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DIGITAL GAME DEVELOPMENT STRATEGY BASED ON EARLY CHILDHOOD EXECUTIVE FUNCTION SKILLS

Roby Naufal Arzaqi[1], Deri Hendriawan[2], Aisah Karunia Rahayu[3]
[123]Universitas Pendidikan Indonesia,
E-mail: robynaufal@upi.edu[1], derihendriawan@upi.edu[2], aisah@upi.edu[3]

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Abstract

The purpose of this study is to create an approach to digital games that can improve early childhood executive functioning, which consists of three main components: working memory, inhibitory control, and cognitive flexibility. In addition, they also wanted to find out how effective digital games designed specifically to train early childhood executive skills were. The research method is D&D (Design and Development), which is based on the ADDIE (Analyze, Design, Development, Implementation, and Evaluation) model from Robert Maribe Branch. The focus of the research is the design stage of development. Therefore, the implementation and evaluation stages will be carried out in the next study. Data were collected through questionnaires, and quantitative descriptive analysis was used to analyze the data. The results of the study focus on strategies in facilitating executive function skills in the form of working memory, thinking flexibility and self-control which involve remembering, categorizing and levels and obstacles. Thus, this article is expected to provide valuable insights for researchers, game developers, and aspiring educators and practitioners in the development of executive skills through digital games.

Keywords: Digital Games, Executive Function Skills, Strategy, Early Childhood

INTRODUCTION

The development of technology in the world of education has changed the way of learning and interacting with science. Along with its popularity, interest in harnessing the potential of games to develop cognitive skills and self-control (Carayannis & Jancelewicz, 2022; Fukuda, 2020). The integration of information and communication technology (ICT) in early childhood education is an opportunity for innovation in education and develops great potential to have a positive impact in improving the quality of early childhood education. Executive Function (EF) is an important skill that includes working memory, self-control, and cognitive flexibility. The development of games specifically designed to train these skills in early childhood is a relatively recent innovation, given the traditional focus of early childhood education more on social and motor skills (Ferguson et al., 2021). In addition, digital games allow personalization in terms of speed and difficulty level, adapting to the child's individual development. This

is different from conventional learning approaches that are often uniform for all children. Through digital games, access to quality learning materials can be more easily disseminated to more children, including those who may not have access to quality conventional education (Salehinejad et al., 2021).

EF includes abilities such as planning, impulse control, mental flexibility, and problem-solving, which are essential for a child's academic, career, and mental well-being (Doebel & Lillard, 2023). This ability is also important for daily life. These skills are essential for education, career, and social functioning. According to several studies, EF is the most important component of school readiness, including early literacy and mathematical thinking skills (Friedman & Robbins, 2022; Shihab et al., 2019). EF also contributes to psychosocial development, mental health, and cognitive aspects, all of which contribute to academic and professional success. A positive association between EF and children's academic achievement, good mental health, and social skills was found (Zelazo, 2020; Menon & D'Esposito, 2022). This shows that measuring the EF ability of preschool children is very important to encourage development.

The development of executive function-based games has great potential to provide significant benefits in improving cognitive function and cognitive performance in various age groups. The development of games for early childhood is a response to the urgent need to provide children with engaging, relevant, and interactive learning approaches in today's digital age. Computer games can be designed to facilitate the development of motor, cognitive, language, and social-emotional skills that are important in early childhood development. The use of games as a learning tool for children's engagement and motivation. Presidential Regulation Number 19 of 2024 provides a strong legal basis for the development of educational games for early childhood. This is reflected in the government's efforts to expand access to quality education through technology, as well as promote innovation in more engaging and effective learning (Setiasih et al., 2023). Game developers have a unique opportunity to create products that support the vision and goals of the regulation. The development of games for early childhood also requires an approach centered on the needs and characteristics of these children, in accordance with the directions in the Presidential Regulation. Games must be designed with aspects such as safety, privacy, and content quality in mind in light of early childhood development. In addition, these games must also be in accordance with the curriculum and educational standards set by the government.

The Scratch and Construct 2 game maker application is a game application that offers various features in developing games. This application can be used by prospective educators and early childhood education practitioners to develop learning methods as learning assessments (Gibb et al., 2021). Scratch facilitates the development of block-based interface designs that make it easy to get acquainted with programming concepts. Construct 2 offers more flexibility and features for developing interactive 2D games without the need for in-depth programming knowledge. Both offer practical options for creating fun and educational learning experiences through digital games. Digital game development using Scratch and Construct 2 requires a structured process from idea and concept to design, programming, testing, and publication.
Research on the development of digital games for early childhood shows that well-designed games can provide significant benefits for children's cognitive, social, and

language development. Age-appropriate design and material considerations, digital safety and health considerations, and a multidisciplinary approach to game development are some of the key factors to consider (Doebel & Lillard, 2023). Research on the level of awareness of early childhood education teachers in Indonesia about executive function is still low. Based on the literature review, teachers outside Indonesia (United Kingdom, America, Turkey, Sweden, New Zealand, and Thailand) have been able to understand the importance of executive functions for child development (Gilmore et al., 2020; Demetriou et al., 2019; Veldsman et al., 2020). The researcher did not find any literature that discusses the skills of early childhood education teachers in facilitating digital learning media based on executive function skills. So this study seeks to provide understanding and guidelines in the use of android-based digital media in developing executive function skills in early childhood. Further research is needed to explore the potential for more sophisticated and science-oriented game development to significantly improve executive function.

METHODOLOGY

This research uses a D&D (Design and Development) approach. It consists of the stages of design, development and evaluation to create learning activity products. Rechey & Klein states that it consists of 3 stages, namely design, production and evaluation (Richey & Klein, 2014). Data analysis was carried out using the Robert Maribe Branch model (Branch, 2009). The ADDIE (Analyze, Design, Development, Implementation, and Evaluation) model is a systematic framework that is often used in instructional design, including the creation of digital learning materials. The five stages consist of the development of the ADDIE model. It consists of an analysis to determine the needs and characteristics of digital game development for AUD; second, designing materials and making digital games; third, media development and expert advice for digital game development; and fourth, the implementation of digital games to be tested after suggestions for improvement from experts. The last stage is the evaluation of digital game development. The focus of this research is the analysis stage, which serves as the basis for executive skills-based digital game development strategies.

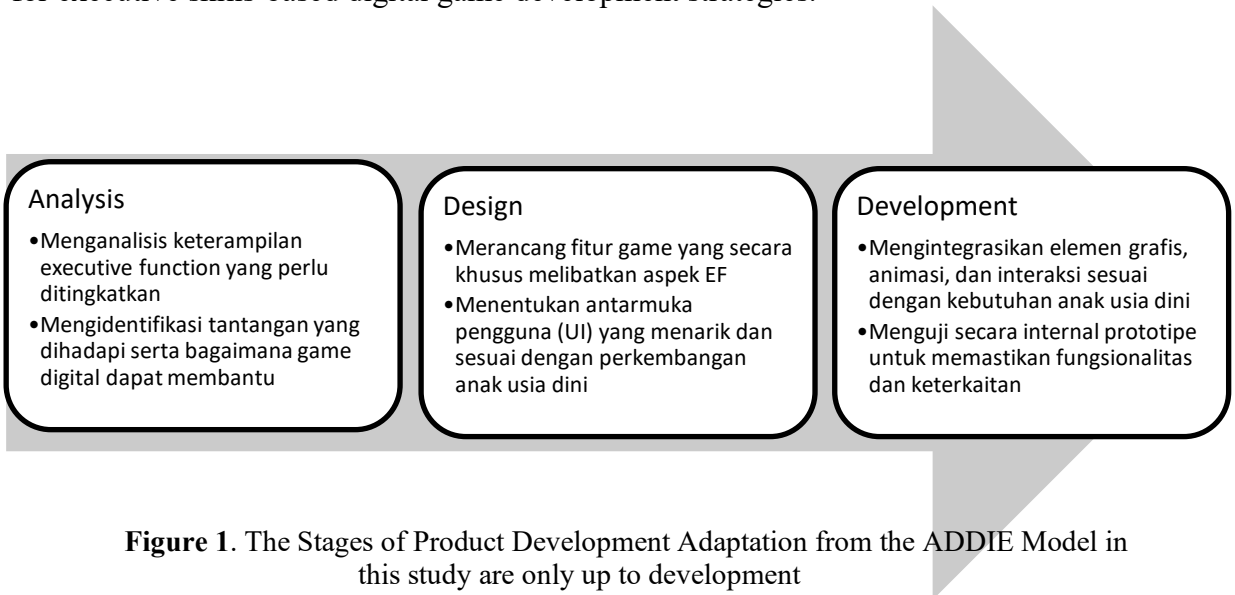

Figure 1. The Stages of Product Development Adaptation from the ADDIE Model in this study are only up to development

The sample in this study was 40 participants, consisting of 20 prospective PAUD teachers and 20 PAUD practitioners (teachers who have been actively teaching) in Serang City,

Banten Province. Participants of prospective teachers are between 22 and 25 years old, while early childhood education practitioners are between 25 and 45 years old. Most of the participants were women (about 90% women and 10% men), according to the general distribution of educators in early childhood education. Prospective PAUD teachers are completing an undergraduate program in Early Childhood Education, while PAUD practitioners have a minimum of 3 years of teaching experience in formal PAUD institutions. Most practitioners and prospective teachers have access to digital technology, with 80% reporting frequent use of digital devices (tablets, computers) in the learning or training process. Data collection techniques include questionnaires and interviews.

The data analysis method used in this study is "quantitative descriptive analysis" which determines the evaluation weight of the survey results that have been determined and quantifies them based on the indicators that have been determined. This analysis is used to describe the characteristics of each data obtained. The results of data analysis are used for application development

RESULTS AND DISCUSSION

Based on the data collected, more than 60% of participants were able to develop digital games using platforms such as Construct, Scratch, and Assemblr Studio. This shows that with the right training, prospective teachers and early childhood practitioners can master the technology to create interactive learning media that supports EF skill development in early childhood. This research highlights the great potential that early childhood education educators have in using technology to support learning, especially in building executive skills through digital games that can be adapted according to children's needs.

Executive Function (EF) refers to a series of mental processes that allow planning, organizing, prioritizing, and completing tasks. It includes the basics of staying focused on a task, switching between different tasks, and rejecting distractions (Veldsman et al., 2020). Focus on completing key tasks and increasing productivity. EF also plays an important role in social and emotional life in the form of regulating emotions and decision-making. In summary, executive functions are essential for success and well-being in all areas of life.

The three main components of executive function are working memory, cognitive flexibility, and self-control (Arzaqi & Diana, 2019; Laureys et al., 2022). Working memory is the ability to store information in the mind for a short period of time while using it to complete a task. For example, the flip card game, where we need to remember a pair of pictures that are the same age. Cognitive flexibility is the ability to switch between tasks or perspectives. This allows us to adapt to new situations and solve problems creatively. Finally, self-control is the ability to resist distractions or urges that may interfere with our goals. So, it helps to stay focused and make good decisions.

These three components work well together to help in self-management. Like in flip card games that require precision in remembering and pairing images (working memory), being able to distract from inappropriate images (cognitive flexibility), and resisting the impulse. As well as being able to complete the game well (self-control). These components support daily activities and identify areas where we may need to improve (Moreau & Chou, 2019). Executive function skills begin to develop in early childhood

and continue to develop throughout adolescence into adulthood. In fact, some aspects of executive function may not be fully mature until a person reaches their mid-20s (Dick et al., 2019; Rahayu et al., 2022). This development is supported by the process that children acquire in learning self-control and problem-solving skills, such as playing games that require turns or solving puzzles.

The development process of this educational game is adjusted to the ADDIE development model, which consists of five stages: analysis, design, development, implementation, and evaluation. The focus of this research is the analysis stage to the development stage, which serves as the basis for executive skills-based digital game development strategies. The analysis was carried out through the distribution of questionnaires that evaluated the needs of early childhood education practitioners and prospective teachers, as well as interviews with experts to get recommendations for game development and development. The results of the analysis are used in the design stage to change the content of the material according to the capabilities of the executive function. The next stage of development involves validation tests conducted by material and media experts to evaluate the media products that have been developed.

Analysis Stage

At this stage, experts are interviewed to find out what material is needed to create a digital game development strategy for early childhood. The interviews were conducted in a semi-structured manner and discussed the opinions and experiences of experts related to the strategy. In addition, at this stage of analysis, a needs analysis questionnaire is distributed to early childhood education practitioners and education candidates who have a theoretical and practical understanding of the early childhood education environment. This needs analysis questionnaire contains questions about opinions and experiences about game media development strategies in early childhood.

Needs Analysis of prospective educators and practitioners

Based on the answers from the questionnaire that has been distributed, prospective early childhood education and practitioners are able to develop games for early childhood using various platforms and applications. 70% of prospective early childhood educators and practitioners have awareness in developing EF skills in the educational environment. EF is taught concretely in hands-on learning activities such as science experiments and projects that allow children to learn scientific concepts and work together. The end of the activity is in the form of recalling which allows children to remember and describe what they have learned (working memory). Through science activities and projects, variables that can affect concepts such as environmental conditions, natural phenomena, and the availability of tools and materials (cognitive flexibility) are found. Furthermore, (self-control) acts by determining common interests over one's own ego and restraining impulsive actions or responses that can harm others (White et al., 2021).

Based on the data that has been collected, more than 60% of prospective educators and early childhood education practitioners are able to develop digital games through various platforms and applications such as contruct, scratch, assemblr studio, etc. Games are considered to be an interesting medium and have educational value, so prospective educators and practitioners need to master skills in developing digital games (Gibb et al., 2021; Arzaqi & Romadona, 2021). Considering the child's learning style, and the era of

massive digitalization. Game development needs to be well-designed so that it can provide knowledge and experience that builds EF skills. 65% of respondents are confused about integrating EF skills in the game they create. Game development is carried out based on interests and trends in the field without knowing the expected learning objectives. Prospective educators and early childhood education practitioners agreed that EF skills need to be taught using various approaches both in concrete activities and through the development of digital games. All respondents agreed on the need for media development and digital innovation to facilitate EF skills. Therefore, the right strategy in developing EF skills-based games needs to be formulated to achieve appropriate learning.

Efforts to stimulate executive function from an early age are an important investment in the sustainable development of children. In line with the research of Cortés Pascual et al. (2019) and Rahayu & Setiasih (2022) found that children whose executive function skills are not adequately stimulated experience difficulties in performing tasks, thus causing difficulties in organizing, planning, and decision-making. As a result, academic achievement and work productivity decrease, stress and frustration increase, and social harmony is disturbed. Developing leadership skills through digital games in early childhood is an effective and engaging approach. Digital games can be specifically designed to address various aspects of executive functioning, such as working memory, planning, self-control, and cognitive flexibility.

Digital games can be an effective tool to develop executive fun skills in early childhood. A memory match game in which there are picture cards that have the right pair. Remember the position of the cards and look for the right card pairs (Arzaqi et al., 2022). Memory match games are useful in improving working memory and the ability to remember and manage information in the short term, strategize in memorizing card positions and completing games sequentially according to the rules. Playing Puzzle is in the form of arranging puzzle pieces into one whole picture. Puzzle games aim to develop problem-solving, planning, and working memory skills (Görgen et al., 2020). Children learn to recognize patterns, plan steps, and memorize the location of certain parts.

Maze games are a type of game in which you navigate a complicated path to reach a goal. The Maze game aims to find the right path, overcome obstacles, and find solutions to achieve goals that involve critical thinking and situational analysis. The benefits in the game are working memory in remembering which path they took and which path ended in a dead end. Train to store and process information in short-term memory. Self-control in reaching a dead end, learning to control impulses and try different paths more carefully, rather than turning around and taking the wrong path. Cognitive flexibility When children encounter stalemates and obstacles, they must be able to think flexibly, try different paths, and adapt to new situations and change strategies and adapt to change.

Design & Development

This stage aims to convey the learning meter while playing. Facilitate engaging visualization and auditory attention to difficulty levels and provide reinforcement. The strategy is in the form of: designing activities/work in a specific and simple manner and with a level of difficulty. In this regard, the goal is to make it easier for children to manage their energy, focus, and emotions. Furthermore, providing visual and auditory assistance

to make it easier for children to understand and remember the information conveyed. The last is to practice to reflect on the tasks that have been done to gain understanding and know the child's self-development.

Figure 2. Digital Game Model Based on Executive Function

Based on the digital game model above, researchers prioritize 3 important skills in executive function in the form of: working memory, flexibility of thinking and self-control (Coelho et al., 2020). Working memory in the form of giving instructions in the game above is to provide an opportunity for children to know and memorize existing images (crabs, deer, chickens, frogs). When the child is ready, it is allowed to "click". Next, the image will be covered by letters. The instruction is that children are invited to choose a picture of a frog. Children's flexibility in finding solutions is based on animals and types of food. Self-control is in the form of patience and precision in compiling pictures and reaching an impasse. Furthermore, there is a level or level of difficulty in each game in the form of additional images and speed so that it trains children to focus and try to complete the game until it is completed (Doebel & Lillard, 2023; Rahayu & Setiasih, 2022a). Researchers provide interesting visualizations accompanied by interactive audio, selection of objects close to the child to increase internal interest and motivation in playing. Use of fonts and sizes for readability. Provide clear tutorials and rules of play so that children can construct a good play experience. Start with an easy and simple level and then increase the level of difficulty.

At this stage, validation tests are also carried out by experts to find out whether the media being developed is suitable for use. This validation test concentrates on the content and appearance of mobile learning. Experts, namely media and material experts, collaborate to find the shortcomings of educational games that are being developed so that revisions can be made. The game that has been developed is first tried by media and material experts. After that, they investigated and looked at the game. After that, the experts were

asked to fill out a survey that had been provided beforehand. The description of the feasibility test of learning media made with the help of material experts, linguists, and media experts is given below.

The results of the Media Feasibility Test, the assessment of the media validation test includes two aspects, namely (1) visual and audio game display (2) Language (3) Material. The results of the assessment of the feasibility of game media conducted by media experts can be seen in the following table:

Table 1. Media Due Diligence Results

It	Aspects	Question Items	Average Eligibility Percentage	Criterion
1	Interface Design	1-7	89,37	Excellent
2	Language	8-15	81,73	Excellent
3	Material	16-20	87,94	Excellent
	Average Overall Score		86,34	Excellent

The explanation of the results of the media validation test with experts covered the aspects of interface design which contained: attractive design display, appropriate color composition and contrast, navigation buttons functioning according to commands got a score of 89.37. The material aspects are in the form of: relave content and according to early childhood development, appropriate material shortness (simple to complex), the grammar of the material presented can be easily understood, audio elements are heard clearly and easily understood and interactive, The suitability of the material with the game has a score of 81.73. Language aspects include: The selection of the type of font used is attractive and easy to read and the suitability of the letters (Proportion of shapes, colors and appropriate font sizes) obtained a score of 87.94

The results of the language feasibility test include three elements: effective, communicative, and easy-to-understand sentences. Language eligibility standards in the media are used to create assessment instruments. The results of the language feasibility assessment are shown in the following table:

Table 2. Language Feasibility Test Results

It	Aspects	Question Items	Average Eligibility Percentage	Criterion
1	Effective and interactive sentences	1-4	81,24	Excellent
2	In accordance with the child's development	5-12	84,70	Excellent
	Average overall score		82,97	Excellent

The explanation of the results of the validation of the language feasibility test with experts includes aspects of the use of affective and interactive sentences including: accuracy of sentence structure (SPOK), effectiveness of words/sentences, inviting the audience to be actively involved obtained a score of 81.24. Aspects in accordance with child

development in the form of: suitability of language acquisition based on children's intellectual development based on age, suitability with the level of social and emotional development received a score of 84.70.

Material Feasibility Aspect, the assessment of the material validation test is carried out based on two aspects, namely the suitability and accuracy of the material and encouraging children's curiosity. The results of the validation of the feasibility of the material can be seen in the following table:

Table 3. Material Validation Test Results

It	Aspects	Question Items	Average Eligibility Percentage	Criterion
1	Suitability and suitability of the material	1-6	89, 22	Excellent
2	Encourage children's curiosity	7-13	81,94	Excellent
	Average overall score		85,58	Excellent

The explanation of the results of the validation of the material feasibility test with experts included the suitability and accuracy of the material: executive function skills, working memory, cognitive flexibility and self-control obtained a score of 89.22. The aspect of encouraging curiosity in the form of: encouraging children's involvement, including concrete knowledge (illustrations in daily life) got an average of 81.94.

The data shows that the development of digital games based on executive function (EF) skills in early childhood has significant potential in improving their learning skills. Based on the results of the media, language, and material feasibility tests, the majority of aspects were rated very good, indicating that the games developed met the appropriate criteria for children. In line with a study by (Gioia et al., 2000) which emphasizes the importance of attractive media design to increase children's interest and motivation in learning. The assessment results showed a high score in the interface design aspect (89.37), indicating that the attractive visual display and good functionality of the navigation buttons can improve the user experience. Well-designed media not only grabs children's attention but also helps them focus more on the material being taught, which supports the effectiveness of learning.

In this study, the language aspect obtained an average score of 82.97, indicating that the language used in the game is easy to understand and in accordance with the child's development. This supports the findings of (Ozonoff et al., 1991) which states that the use of appropriate language can help children understand more complex concepts, as well as support their ability to solve problems. Communicative and interactive language in digital games can facilitate more effective learning, allowing children to be more actively involved in the learning process.

The results of the material feasibility test showed an average score of 85.58, with an emphasis on the suitability and accuracy of the material. This is in line with research by (Senn et al., 2004) which found that stimulation of executive function skills from an early

age can have a positive impact on children's cognitive development. The materials designed in this digital game aim to develop skills such as working memory, flexibility of thinking, and self-control all aspects that are important in executive functioning.

By providing a fun and relevant learning experience, this game helps children to not only learn theory, but also apply the skills they learn in practical contexts. The use of game elements such as memory matches, puzzles, and mazes has been shown to be effective in stimulating the cognitive abilities necessary for executive function. This supports the argument that play can be a powerful tool in developing fundamental skills for children, as also described in the study (Gioia et al., 2002). As technology evolves and educational needs continue to change, the development of EF-based digital games is also relevant to the needs of 21st century skills. Critical thinking skills, collaboration, and creativity are becoming increasingly important in this fast-paced world. This study emphasizes the need for prospective early childhood educators and practitioners to master digital skills and understand how to integrate technology into learning, in line with the findings that digital skills can improve the effectiveness of teaching and learning in the ever-evolving era of digitalization.

The results of this study as a whole show that digital game development training based on executive function (EF) skills is very beneficial for prospective teachers and early childhood education practitioners. About 60% of participants were able to develop effective digital games, and all participants agreed on the importance of teaching EF skills to early childhood. However, about 65% of participants admitted that they had difficulty integrating EF skills properly into the games they created. These results are in line with findings (Miller & Wallis, 2009) which emphasizes the importance of stimulating EF skills from an early age to support children's academic and social development. Inadequate stimulation can result in difficulties in organizing, planning, and decision-making, which negatively affects academic performance. This research confirms that digital games can be an interesting and effective medium to support the development of these skills. Furthermore, research (Kesner & Churchwell, 2011) also shows that the use of technology in education, especially at the early childhood level, can increase children's motivation and engagement. The use of digital games allows for interactive and fun learning experiences, which is in line with the results of this study, where participants feel that games can be an interesting medium and have educational value.

However, the challenges faced by 65% of participants in integrating EF skills in digital games reflect the findings from (Graham et al., 2007), which stated that many educators do not have enough understanding of how to structure learning content that prioritizes EF skills. This demonstrates the need for a more comprehensive training program that not only teaches the technical aspects of game development but also includes guidelines for creating specific learning objectives related to EF. Therefore, the findings of this study suggest that effective digital game development should be supported by a deep understanding of EF skills and a proper pedagogical approach. Collaboration between educators, education experts, and game developers is needed to formulate strategies that can help prospective teachers and early childhood education practitioners in creating learning media that is not only interesting but also educational, so as to be able to stimulate children's EF skills optimally. Therefore, this study makes an important contribution to the understanding of technology integration in early childhood education

and highlights the importance of EF skill development as an integral part of the early childhood education curriculum.

CONCLUSION

The right strategy in developing games based on executive function skills needs to be formulated in order to achieve appropriate learning. Digital games are developed by paying attention to 3 main skills in executive function in the form of: working memory, flexibility of thinking and self-control. The strategy used is in the form of designing specific and simple activities/work with a level of difficulty. In addition, the development of EF skills-based digital games for prospective teachers and early childhood education practitioners is effective in improving their ability to design innovative learning media. More than 60% of participants were able to develop digital games using multiple platforms, and all participants agreed that EF skills are important to be taught early on, both through concrete methods and digital media. However, about 65% of the participants still had difficulty effectively integrating EF skills into the games they created, especially when it came to defining specific learning objectives. Therefore, a more structured strategy and continuous support are needed so that digital game development can achieve optimal learning goals.

BIBLIOGRAPHY

Arzaqi, R. N., & Diana, D. (2019). The Learning Management For Children With Special Needs (Study In Efata PAUD, Semarang City). Belia: Early Childhood Education Papers, 8(2), 105–112.

Arzaqi, R. N., Rahayu, A. K., Romadhona, N. F., & Setiasih, O. (2022). Strategi Kepala TK dalam Upaya Mitigasi Potensi Learning Loss pada Anak Usia Dini selama Pandemi COVID-19. Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini, 6(6), 6102–6109.

Arzaqi, R. N., & Romadona, N. F. (2021). The Kindergarten's Headmaster View of the Potential for Learning Loss in Early Childhood Education durung Pandemic COVID-19. Indonesian Journal of Early Childhood Education Studies, 10(2), 143–148.

Carayannis, E. G., & Morawska-Jancelewicz, J. (2022). The futures of Europe: Society 5.0 and Industry 5.0 as driving forces of future universities. Journal of the Knowledge Economy, 1–27.

Coelho, L. A., Amatto, A. N., Gonzalez, C. L. R., & Gibb, R. L. (2020). Building executive function in pre-school children through play: a curriculum. International Journal of Play, 9(1), 128–142.

Cortés Pascual, A., Moyano Muñoz, N., & Quilez Robres, A. (2019). The relationship between executive functions and academic performance in primary education: Review and meta-analysis. Frontiers in Psychology, 10, 1582.

Demetriou, E. A., DeMayo, M. M., & Guastella, A. J. (2019). Executive function in autism spectrum disorder: history, theoretical models, empirical findings, and potential as an endophenotype. Frontiers in Psychiatry, 10, 753.

Dick, A. S., Garcia, N. L., Pruden, S. M., Thompson, W. K., Hawes, S. W., Sutherland, M. T., Riedel, M. C., Laird, A. R., & Gonzalez, R. (2019). No evidence for a bilingual executive function advantage in the ABCD study. Nature Human Behaviour, 3(7), 692–701.

Doebel, S., & Lillard, A. S. (2023). How does play foster development? A new executive function perspective. Developmental Review, 67, 101064.

Ferguson, H. J., Brunsdon, V. E. A., & Bradford, E. E. F. (2021). The developmental trajectories of executive function from adolescence to old age. Scientific Reports, 11(1), 1382.

Friedman, N. P., & Robbins, T. W. (2022). The role of prefrontal cortex in cognitive control and executive function. Neuropsychopharmacology, 47(1), 72–89.

Fukuda, K. (2020). Science, technology and innovation ecosystem transformation toward society 5.0. International Journal of Production Economics, 220, 107460.

Gibb, R., Coelho, L., Van Rootselaar, N. A., Halliwell, C., MacKinnon, M., Plomp, I., & Gonzalez, C. L. R. (2021). Promoting executive function skills in preschoolers using a play-based program. Frontiers in Psychology, 12, 720225.

Gilmore, C., Cragg, L., & Simms, V. (2020). What can cognitive psychology tell us about the challenges of learning mathematics (and what do we still not know)?

Gioia, G. A., Isquith, P. K., Guy, S. C., & Kenworthy, L. (2000). Test review behavior rating inventory of executive function. Child Neuropsychology, 6(3), 235–238.

Gioia, G. A., Isquith, P. K., Kenworthy, L., & Barton, R. M. (2002). Profiles of everyday executive function in acquired and developmental disorders. Child Neuropsychology, 8(2), 121–137.

Görgen, R., Huemer, S., Schulte-Körne, G., & Moll, K. (2020). Evaluation of a digital game-based reading training for German children with reading disorder. Computers & Education, 150, 103834.

Graham, S., Harris, K. R., & Olinghouse, N. (2007). Addressing executive function problems in writing. Executive Function in Education: From Theory to Practice, 216–236.

Kesner, R. P., & Churchwell, J. C. (2011). An analysis of rat prefrontal cortex in mediating executive function. Neurobiology of Learning and Memory, 96(3), 417–431.

Laureys, F., De Waelle, S., Barendse, M. T., Lenoir, M., & Deconinck, F. J. A. (2022). The factor structure of executive function in childhood and adolescence. Intelligence, 90, 101600.

Menon, V., & D'Esposito, M. (2022). The role of PFC networks in cognitive control and executive function. Neuropsychopharmacology, 47(1), 90–103.

Miller, E. K., & Wallis, J. D. (2009). Executive function and higher-order cognition: definition and neural substrates. Encyclopedia of Neuroscience, 4(99–104).

Moreau, D., & Chou, E. (2019). The acute effect of high-intensity exercise on executive function: a meta-analysis. Perspectives on Psychological Science, 14(5), 734–764.

Ozonoff, S., Pennington, B. F., & Rogers, S. J. (1991). Executive function deficits in high-functioning autistic individuals: relationship to theory of mind. Journal of Child Psychology and Psychiatry, 32(7), 1081–1105.

Rahayu, A. K., Muliasari, D. N., & Halimah, L. (2022). Improving Early Childhood English Speaking Ability through Storyreading Method. Indonesian Journal of Early Childhood Education Studies, 11(1), 1–6.

Rahayu, A. K., & Setiasih, O. (2022a). Parents' Role in Familiarizing themselves with Clean and Healthy Living Behavior in Early Childhood during the COVID-19. Indonesian Journal of Early Childhood Education Studies, 11(2), 83–90.

Rahayu, A. K., & Setiasih, O. (2022b). Strategi Orang Tua dalam Membiasakan PHBS Anak Usia Dini saat Pandemi COVID-19. Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini, 6(5), 4118–4127. https://doi.org/10.31004/obsesi.v6i5.2115

Richey, R. C., & Klein, J. D. (2014). Design and development research. Handbook of

Research on Educational Communications and Technology, 141–150.
Salehinejad, M. A., Ghanavati, E., Rashid, M. H. A., & Nitsche, M. A. (2021). Hot and cold executive functions in the brain: A prefrontal-cingular network. Brain and Neuroscience Advances, 5, 23982128211007770.
Senn, T. E., Espy, K. A., & Kaufmann, P. M. (2004). Using path analysis to understand executive function organization in preschool children. Developmental Neuropsychology, 26(1), 445–464.
Setiasih, O., Rahayu, A. K., & Arzaqi, R. N. (2023). Effective Leadership of Kindergarten Principals in Facing the Impact of Learning Loss in Kindergartner During the Covid-19 Pandemic. SEA-CECCEP, 4(01), 34–42.
Shihab, K. M., Sussi, S., Munadi, R., Prasojoe, R. R., & Fitriyanti, N. (2019). Pembuatan Game Online BoMCleaN sebagai Media Pembelajaran Kebersihan Lingkungan. Jurnal Edukasi Dan Penelitian Informatika (JEPIN), 5(1), 113. https://doi.org/10.26418/jp.v5i1.29874
Veldsman, M., Tai, X.-Y., Nichols, T., Smith, S., Peixoto, J., Manohar, S., & Husain, M. (2020). Cerebrovascular risk factors impact frontoparietal network integrity and executive function in healthy ageing. Nature Communications, 11(1), 4340.
White, R. E., Thibodeau-Nielsen, R. B., Palermo, F., & Mikulski, A. M. (2021). Engagement in social pretend play predicts preschoolers' executive function gains across the school year. Early Childhood Research Quarterly, 56, 103–113.
Zelazo, P. D. (2020). Executive function and psychopathology: A neurodevelopmental perspective. Annual Review of Clinical Psychology, 16, 431–454.