development. Observations were carried out at Kemala Bhayangkara 26 Kindergarten, Bengkulu City, and the results showed that the existing learning media still needed to be more diverse. The learning media used is only print media. Based on the potential problems identified and collected, a product design stage is created to create learning media in word wall-based educational games to stimulate cognitive development for children aged 5-6. The content of this media aims to introduce numbers and letters to children with various themes.

Third, product design. This word wall-based educational game was developed using the internet and the Canva application. This educational game contains pictures, alphabet letters and exciting numbers for children aged 5-6. Using this word wall-based educational game as a learning medium is expected to stimulate cognitive development for children at that age. All designs in this game were created directly using the internet and the Canva application. The results of the wordwall-based educational game product design are presented in Figure 1.

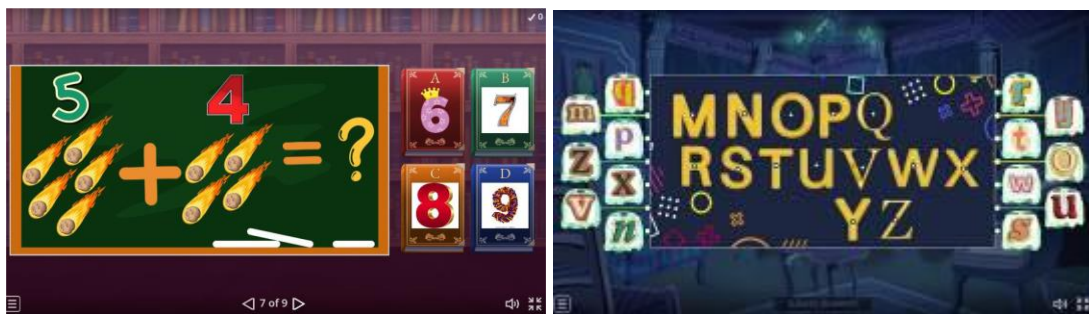


Figure 1. Wordwall-Based Educational Game Design

Fourth, design validation. After completing the initial product of educational games as a medium to stimulate the development of cognitive abilities for children aged 5-6 years, validation was carried out by experts, namely material and media experts. This validation process was carried out twice, first for the initial product and second, after improvements were made to perfect the revised initial product. The assessment results carried out by media expert validators showed that aspect 1. The physical aspect obtained a feasibility percentage of 100%, aspect 2. The utilization aspect obtained a feasibility percentage of 100%, aspect 3. The image illustration aspect obtained a feasibility percentage of 100%, and aspects 4. In terms of design, the feasibility percentage is 100%. The total assessment score is 36 out of 9 assessment indicators. The average rating of media expert validators is 4, with a percentage of 100%. The assessment results from learning media experts show that in aspect 1. Regarding the content of wordwall-based educational games, the feasibility was 100%, and aspect 2. Regarding the presentation of the material, the feasibility percentage was 100%. The total assessment score obtained was 16 from 2 assessment indicators. The average assessment of material expert validators is 4, with a feasibility percentage of 100%. Based on this, it can be concluded that the educational games developed have received very good qualifications from experts.

Fifth, design revision. After material experts and media experts had carried out an assessment, the validator gave several suggestions. These suggestions become a guide in making revisions to the product design. The input given by the material expert is 1) improving the picture of the moon and planets; this is considered less relevant for children because we can see only one moon and planet, not two, three, etc. It is best to replace it with another more relevant image for children. 2) Correction of the sign (-): This is also considered less relevant for children because, according to children's understanding, the sign (-) is a reduction; it is best to replace it with the word up. The results of the improvements are presented in Figure 2



Figure 2. Wordwall-Based Educational Game After Revision

Sixth, product testing. Limited testing was carried out on a limited basis on students at Kindergarten Kemala Bhayangkari 26, Bengkulu City. Through student participation in trying and playing games on products that have been developed, the results show that this word wall-based educational game effectively stimulates cognitive development for children aged 5-6 years at Kemala Bhayngkari 26 Kindergarten, Bengkulu City. The responses and scores obtained from students prove the effectiveness of the product. The results of limited trials show positive responses from teachers and students; this is an advantage for researchers. Even though a positive response was received, several suggestions submitted by the teacher positively impacted product development. These suggestions are related to improvements to the image display. An attractive appearance in the image is essential to attract children's interest, so they are more curious about games from this word wall-based game media. The main focus of this product is early childhood, so an attractive appearance will be more effective in attracting attention.

Seventh, product revision. After assessing the product, the teacher at Kindergarten Kemala Bhayangkara 26, Bengkulu City, obtained input from the teacher during a limited trial. This input becomes an essential reference in the process of revising the product. The teacher gives suggestions on replacing the background of the image with an image that is more interesting to the child. Apart from that, the hope for the future is that this word wall-based educational game will continue to be improved so that it becomes a very good and helpful product in the learning process at school, especially at Kemala Bhayangkara 26 Kindergarten, Bengkulu City.

Eighth, test use. Limited trials are used to assess the usability of word wall-based educational games and determine whether this product is viable. In this limited trial, teachers are essential as principal assessors because they will be the primary users and implementers in the learning process. Product development begins with the design stage based on the results of observations carried out by researchers at Kemala Bhayangkara 26 Kindergarten, Bengkulu City. The observation results show that the media used in learning is still not varied enough, so children are less interested in and focused on learning. Apart from that, this word wall-based educational game has never been used as a learning medium. The assessment analysis results carried out by kindergarten teacher Kemala Bhayangkari show that in aspect 1, Regarding the material, the feasibility percentage reached 100%, as well as in aspect 2. Regarding the presentation, the feasibility percentage was 100%. The total assessment score obtained was 24 from 6 assessment indicators. The average teacher assessment is 4, with an eligibility percentage of 100%. The explanation above shows the teacher's assessment of the product from two aspects. The first aspect is the quality of the material, which received a percentage of 100% in the "Very Decent" category. The second aspect is the assessment of the quality of the presentation, which also received a 100% percentage in the "Very Decent" category.

Based on the results of observations from product research and development, the wordwall-based educational game developed is very feasible and in accordance with the standards set by material experts, media experts and teachers. This happens because wordwall-based educational games are developed by following appropriate development steps. The research results show that this wordwall-based educational game is effective in stimulating cognitive development for children aged 5-6 years, in accordance with established effectiveness criteria. Learning is considered successful or complete if at least 75% of the number of children taking part in the learning achieve a score of 60 or more. This is proven by the scores of 9 children, of which the score was above 60 and only 1 child had a score below 60.

Discussion

The results of data analysis show that this wordwall-based educational game media is feasible based on validation from media experts, material experts and teacher responses. This is caused by several factors, namely as follows. First, wordwall-based educational game media can stimulate the cognitive development of children aged 5-6 years. The development of wordwall educational game media can help stimulate the cognitive development of children in this age range (Agusti & Aslam, 2022; Akbar & Hadi, 2023; Silvia et al., 2021). Learning is carried out through activities while playing, and according to the child's characteristics, such as playing, the child is more focused on learning. Games are fun and happy for children because the world of children is the world of play (Hidayaty et al., 2022; Rahmatia et al., 2021). Playing is the main activity carried out in a child's life. When children play, they will do it seriously (Aprita & Kurniah, 2021; Hidayaty et al., 2022; Rahmatia et al., 2021). Educational games help improve language skills, thinking, and environmental interaction. These educational games can be created by making game tools that have properties such as dismantling, grouping, combining, looking for matches, assembling, forming, tapping, arranging, and so on (Baharun et al., 2020; Widayati et al., 2021; Yanthi et al., 2020). Games also have a positive impact on children's brain development

Second, word wall-based educational game media can attract children's attention to learning. This word wall-based educational game is designed excitingly so that children are interested and actively involved in the learning process so that learning becomes more in-depth and exciting. This wordwall-based educational game has text, image, sound and animation commands (Hidayaty et al., 2022; Purwitasari, 2022). Text Commands are elements used to convey information in wordwall-based educational games. Images in educational wordwall games are elements used to convey information visually and can help convey information more impressively and interestingly (Anindyajati & Choiri, 2017; Nisa & Susanto, 2022). Sound is used to sweeten this wordwall-based educational game to make the presentation interesting. Lastly, animation, the animation here is used to increase children's interest in playing wordwall-based educational games and being actively involved in the learning process. This is also supported by research, stating that in the last few decades, multimedia technology advances have changed the gaming industry's landscape (Anindyajati & Choiri, 2017; Shofa & Surjono, 2018). Multimedia combines graphics, sound, animation, video, and user interaction to create immersive and engaging gaming experiences (Kurniawan et al., 2020; Wulandari et al., 2017).

Third, wordwall-based educational game media can increase children's playing experience. The role of multimedia in enhancing the gaming experience and exploring various game components (Panjaitan et al., 2020; Widyatmojo & Muhtadi, 2017). When this game was shown to the children, they were more focused and asked many questions about what learning and games we would do. The content in this wordwall-based educational game has various features so that it can be adapted to the age level of group B children. This is

supported by research, which reveals that the Wordwall Game also has many features that can be adjusted to suit needs, and there are supporting images so that students understand it better (Hidayaty et al., 2022; Purwitasari, 2022).

Previous findings reveal that this word wall game is easily accessible to students and is very comfortable to use (Anindyajati & Choiri, 2017; Nisa & Susanto, 2022). Other findings also reveal that word-based educational game media can stimulate children's cognitive development (Agusti & Aslam, 2022; Kunti Shouma Tsaniya et al., 2023). However, providing opportunities for children to play and stimulate their development by learning outside the digital environment to get more authentic experiences is also essential. The advantage of Wordwall as a tool in learning media is that it is an innovation-based media that is adaptive and changing, easy to use and modify, has free elements, and has an attractive appearance. The limitation of this research is that word wall-based educational game media was developed to provide stimulation for early childhood. This research implies that the development of word wall-based educational games can help children improve and provide a pleasant learning atmosphere to stimulate children's development. Using real media makes learning more meaningful because children can experience it directly by touching, seeing, and hearing it. It can also stimulate the learning process, accelerating the mastery of knowledge and skills.

4. CONCLUSIONS AND SUGGESTIONS

The results of the data analysis show that this wordwall-based educational game media is feasible based on validation from media experts, material experts, and teacher responses. This happens because word wall-based educational games are developed by following appropriate development steps. The research results show that this word wall-based educational game effectively stimulates cognitive development for children aged 5-6 years, per established effectiveness criteria. It was concluded that wordwall-based educational game media is suitable for learning.

5. REFERENCE

- Agusti, N. M., & Aslam, A. (2022). Efektivitas Media Pembelajaran Aplikasi Wordwall Terhadap Hasil Belajar IPA Siswa Sekolah Dasar. *Jurnal Basicedu*, 6(4), 5794–5800. <https://doi.org/10.31004/basicedu.v6i4.3053>.
- Akbar, H. F., & Hadi, M. S. (2023). Pengaruh Penggunaan Media Pembelajaran Wordwall Terhadap Minat Dan Hasil Belajar Siswa. *Jurnal Psikologi*, 4(2), 1653–1660. <https://doi.org/10.31004/cdj.v4i2.13143>.
- Amelia, N., & Aisyah, N. (2021). Model Pembelajaran Berbasis Proyek (Project Based Learning) dan Penerapannya pada Anak Usia Dini di TK IT Al-Farabi. *BUHUTS AL-ATHFAL: Jurnal Pendidikan dan Anak Usia Dini*, 1(2), 181–199. <https://doi.org/10.24952/alathfal.v1i2.3912>.
- Anggraeni, N. O., Abidin, Y., & Wahyuningsih, Y. (2023). Pengembangan Media Pembelajaran Permainan Ular Tangga Digital Pada Materi Keragaman Budaya Indonesia Mata Pelajaran Ips Kelas Iv Sekolah Dasar. *Jurnal PIPSI (Jurnal Pendidikan IPS Indonesia)*, 8(1), 22. <https://doi.org/10.26737/jpipsi.v8i1.3976>.
- Anhusadar, L. O., & Islamiyah, I. (2021). Penerapan Perilaku Hidup Bersih dan Sehat Anak Usia Dini di Tengah Pandemi Covid 19. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 5(1), 463–475. <https://doi.org/10.31004/obsesi.v5i1.555>.
- Anindyajati, Y. R., & Choiri, A. S. (2017). The effectiveness of using Wordwall Media to increase science-based vocabulary of students with hearing impairment. *European*

- Journal of Special Education Research*, 2(2), 1–13. <https://doi.org/10.5281/zenodo.236877>.
- Aprita, N., & Kurniah, N. (2021). Pengembangan Media Busy Book Untuk Meningkatkan Kemampuan Membaca Awal Dan Perkembangan Kognitif Anak Usia Dini (Studi Pada Anak Kelompok A PAUD Kota Bengkulu). *Diadik: Jurnal Ilmiah Teknologi Pendidikan*, 11(1), 50–63. <https://doi.org/10.33369/diadik.v11i1.18368>.
- Astutik, A. F., Rusijono, & Suprijono, A. (2021). Pengembangan Media Komik Digital Dalam Pembelajaran IPS Sebagai Penguatan Karakter Peserta Didik Kelas V SDN Geluran 1 Taman. *Jurnal Education and development Institut Pendidikan Tapanuli Selatan*, 9(3), 543–554. <https://doi.org/10.37081/ed.v9i3.2894>.
- Awan, V. (2020). Kemampuan Berpikir Simbolik Anak Melalui Bermain Dengan Media Stick Angka. *Jurnal Pendidikan dan Pembelajaran Anak Usia Dini*, 7(2). <https://doi.org/10.21107/pgpaudtrunojoyo.v7i2.8878>.
- Azis, M. (2019). Analisis Kesulitan Belajar Membaca dan Menulis Permulaan PAUD Di Kelompok Bermain Fun Islamic School. *Al-Athfaal: Jurnal Ilmiah Pendidikan Anak Usia Dini*, 2(2). <https://doi.org/10.24042/ajipaud.v2i2.5927>.
- Azmita, M., & Mahyuddin, N. (2021). Peningkatan Penilaian Aspek Perkembangan Kognitif Anak Usia 4-6 tahun di Taman Kanak-Kanak. *Edukatif: Jurnal Ilmu Pendidikan*, 3(1). <https://doi.org/10.31004/edukatif.v3i1.276>.
- Baharun, H., Zamroni, Z., Amir, A., & Saleha, L. (2020). Pengelolaan Alat Permainan Edukatif Berbahan Limbah Dalam Meningkatkan Kecerdasan Kognitif Anak. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 5(2), 1382–1395. <https://doi.org/10.31004/obsesi.v5i2.763>.
- Crisdiana, R. (2021). Developing a digital learning game as a medium for cultural enrichment on descriptive text. *Celt: A Journal of Culture, English Language Teaching & Literature*, 19(2), 354. <https://doi.org/10.24167/celt.v19i2.529>.
- Del Moral Pérez, M. E., Guzmán Duque, A. P., & Fernández García, L. C. (2018). Game-Based Learning: Increasing the Logical-Mathematical, Naturalistic, and Linguistic Learning Levels of Primary School Students. *Journal of New Approaches in Educational Research*, 7(1), 31–39. <https://doi.org/10.7821/naer.2018.1.248>.
- Furima, Y. A., Naibaho, J. P. P., & Suhendra, C. D. (2023). Aplikasi Belajar Dan Bermain Untuk Anak Usia Dini Menggunakan Kodular. *JISTECH: Journal of Information Science and Technology*, 11(1), 47–58. <https://doi.org/10.30862/jistech.v11i1.63>.
- Ghani, M. T. A., Hamzah, M., Daud, W. A. A. W., & Romli, T. R. M. (2022). The Impact of Mobile Digital Game in Learning Arabic Language at Tertiary Level. *Contemporary Educational Technology*, 14(1), 1–18. <https://doi.org/10.30935/cedtech/11480>.
- Hasbi, D. M. (2017). Konsep Dasar Pendidikan Anak Usia Dini (Paud). *Jakarta: PT Indeks*, 79.
- Hidayaty, A., Qurbaniah, M., & Setiadi, A. E. (2022). Pengaruh Media Wordwall Terhadap Minat Dan Hasil Belajar The Influence of Wordwall on Students Interests and Learning Outcomes. *Jurnal Penelitian Ilmu Pendidikan*, 15(2), 211–223. <https://doi.org/10.21831/jpipfip.v15i2.51691>.
- Humaida, R. T., & Suyadi, S. (2021). Pengembangan Kognitif Anak Usia Dini melalui Penggunaan Media Game Edukasi Digital Berbasis ICT. *Aulad: Journal on Early Childhood*, 4(2), 78–87. <https://doi.org/10.31004/aulad.v4i2.98>.
- Husain, R., & Kaharu, A. (2021). Menghadapi Era Abad 21: Tantangan Guru Pendidikan Anak Usia Dini di Kabupaten Bone Bolango. *Jurnal Obsesi Jurnal Pendidikan Anak Usia Dini*, 5(1). <https://doi.org/10.31004/obsesi.v5i1.527>.
- Kavak, Ş. (2022). Digital Game-Based Learning Model As an Educational Approach. *Prizren Social Science Journal*, 6(2), 62–70. <https://doi.org/10.32936/psj.v6i2.311>.

- Kunti Shouma Tsaniya, Olivia Zakkia Nafis, Frisca Eman Rosaiifa, Susilo Tri Widodo, & Nur Indah Wahyuni. (2023). Pengaruh Penggunaan Media Pembelajaran Wordwall Untuk Meningkatkan Keaktifan Belajar Peserta Didik Pada Mata Pelajaran Pendidikan Pancasila Kelas Iv Sdn Tlogosari Wetan 01 Semarang. *Didaktik : Jurnal Ilmiah PGSD STKIP Subang*, 9(5), 1452–1460. <https://doi.org/10.36989/didaktik.v9i5.2072>.
- Kurniawan, F. Y., Siahaan, S. M., & Hartono, H. (2020). Pengembangan multimedia interaktif berbasis adventure game pada materi prinsip animasi. *Jurnal Inovasi Teknologi Pendidikan*, 6(2), 183–195. <https://doi.org/10.21831/jitp.v6i2.28488>.
- Megantari, K. A., Margunayasa, I. G., & Agustina, A. G. T. (2021). Belajar Sumber Daya Alam Melalui Media Komik Digital. *Jurnal Jurusan Pendidikan Guru Sekolah Dasar*, 9(1), 140. <https://doi.org/10.23887/jjpsd.v9i1.34251>.
- Nisa, M. A., & Susanto, R. (2022). Pengaruh Penggunaan Game Edukasi Berbasis Wordwall Dalam Pembelajaran Matematika Terhadap Motivasi Belajar. *JPGI (Jurnal Penelitian Guru Indonesia)*, 7(1), 140. <https://doi.org/10.29210/022035jpgi0005>.
- Nurdin, M., Dewi, R., & Muniyati, sri uni. (2023). Pengaruh Penggunaan Media interaktif Berbasis Wordwall terhadap hasil belajar IPS : Studi Eksperimen Siswa Kelas V SD Negeri 14 Biru Kecamatan Tanete Riattang Kabupaten Bone. *Global Journal Basic Education*, 2(1), 69–78. <https://doi.org/10.35458>.
- Panjaitan, R. G. P., Titin, T., & Putri, N. N. (2020). Multimedia interaktif berbasis game edukasi sebagai media pembelajaran materi sistem pernapasan di Kelas XI SMA. *Jurnal Pendidikan Sains Indonesia (Indonesian Journal of Science Education)*, 8(1), 141–151. <https://doi.org/10.24815/jpsi.v8i1.16062>.
- Pinatih, S. A. C., Putra, D. B. K., & Semara, N. (2021). Pengembangan Media Komik Digital Berbasis Pendekatan Saintifik pada Muatan IPA. *Jurnal Penelitian dan Pengembangan Pendidikan*, 5(1), 115–121. <https://doi.org/10.23887/jppp.v5i1.32279>.
- Purwitasari. (2022). The Effectiveness of Wordwall Application. *Jurnal Inovasi Pendidikan Matematika*, 2(June), 453–468.
- Putri, A. M., Wardhani, I. P., Widayati, S., & Irfan. (2020). Aplikasi Permainan OXTOE Berbasis Visual Studio 2010 dengan Bahasa Pemrograman Visual Basic.Net. *Jurnal Ilmiah Komputasi*, 19(3), 391–400. <https://doi.org/10.32409/jikstik.19.3.64>.
- Rahayu, T., Mayasari, T., & Huriawati, F. (2019). Pengembangan Media Website Hybrid Learning berbasis Kemampuan Literasi Digital dalam Pembelajaran Fisika. *Jurnal Pendidikan Fisika*, 7(1), 130–142. <https://doi.org/10.24127/jpf.v7i1.1567>.
- Rahmatia, R., Pajarianto, H., Kadir, A., Ulpi, W., & Yusuf, M. (2021). Pengembangan Model Bermain Konstruktif dengan Media Balok untuk Meningkatkan Visual-Spasial Anak. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 6(1). <https://doi.org/10.31004/obsesi.v6i1.1185>.
- Rekysika, N. S., & Haryanto, H. (2019). Media Pembelajaran Ular Tangga Bilangan Untuk Meningkatkan Kemampuan Kognitif Anak Usia 5-6 Tahun. *Cakrawala Dini: Jurnal Pendidikan Anak Usia Dini*, 10(1), 56–61. <https://doi.org/10.17509/cd.v10i1.16000>.
- Shofa, H., & Surjono, H. D. (2018). Pengembangan Multimedia Pembelajaran Berbasis Role Playing Games (RPG) Pada Materi Lingkaran untuk Siswa SMP/MTs Kelas VIII. *Jurnal Inovasi Teknologi Pendidikan*, 5(2), 151–164. <https://doi.org/10.21831/jitp.v5i2.15048>.
- Siahaan, H., Nasution, W. S., Ayunita, S., Bara, B. bat., Hakim, N., & Harahap, E. F. (2023). Peran Guru dalam Pengembangan Kognitif dan Strategi Pembelajaran pada Anak Usia Dini. *Jurnal Usia Dini*, 9(1). <https://doi.org/10.24114/jud.v9i1.47815>.

- Silvia, K. S., Widiana, I. W., & Wirabrata, I. D. G. F. (2021). Meningkatkan kosakata anak usia dini melalui media wordwall. *Jurnal Pendidikan Anak Usia Dini Undiksha*, 9(2), 261–269. <https://doi.org/10.23887/paud.v9i2.36814>.
- Sopiah, C. (2021). Dampak Pembelajaran Online Terhadap Pendidikan Karakter Anak Usia Dini. *Jurnal Jendela Bunda Program Studi PG-PAUD Universitas Muhammadiyah Cirebon*, 8(2), 22–31. <https://doi.org/10.32534/JJB.V8I2.1719>.
- Sugiono. (2015). *Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D)*. Alfabeta.
- Susilawati, B., & Satriawan, D. (2018). Membangun Media Interaktif Belajar Anak Usia Dini Dalam Mengenal Huruf dan Angka. *Al-Athfaal: Jurnal Ilmiah Pendidikan Anak Usia Dini*, 1(1), 34–49. <https://doi.org/10.24042/ajipaud.v1i1.3059>.
- Swari, I. G. A. A. M., & Ambarawa, D. P. (2022). Video Animasi Mengenal Huruf dan Angka untuk Menstimulus Kemampuan Kognitif dan Bahasa Anak Usia Dini. *Jurnal Pendidikan Anak Usia Dini Undiksha*, 10(1), 163–172. <https://doi.org/10.23887/paud.v10i1.47346>.
- Wahyuni, N. L. A. I. (2022). Media Papan Pintar Angka Berbasis Animasi Untuk Stimulus Kognitif Anak Usia Dini. *Jurnal Pendidikan Anak Usia Dini Undiksha*, 10(1), 120–128. <https://doi.org/10.23887/paud.v10i1.47134>.
- Wardani, S., Lindawati, L., & Kusuma, S. B. W. (2017). The development of inquiry by using android-system-based chemistry board game to improve learning outcome and critical thinking ability. *Jurnal Pendidikan IPA Indonesia*, 6(2), 196–205. <https://doi.org/10.15294/jpii.v6i2.8360>.
- Widayati, J. R., Safrina, R., & Supriyati, Y. (2021). Alat Permainan Edukatif: Analisis Pengembangan Literasi Sains Anak Usia Dini Abstrak. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 5(1), 654–664. <https://doi.org/10.31004/obsesi.v5i1.692>.
- Widyatmojo, G., & Muhtadi, A. (2017). Pengembangan Multimedia Pembelajaran Interaktif Berbentuk Game untuk Menstimulasi Aspek Kognitif dan Bahasa Anak TK. *Jurnal Inovasi Teknologi Pendidikan*, 4(1), 38–49. <https://doi.org/10.21831/jitp.v4i1.10194>.
- Winarti, W., & Suryana, D. (2020). Pengaruh Permainan Puppet Fun terhadap Kemampuan Membaca Anak Usia Dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 4(2). <https://doi.org/10.31004/obsesi.v4i2.462>.
- Wulandari, R., Susilo, H., & Kuswandi, D. (2017). Penggunaan Multimedia Interaktif Bermuatan Game Edukasi untuk Meningkatkan Aktivitas dan Hasil Belajar Siswa Sekolah Dasar. *Jurnal Pendidikan: Teori, Penelitian dan Pengembangan*, 2(8), 1024–1029. <https://doi.org/10.17977/jptpp.v2i8.9759>.
- Yanthi, N., Yuliaratiningsih, M. S., Hidayah, N., & Sari, M. P. (2020). Pemanfaatan Limbah Bahan Tekstil Menjadi Alat Permainan Edukatif Anak Usia Dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 5(1), 26. <https://doi.org/10.31004/obsesi.v5i1.363>.
- Zahwa, S. A., Nisa', T. F. F., & Fajar, Y. W. (2018). Pengaruh Metode Bermain Peran Makro Terhadap Kemampuan Berpikir Simbolik Anak Kelompok B. *Jurnal PG-PAUD Trunojoyo: Jurnal Pendidikan dan Pembelajaran Anak Usia Dini*, 5(1), 30–38. <https://doi.org/10.21107/pgpaudtrunojoyo.v5i1.3848>.