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Teacher's Creative Model for Developing Child-Friendly Digital-Based Assignments in Indonesian Junior High Schools

Kenys Fadhilah Zamzam  and **Ririn Dwi Agustin*** 
 Universitas Insan Budi Utomo
 Malang, Indonesia

Alfiani Athma Putri Rosyadi 
 Universitas Muhammadiyah Malang
 Malang, Indonesia

Sikky El Walida 
 Universitas Islam Malang
 Malang, Indonesia

Abstract. This study aimed to explore and describe creative model of teachers in developing child-friendly digital-based assignments. The research method employed was design research with a development study type, involving 48 junior high school teachers selected through purposive sampling technique, namely innovative teachers who frequently used child-friendly digital-based assignments. Data collection was conducted through in-depth interviews, participant observation, and document analysis, which were then validated by triangulation of sources and methods. The results identified four creative model. Moreover, the imitation model was characterized by teachers copying existing digital assignments without significant changes to the format, activities, or child-friendly elements. The transition model showed changes in the context and procedure for completing the assignments, although the basic structure remained intact. During the analysis, the modification model comprised significant changes to the problem context and assignments structure without altering the essence of the completion procedure. The highest innovation was the construction model, where teachers formed entirely new and original problem contexts, solution procedures, and digital assignments structures. This was often in the form of interactive educational games that changed the level of challenge to non-routine problems and inspired critical thinking. The 48 teachers were evenly distributed across grades VII, VIII, and IX (16 teachers each). This study was carried out in Malang City labeled as an education city that supports

*Corresponding author: Ririn Dwi Agustin; ririndwiagustin85@gmail.com

digital learning innovation and these research findings own implications for teacher professional development through tiered training towards the more creative, original, and child-friendly digital assignment practices.

Keywords: Creative Model; Teachers; Developing Assignments; Child-Friendly; Digital-Based; Mathematic education

1. Introduction

Creativity is a needed skill to face the rapid advancement of technology. Creative people will become innovators and pioneers of change who lead to progress. Furthermore, the skill is also needed in the advancement of science, technology, culture, and the arts. An example of creativity is the ease of access to information worldwide. Several studies have been conducted to investigate the importance of the skill, specifically in mathematics. This is relevant to the essence of mathematics education, namely, inspiring critical thinking and reasoning, initiating ideas to solve problems. As a result, creativity in mathematics education is a major component used to develop higher-order thinking skills (HOTS).

Exploring creativity becomes particularly engaging when connected to mathematics education, as explained by Joklitschke (Joklitschke J, 2022), who show both the importance of the skill and its expanding relevance in the field. Schindler & Lilienthal proved the importance of the creativity processes of students in mathematics learning (Schindler, 2020). According to the revised Bloom's taxonomy, the highest level of cognition is creativity. The ability to create makes a person a good problem solver and innovator (Elgrably, 2021). (Kim, 2023) and (Leikin, 2024) used fluency, flexibility, as well as originality to analyze the skill. The analysis found a positive correlation between mathematical aptitude and creativity.

This study explores creative thinking from different perspectives and traces how the skill develops based on the cognitive processes included in creativity. The skill builds on a study by Subanji (Subanji, 2021), who identified three creative model, including imitation, modification, and construction. The imitation model differs from the modification model, where students can alter procedures or find alternative solutions to improve problem outcomes. Meanwhile, the construction model includes forming new works or developing novel problem-solving methods modified to the specific problem.

Individuals in the modified creative model are unable to solve new, previously unaddressed problems using novel solution procedures. The three creative model can continue to develop and are expected to persist in the mathematics learning process. Subanji explained that these three creative models have significant potential for further improvement. However, the development of model encounters challenges in education in digital age. Education has experienced considerable transformation, requiring the adaptation of teaching methods to meet the needs and characteristics of students. Children growing up in digitally rich environment have made technology an integral part of personal daily lives.

Therefore, incorporating technology into the teaching and learning process is inevitable, including in the assignments process (Smith, 2022). Digital-based assignments often do not fully consider child-friendly aspects. This has the potential to cause stress or boredom rather than stimulate the skill and enthusiasm for learning, and eventually hinder the development of creativity in students.

The concept of child-friendly digital-based assignments is crucial to ensuring that the use of technology in learning is academically effective and supports psychological and emotional development of children. Assignments designed with characteristics of children in mind, including appropriate duration, clear instructions, engaging visuals, and interactive elements, can increase motivation as well as engagement (Chen, 2023; Zamzam, 2023). However, the challenge lies in the ability of teachers to innovate and develop creative model for designing these assignments. Teachers may struggle to realize the full potential of child-friendly digital-based assignments without a structured and adaptive model.

Creativity in teachers plays a central role in bridging the gap between the potential of technology and developmental needs among children. Creative teachers can see outside the limitations of textbooks and conventional methods as well as design engaging and enjoyable learning experiences (Davis, 2021). Developing creative model for teachers in creating child-friendly digital-based assignments is not about adding variety to assignments alone, but rather a strategic effort to improve 21st-century skills in students. These skills include critical thinking, collaboration, communication, and creativity, all of which are essential in the current digital society (Johnson, 2020).

The context of the discussion further shows the compelling reason to study creative thinking, as it is crucial for addressing the various issues arising from global developments (Aurelia, 2021; Beghetto, 2017; Dwi, 2022; Sriraman, 2017). This drive signifies the importance of assessing creativity based on how a thought or idea surfaces, complete with indicators of characteristics of the process. Therefore, the ability of teachers to be creative in designing digital learning that supports creative thinking among students is highly relevant to the need to assess and inspire the development of these innovative ideas. The skill serves as a bridge to the main focus of this study, namely, the cognitive processes of teachers in developing creative child-friendly digital-based assignments. Following the discussion, creative model process will explore creative thinking from different perspectives, providing further perception into how teachers can improve creativity in digital age.

Based on prior description, it can be summarized that teacher creativity becomes the primary key to address the challenges of mathematics in digital era, particularly in the development of digital-based assignments that are not only academically effective but also conducive to children's psychological and emotional development. Even though varied studies have emphasized the importance of creativity in mathematics learning and identified several creative models, studies that specifically examine the cognitive processes of teachers in developing Child Friendly Digital-Based Assignments remain limited. Therefore,

this study focuses on revealing teachers' creative models in designing child-friendly digital assignments, which are reflected in the variety of problem contexts, problem-solving procedures, and assignment structures. This study aims to explore and describe teachers' creative models and identify the characteristics of each model, including imitation, transition, modification, and construction. In line with these objectives, the research questions are directed at how teachers' creative models in developing child-friendly digital assignments work, what the characteristics of each creative models are, and what cognitive processes underlie the emergence of different models of creativity in the development of child-friendly digital assignments.

2. Literature Review

Literature review in this research was compiled to provide a theoretical and conceptual foundation relevant to the focus of the study, namely teachers' creative models in developing Child-Friendly Digital-Based Assignments. This literature review discusses concepts and findings from previous studies regarding creativity in education, particularly in the context of mathematics education, as well as the role of teacher creativity in responding to learning challenges in the digital era. Through the mapping of relevant theories and research results, this literature review aims to clarify the position of the research, identify the existing research gaps, and build a framework that supports the analysis of teachers' creative models in developing child-friendly digital assignments.

2.1 Creativity in Mathematics Education and Creative Cognitive Process

Creativity is a high-level cognitive ability that becomes increasingly important in 21st-century education, especially in dealing with the complexity of real-world problems. In education context, creativity is understood as the ability to generate original, valuable, and contextually appropriate ideas or solutions. Bloom's revised taxonomy places creativity at the highest cognitive level, as it involves complex thinking processes such as combining, modifying, and creating new knowledge. As the result, creativity is not only seen as an end result, but as a cognitive process that develops through meaningful learning experiences (Abdallah, 2023; Levenson, 2015).

In mathematics education, creativity plays a strategic role as learning mathematics essentially requires critical thinking, reasoning, and problem-solving skills. Mathematical creativity allows students to explore various problem-solving strategies, view problems from different perspectives, and generate non-routine solutions. Research shows that mathematics learning that provides room for exploration and flexibility in thinking can improve conceptual understanding while encouraging the emergence of creative ideas (Murangira, 2024). Thus, creativity becomes an integral part of the development of Higher Order Thinking Skills (HOTS).

A number of international studies identified that creativity in mathematics can be analyzed through cognitive indicators such as fluency, flexibility, and originality. (Pourdavood, 2021) argue that there is a positive correlation between mathematical ability and creativity, especially when students are confronted with

open-ended and challenging assignments. These findings highlight that creativity is not a spontaneous ability, but rather one that can be developed through precise and contextual learning designs.

In addition to students, creativity is also closely related to teachers' cognitive processes in designing mathematics learning. Teachers do not only act as conveyors of material, but also as designers of learning experiences that open up creative thinking space. In this case, teacher creativity is reflected in the way teachers design problem contexts, select problem-solving procedures, and arrange assignment structures that allow for exploration and reflection. Research on creative thinking models show that creativity develops through particular patterns or stages, rather than as a static ability (Joklitscke J, 2022).

A research conducted by Subanji et al. (2021) proposes three main creative models, namely imitation, modification, and construction. The imitation model is characterized by the replication of the existing ideas or procedures without any significant changes. The modification model shows the adjustment of some elements, such as context or presentation, without changing the basic structure. Meanwhile, the construction model represents the highest level of creativity, where individuals are able to create completely new and original solutions or products. These three models describe a creative cognitive process that is dynamic and can develop along with experience and learning environment support.

Furthermore, the creative cognitive process is greatly influenced by the type of assignment and learning environment presented. Cognitively challenging, open-ended assignments that are relevant to learners' experiences have been proven to trigger the emergence of creative thinking processes in both students and teachers (Nielsen, 2023). Therefore, the understanding of creativity in mathematics education and creative cognitive processes becomes an important theoretical foundation for examining how teachers design learning and assignments that can foster creativity in a sustainable manner.

Overall, this study confirms that creativity in mathematics education is not only related to learning outcomes, but also to how creative cognitive processes are facilitated through learning design. The conceptual framework of creativity and this creative model becomes a strong basis for examining teacher creativity in the context of assignment development, particularly in digital learning, which requires a balance between cognitive challenges and the needs of students development.

2.2 Teachers' Creativity in Developing Child-Friendly Digital-Based Assignments

The development of digital technology has brought significant changes to learning practices, including in the design and delivery of assignments. Technology integration in learning requires teachers to not only master technical aspects, but also possess pedagogical creativity so that learning remains meaningful and appropriate to the characteristics of the students. In this context, teacher creativity is a key factor in ensuring that digital learning is not merely

technological, but also humanistic and oriented towards the needs of children development.

The concept of child-friendly learning highlights the importance of learning that supports the comfort, safety, and psychological well-being of students. In digital-based assignments, this principle is reflected in the design of assignments with proportional duration, clear instructions, attractive visual displays, and interactive elements that can increase student motivation and engagement. Research shows that digital assignments designed by considering child-friendly principles can increase active engagement and positive learning experiences, so that learning is not perceived as a burden, but rather as a fun and meaningful activity.

The development of Child-Friendly Digital-Based Assignments places teachers as learning designers. Creative teachers are capable of connecting learning objectives to the context of children's lives, selectively utilize technology features, and design assignment structures that encourage exploration and reflection. Teachers' creativity is reflected in their ability to determine the context of problems, problem-solving procedures, and forms of digital assignment presentation that are appropriate to the world and experiences of students. Thus, teachers' creativity acts as a connector between digital technology potentials and children's learning needs.

Nevertheless, the level of creativity among teachers in developing digital assignments still varies. Some teachers still tend to imitate or reproduce the existing digital assignments without making meaningful adjustments. This condition indicates that the utilization of technology is often superficial and does not fully support the development of student creativity. Without a clear creative framework, digital assignments risk becoming mere substitutes for conventional media, rather than a means of creating a richer learning experience.

The literature related to teacher creativity displays that the creative process develops gradually, starting from imitation, moving on to modification, and finally to construction. In the context of child-friendly digital assignments, these stages are reflected in changes in the way teachers design problem contexts, organize problem-solving procedures, and arrange assignment structures. At the construction level, teachers are able to create original, interactive, and cognitively challenging digital assignments, such as educational games or collaborative digital projects. These types of assignments do not only support conceptual understanding but also develop 21st-century skills such as creativity, critical thinking, and independent learning.

In conclusion, studies on teachers' creativity in developing Child-Friendly Digital-Based Assignments become important to understand how teachers' cognitive processes work in responding to the demands of digital learning. This understanding is expected to form the basis for designing training and policies that encourage teachers to move towards more creative, child-friendly, and sustainable digital learning practices.

3. Methodology

This research was designed to examine as well as develop teachers' creative models in designing child-friendly digital-based assignments for junior high school learning. To achieve this objective, this study employed a design research method with a development studies type, which focuses on the development and validation of theories regarding educational interventions such as learning programs, processes, strategies, or materials as solutions to educational problems. This method was selected because it allows researchers to systematically design, test, and revise child-friendly digital assignments based on empirical findings in a real learning context.

Through the design research approach, this study did not only produce learning products in the form of Child-Friendly Digital-Based Assignments, but also produce a theoretical understanding of teachers' creativity process and dynamics in its development. In addition, the use of development studies allows for the continuous tracking of teacher creativity and the mapping of teacher creativity models during the process of developing and implementing learning interventions. Therefore, this research method is systematically structured and described through the subchapters of research design, significance of research, research focus, research subjects and context, data collection techniques, research instruments, and data analysis and validity techniques.

3.1 Research Design

This research employed a design research method with a development studies type that aimed to develop and/or validate theories regarding educational interventions, such as programs, processes, strategies, or learning materials, as solutions to solve educational problems (McKenney, 2019). Through the design research method, researchers can develop and test child-friendly digital-based assignments. The development studies type of design research method was chosen for this study because it is effective for developing and validating theories on educational interventions (Sandoval, 2020; Easterday, 2021).

This distinguishes it from other methods which only design the learning process. Moreover, the development studies type of design research method can also track the development of teachers' creativity on an ongoing basis and map teachers' creativity models. The procedure in design research with the development studies type was carried out in 4 stages, namely Problem Identification and Context Analysis, Design and Development Prototype, Revision and Further Development, and Implementation and Formative Evaluation. The details of the stages are shown in the following Figure 1.

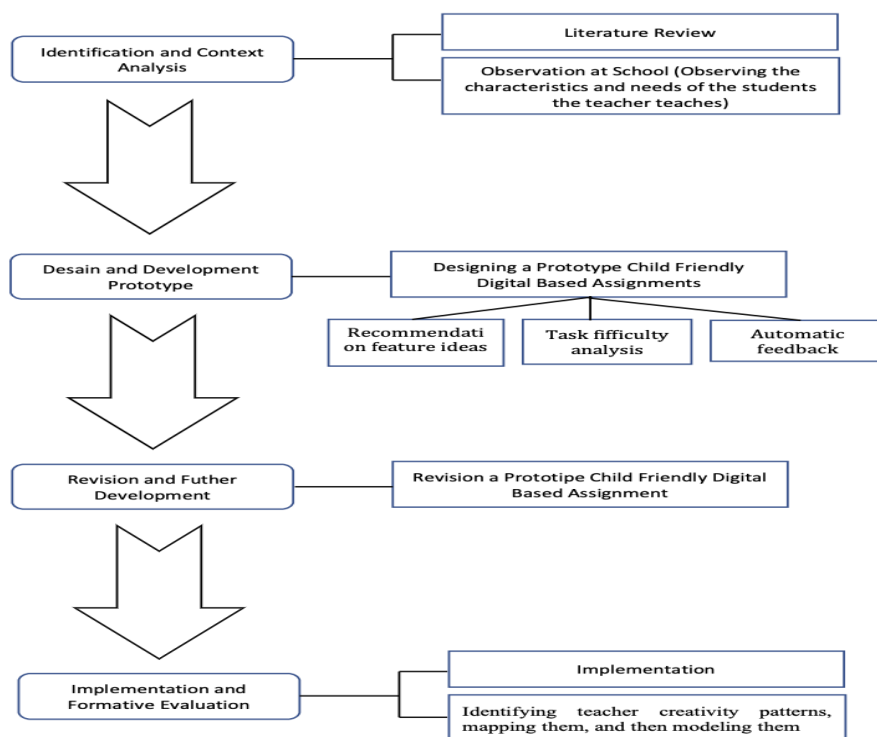


Figure 1: Research Procedure

3.2 Significance of Research

This study is significant because it provides a strong conceptual contribution to understanding teacher creativity as a cognitive process that develops gradually in the development of Child-Friendly Digital-Based Assignments. Unlike previous studies that tend to position creativity as an end result, this study emphasizes that teacher creativity can be mapped through a creative model of imitation, transition, modification, and construction, which reflects an increase in thinking complexity and the ability to create non-routine assignments.

Through a development studies type of design research approach, this study also reinforces the argument that digital learning innovations do not only need to be designed, but also tested and validated iteratively in an authentic context. Practically, the findings of this study provide a reflective framework for teacher professional development to move beyond imitation practices towards original and meaningful construction. Hence, this study contributes to bridging creativity theory, educational intervention, and the need for child-friendly digital learning oriented towards HOTS development and pedagogical innovation sustainability.

3.3 Research Variable

This study does not use independent and dependent variables as in quantitative research, but focuses on one main variable, namely teachers' creative model in developing Child-Friendly Digital-Based Assignments. This variable is understood as a manifestation of the teacher's cognitive process in designing child-friendly digital assignments, which is reflected in three main aspects, namely the problem context, the problem-solving procedure, and the structure of the digital assignment. Based on the level of complexity of changes in these three

aspects, the teacher's creative model is classified into four categories, namely imitation, transition, modification, and construction. These four categories represent the development of teachers' creativity from reproductive practices to the creation of original non-routine digital assignments. Focusing on this variable allows this study to map the dynamics of teachers' creativity in a sustainable manner in the process of developing and validating child-friendly digital assignments, in accordance with the characteristics of development studies type design research.

3.4 Research Subjects and Context

This study involved 48 junior high school mathematics teachers in Malang City who were selected through purposive sampling based on their experience and innovation in developing Child-Friendly Digital-Based Assignments. Malang City was chosen as the research context because of its educational ecosystem that supports digital learning innovation. This study has complied with ethical clearance principles, whereby all participants voluntarily participated in the study after providing informed consent. The anonymity and confidentiality of participants were maintained by using codes for all data, removing personal and institutional identities, and reporting findings in aggregate to prevent individual identification.

3.5 Data Collection Technique

Data collection in this study was systematically designed to capture teachers' cognitive processes and the dynamics of their creativity in developing Child-Friendly Digital-Based Assignments. In line with the characteristics of development studies type design research, data were collected repeatedly and complementarily through in-depth interviews, participatory observation, document analysis, and the provision of initial assignments as triggers for creative activities. This multimodal strategy allowed researchers to not only identify the digital assignment products produced by teachers, but also to trace how creative ideas emerged, developed, and underwent transformation from imitative practices to non-routine constructions.

In-depth interviews were conducted in a semi-structured manner to explore teachers' understanding of child-friendly digital assignment concepts, the pedagogical considerations underlying assignment design, and teachers' reflections on the creative processes they experienced. Participatory observations were conducted while teachers designed and implemented digital assignments, focusing on design decision-making, teacher interactions with technology, and students' initial responses to the developed assignments.

In addition, document analysis was conducted on lesson plans, digital assignment artifacts, and student and parent feedback to identify the characteristics of the structure, context, and procedures for completing the assignments. The initial assignment served as a stimulus to elicit a variety of creative ideas, thereby facilitating the continuous mapping of teachers' creative models in the trajectory of imitation, transition, modification, and construction.

3.6 Research Instruments

The research instruments were designed to consistently capture teachers' cognitive processes and the dynamics of creative models in the development of Child-Friendly Digital-Based Assignments. This study used a combination of instruments in the form of semi-structured interviews, survey questionnaires, observation sheets, and analysis of digital assignment artifacts. Semi-structured interviews are prioritized because of their ability to deeply explore teachers' reasons, pedagogical considerations, and creative reflections that are non-linear in nature, while survey questionnaires are used to systematically map teachers' creative model tendencies. Observation and document analysis instruments serve to verify the consistency between teachers' statements, assignment development practices, and the resulting products.

After the research subjects were selected and the data collection instruments were prepared, the initial step of the research was carried out by giving the initial assignment (Figure 2) to the teachers as a stimulus to bring out a variety of strategies and creative ideas in designing child-friendly digital assignments. Next, participatory observation was conducted while teachers developed and implemented digital assignments in the classroom, focusing on teacher interactions with technology, the design decision-making process, and student responses to the developed assignments.

Document analysis was carried out on lesson plans, digital assignment artifacts, and student and parent feedback to strengthen the understanding of the characteristics of the assignments and the impact of their use. To ensure consistency and sharpness of analysis, all instruments were developed based on creative model indicators imitation, transition, modification, and construction which were aligned with the coding, reduction, and conclusion drawing processes in the data analysis stage. The details of the creative model indicators and analysis instruments are presented in Table 1.



Figure 2: Initial Assignments

Translation: Which of the following groups included the given set?

Table 1: Instrument Development

Creative Model	Conceptual creativity in developing Child-Friendly Digital-Based Assignments	Indicator
Imitation	Mimic the context, completion procedures, and structure of assignments in digital format.	Teachers copy/replicate existing digital assignments without changing the format, activities, or child-friendly elements; Teachers did not make changes to the structure of digital assignments or activities.
Transition	Mimicking the context, modifying the solution procedure, and imitating the assignments structure in digital format.	Teachers mimicked the context of the existing problem, but added the questions or variations, allowing the resolution procedure to be different from the initial digital assignments.
	Mimicking the context, modifying the solution procedure, and imitating the assignments structure in digital format.	Teachers changed questions in the form of images or other digital media, but the structure of digital assignment remained similar.
	Mimicking the context, changing the completion procedure, and changing the assignments structure in digital format.	Teachers mimicked the context and procedure of completion of existing assignments, but changed the format or display of digital structures (for example from text to interactive videos, or from multiple choice quizzes to drag-and-drop) Teachers mimicked the context of the problem but changed the flow of solutions and presented in a different digital assignment structure (for example assignments that were originally in the form of worksheets were converted

		into interactive simulations).
Modification	Changing the context, imitating the solution procedure, and imitating the assignments structure in digital format.	Teachers changed the problem context to make it more relevant to the experience of child or digital environment, but the solution procedure and digital assignments structure remained similar to the existing assignment. Teachers changed the problem context and the solution flow, but presented it in a familiar or similar digital assignments structure (e.g., from a traditional multiple-choice quiz to a gamified quiz). Teachers changed the problem context to make it more engaging for child, and changes digital assignments structure (e.g., from a traditional problem to an interactive digital open-ended problem) without changing the essence of the solution procedure.
	Changing the context, imitating the solution procedure, and imitating the assignments structure in digital format.	
	Changing the context, imitating the solution procedure, and imitating the assignments structure in digital format.	
Construction	Changing the context, changing the completion procedure, and changing the assignments structure in digital format.	Teachers created completely new problem contexts that were different and relevant to children, developed innovative solution procedures, and designed unique as well as original digital assignments structures (e.g., creating an interactive digital educational game from scratch, or a multi-platform digital collaborative project that had never existed before), changing the level of challenge to non-routine problems.

3.7 Data Analysis Technique

Data analysis in this research was carried out systematically and iteratively to reveal teachers' cognitive processes and map the development of creative models in the development of Child-Friendly Digital-Based Assignments. Data from interviews, observations, questionnaires, and digital assignments were analyzed through the stages of data organization, data reduction, coding, and thematic interpretation, enabling researchers to identify consistent patterns of creative thinking and shifts in models from imitation to non-routine construction. This analysis process followed the principles of interactive qualitative analysis, which emphasizes the dynamic relationship between data, categories, and conclusions (Denzin, 2018).

Data coding was done deductively-inductively based on indicators of the creative model of the problem context, problem-solving procedures, and assignment structure that enabled the classification of teachers into imitation, transition, modification, or construction models. This approach ensured that the creative models produced were not only descriptive but also represented the actual level of complexity of teachers' creative thinking in the context of child-friendly digital assignment design. The validity of the findings is guaranteed through triangulation of sources and methods, while the validity of the interpretation is strengthened through member checking, by confirming the initial analysis results with the participants (Creswell, 2018; Noble, 2024). Thus, data analysis in this study builds a strong bridge between cognitive processes, creative products, and conclusions about teachers' creativity models.

4. Results and Findings

The work of teachers in developing child-friendly digital-based assignments was categorized into three possible creative model, namely imitation, modification, and construction. After further analysis, several characteristics of responses of teachers were identified that could not be categorized into the three existing creative model. This creativity extended outside merely imitating the context, solution procedures, and assignments structure in digital format. However, the procedures were unable to change the context, even though the solution processes and assignment's structure were still imitated.

This inability of teachers fell into the transition-type creative model. When teachers were able to change the problem context and alter the solution flow and present it in a familiar or similar digital assignments structure, the skill fell into the modification-type creative model category. Meanwhile, when teachers developed entirely new problem context that was both distinct and relevant to children, introduced innovative solution procedures, and designed a unique as well as original structure for digital assignments, the work was categorized under the construction creative model.

The four categories of the creative model, including imitation, transition, modification, and construction were established by introducing one additional category to the existing framework. After these categories were defined, the subjects were grouped accordingly, as shown in Table 2.

Table 2: Division of subjects into category groups

Creative Model	Grade VII	Grade VIII	Grade IX	Total
Imitation	5	3	4	12
Transition	6	5	3	14
Modification	3	4	5	12
Construction	2	4	4	10
Total	16	16	16	48

In the context of developing digital learning materials, the imitation creative model was a common phenomenon among teachers. This model occurred when teachers copied an existing digital assignment exactly, without making significant modifications to the format, activities, or elements that supported interactivity and appealed to both students as well as teachers. Relating to the discussion, teachers did not make fundamental changes to the structure of digital assignments or activity. Difficulty generating new ideas for developing assignments was the primary activator behind this creative model.

As a result, teachers tended to replicate existing content simplistically rather than designing relevant and engaging innovations, sometimes even simply changing the visual background. Figure 3 showed the results of developing child-friendly digital-based assignments that fell into the imitation-type creative model category.



Figure 3: Development Results of Teachers in the Imitation-type Creative Model

Translation: Among the groups below, which one is not included in the set.....

A concrete representation of the work of teachers adopting this method was shown in the figure on how digital assignments developed tended to replicate existing materials, with little or no significant modifications to the format, core activities, or child-friendly elements. Limitations in innovative ideas for assignments development were evident, with the most significant changes being cosmetic elements such as the background display. This signifies that even when digital assignments are created, the essence of academic adaptation and creativity to improve the learning experiences of students remains a challenge for teachers.

Q: Good afternoon, and thank you for your time. Based on the digital assignment you created, I noticed some similarities with the example provided. Could you explain the process you followed in designing this assignment?

G: Good afternoon. Yes, ma'am. To be honest, I used the example given. I thought the format was effective and the activities were clear, therefore, I adopted it directly.

Q: Were there any parts you changed or added to the original assignment?

G: I mostly just adjusted the color or background to make the appearance look a little different. In terms of the questions and structure, I followed the features exactly as they were. I often feel unsure generating new ideas, and rather than struggling with that, I prefer to use what is already available and proven to work.

Q: You did not add interactive features or other elements to make it more child-friendly elements, correct?

G: No, ma'am. I believe the existing format is sufficient. What matter most is that the material is delivered effectively. It is quite difficult to develop genuinely new ideas, specifically those suitable for children currently. I also worry that when I experiment with different feature, the results may not be optimal.

During the process of developing digital assignments by teachers, the transition-type creative model marked an evolutionary step away from simple imitation. In this model, teachers started to show initiative in changing and adapting, although not yet created a subject entirely new from scratch. The essence of the transition-type creative model was changing the context and procedures for completing the assignments, while still mimicking or maintaining the basic structure of the assignment in an existing digital format. This phenomenon was observed when teachers took a familiar or frequently used digital assignments and then modified the context of the problem presented to make it more relevant to a particular learning situation.

At the same time, the flow or procedure for completing the assignments was also modified to reflect the new context, requiring students to think and interact in slightly different ways. Despite these modifications, the total structure of the digital assignments, including layout, types of interactions, and presentation format, often remained consistent with the original model. This signified that teacher had not completely redesigned digital assignments. Figure 4 showed the results of developing digital assignments where changes in the context and completion flow were evident as a concrete example. However, digital framework still reflected familiar patterns or was copied from other digital assignments. This showed a significant creative effort yet remained in the shadow of the existing structure.

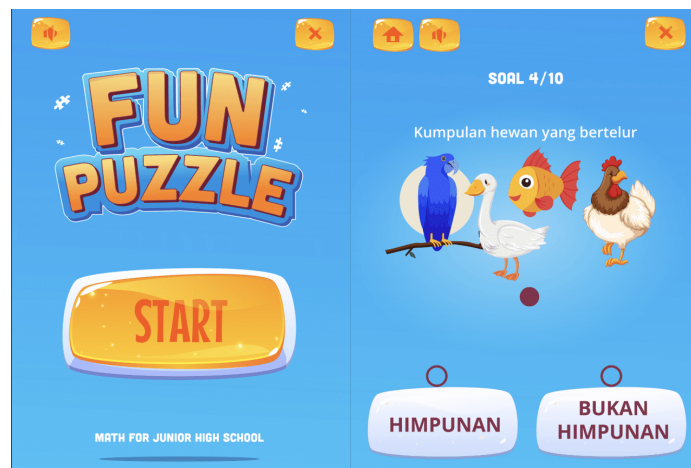


Figure 4: Development Results of Teachers in the Transition-type Creative Model

Translation: A group of animals that lay eggs can be a set or not.

The results of digital assignments developed by teachers who fell into the transition-type creative model were shown in the figure, implying a move outside simple imitation. This view signified increased attention by teachers to visual and interactive aspects in improving the learning experience. The use of sound effects (represented by the speaker icon in the upper left corner) and engaging visuals (including a bright color palette, playful typography such as in "FUN PUZZLE," and a prominent "START" button design) showed the efforts of teachers to form a more immersive and enjoyable experience for students.

As the basic structure of the "puzzle" remained familiar, these changes to the visual and aural context significantly altered the feel of the assignments, making the learning activity less boring. This reflected the transition of teachers from simply copying to innovating elements that improve the engagement of students, even though the core activity framework remains inspired by existing formats.

Q: Good afternoon. This assignment looks interesting, having sound effects and a more interactive design. Could you describe the process you followed in designing it?

G: Good afternoon. I was inspired by the example assignment provided, but I did not want to simply copy it. I aimed to make it livelier and more relevant to personal material.

Q: Which parts did you modify from the original assignment?

G: I used the basic idea, which was a quiz or puzzle, but I changed the context. I also added sound effects and made the appearance more engaging by adjusting the font and using brighter colors, enabling the children to feel more enthusiastic about completing it.

P: You changed the context and added supporting elements, but the fundamental structure of the quiz remained the same?

G: Correct. I have not created an entirely new format yet. For me, the important process is making the assignment more relevant and engaging for students. Even changing the context and visuals requires time. What matter is that I am not simply copying, I am starting to add my personal touch.

The following process was the modification-type creative model, a more substantial progressive step than the previous transition method. At this stage,

teachers changed the context or procedure and boldly intervened more deeply in the assignments design. The essence of the modification-type creative model was in the ability of teachers to change the context of the problem for more engagement and relevance to students, while simultaneously making significant changes to the structure of the assignments, without altering the essence of the solution procedure.

Teachers strived to package learning materials with new and fresh narratives or scenarios, effectively arousing interest and curiosity among students. The context presented was no longer boring or abstract, but instead in line with the experience familiar to children, making the material feel more engaging and relevant to the teenagers. Along with this engaging change in context, teachers also modified the structure of digital assignments. This may not simply signify changing the background color or font, completely renovating the visual appearance and placement of elements on the layer.

The structural changes were made while maintaining the essence of the desired completion procedure. In other words, the competencies or skills students were expected to achieve through the assignments remained the same. Only the method for achieving the abilities was presented in a more modern and updated framework and experience. This model reflected a greater level of creativity by teachers, who significantly redesigned learning experiences for more effectiveness and engagement for students, while maintaining the primary academic objectives of the assignments, as shown in Figure 5.

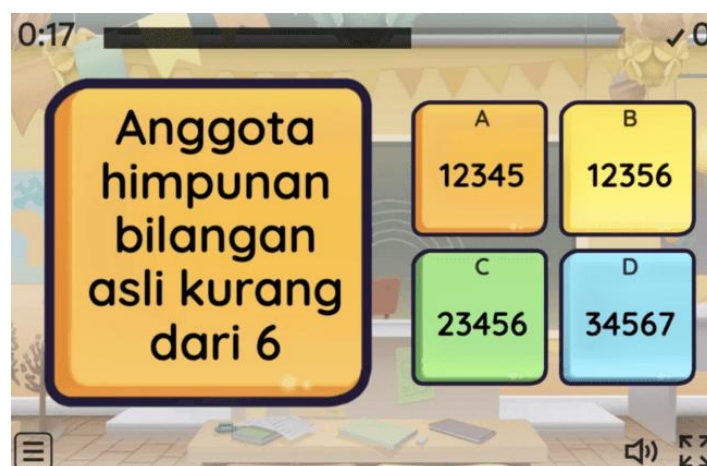


Figure 5: Development Results of Teachers in the Modification-type Creative Model

Translation: The members of the set of natural numbers were less than 6.

The implementation of the modification-type creative model by teachers in developing child-friendly digital-based assignments was shown in the figure. This image signified an interactive quiz environment carefully designed to improve student engagement. A prominent feature was the use of voice, as a question narrator or to provide response feedback, which added a richer auditory dimension to the learning experience. In this context, a crucial modification aspect

was the inclusion of a time limit for completing the assignments, which was visible by the timer at the top of the screen. This feature added a challenge and trained the critical thinking and decision-making skills of students, representing a significant structural change from a static assignment. Furthermore, the questions presented appeared more varied with very similar answer choices, showing that teachers had modified the question structure to inspire deeper analysis and careful selection of answers. All of these elements reflected the efforts of teachers to substantially alter the assignment's structure to create a more challenging and interactive learning experience, in line with the characteristics of the modification-type creative model.

Q: Good afternoon. This digital assignment looks very different from the others. It includes a timer feature and a wider variety of questions. Could you tell us about the design process?

G: Good afternoon. I deliberately wanted to create new feature. My aim was for the assignment to deliver the material and also train thinking speed of children.

Q: You made fairly significant changes to the structure, correct?

G: That is right. I started with the basic concept of a quiz, but I added new features. For example, I included a timer for each question, allowing children to get used to working under time pressure. I also varied the type of questions, and provided answer options that were similar, requiring students to pay close attention.

Q: And concerning appearance, was it completely changed?

G: Yes. I did not just change the colours, I redesigned the entire layout. I added more interactive buttons and incorporated a sound feature. The idea was to make children feel like playing a game, rather than simply completing an assignment. Essentially, I wanted to transform learning experience of students, and also maintaining the primary purpose of delivering the material.

The highest innovation in developing child-friendly digital-based assignments was the construction-type creative model, where teachers no longer adapted rather completely created the content and format. In this model, teachers designed entirely new problem contexts that were highly relevant to the environment of children, developed innovative solution procedures, and constructed unique as well as original digital assignments structures, often in the form of interactive educational games. The result obtained during the analysis was assignments that fundamentally shifted the level of challenge to non-routine problems, inspiring critical thinking and creativity among students at the highest level. An example of developing child-friendly digital-based assignments using this creative model was shown in Figure 6.

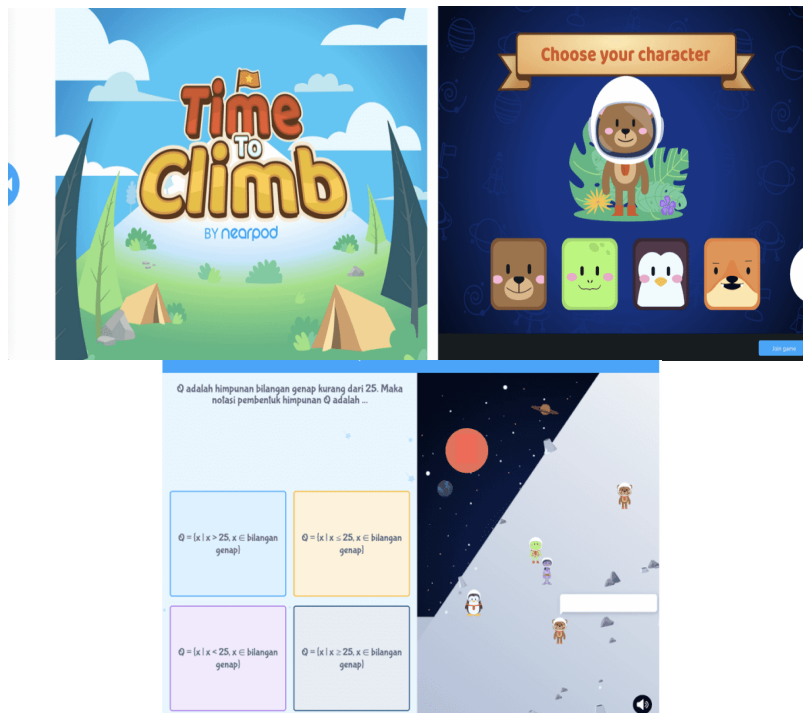


Figure 6: Development Results of Teachers on Construction-type Creative Model

Translation: Q was a set of even numbers less than 25, signifying that the notation for forming the set Q was.....

The results of the development of teachers in the construction-type creative model was shown in the figure, representing an interactive digital educational game titled "Time to Climb,". This signified how teachers had built a completely new and original learning experience, specifically designed to be engaging and relevant to the environment of children. The process started with an engaging initial interface and bright visuals, where students were invited to immersive learning through a game format. Moreover, the method was inherently child-friendly because it transformed what often seemed formal learning activities into a fun and playful experience that engaged curiosity.

The personalized experience was improved by the inclusion of a player character selection feature, which allowed students to select a personal avatar. This feature effectively improved an emotional connection and a sense of ownership over the game, a major element of child-friendly design, increasing essential motivation as well as promoting active engagement. The height of child-friendly design was the incorporation of learning materials into the narrative of the game. To reach the "mountain peak," students would answer interactive questions during the game.

This was a simple quiz and a non-routine challenge that combined elements of adventure and learning, making the experience a fun, motivating, as well as non-threatening activity for children. Furthermore, progress in the game directly depended on understanding and solving the questions. This showed that the entire design, including the intuitive game concept, personalized character selection, and the engaging, game-like problem-solving flow, reflected ability of

teachers to develop unique as well as innovative structures for digital assignments. The ability transformed learning into a highly engaging, relevant, and positively challenging experience for the development of children.

Q: Good afternoon. This is impressive! The digital assignment you developed resembles a complete educational game. Could you explain how the idea surfaced and how you went about the design process?

G: Good afternoon. This idea came from my desire to make students genuinely excited about the material. I found traditional assignments monotonous, and therefore I thought, "Why not turn it into an adventure"?

Q: You did not adapt the format from an existing assignment, but rather built it entirely from scratch?

G: That is correct. I did not copy. I imagined a story where kids have to climb a mountain, with each correct answer representing a step upward. I also added personalization features, such as character selection, allowing students to feel like they are truly part of the game. The aim is to answer questions and form an enjoyable learning experience.

Q: The questions also appear different from a typical quiz.

G: Yes, because I want students to think critically, not just memorize. I designed the questions as non-routine challenges that require analysis and decision-making, rather than simply selecting an answer. My aim is for students to look forward to completing the assignment, rather than viewing it as an obligation.

The dominance of imitation and transition models indicated that most teachers were still in the early adaptation phase of developing Child-Friendly Digital-Based Assignments, where creativity developed incrementally through changes in context or procedure without a complete reconstruction of the assignment structure. The distribution pattern across grade levels showed a progressive trend, with modification and construction models appearing more frequently in grades VIII and IX, indicating the influence of material complexity and the maturity of students' cognitive demands. Teachers' choice on creative models was also influenced by internal and external factors, including experience with technology, pedagogical risk-taking, and institutional support from the school. These findings are in line with the view that creativity develops through iterative practice and a supportive context, rather than an instant leap towards non-routine innovation (Amabile, 2021; Baer, 2022).

5. Discussion

This study examined the crucial role of the creativity of teachers in developing child-friendly digital-based assignments in digital era, with empirical findings showing the dominance of imitation and transition models and the progressive distribution of creative models between grade levels. This pattern provides a strong basis for understanding teacher creativity as a cognitive process that develops gradually in the context of child-friendly digital learning. Creativity is an essential skill for dealing with technological advances and encouraging innovation (Alimuddin, 2023; Orbanus, 2024), especially in mathematics education that emphasizes the development of higher-order thinking skills (HOTS) and problem solving (Schoenfeld, 2016; Alshammari, 2024).

These findings expand the the research conducted by Subanji et al. (2021), which previously identified three creative models—imitation, modification, and construction—by showing that transition is an important phase between the two, especially in the context of technology integration. Amidst the challenges of digital learning that can potentially cause stress or boredom, these four creative models reflect the spectrum of teachers' abilities in designing digital assignments that are not only pedagogically effective but also child-friendly, ranging from imitation to the creation of non-routine assignm (Schoenfeld, 2016)ents that encourage critical thinking. The characteristics of each model are summarized in Table 3 and confirm that achieving the construction model represents the pinnacle of teacher creativity in designing original and meaningful digital learning experiences.

Table 3: Characteristics of Creative Model in Developing Child-Friendly Digital-based Assignments

No.	Aspect	Characteristics of Creative Model in Developing Assignments			
		Imitation	Transition	Modification	Construction
1.	Problem Context	Copying the problem context	Copying the problem context	Changing the problem context	Changing the problem context into a new problem
2.	Completion Procedure	Copying a solution procedure	Partially copying or partially changing a solution procedure	Partially changing a solution procedure	Changing the assignments, thereby changing the solution procedure, changes
3.	Assignments Structure	Copying the assignments structure	Copying or changing the assignments structure	Changing the assignments structure	Changing the assignments structure to a non-routine

The table showed four creative model for teachers in developing child-friendly digital-based assignments, namely imitative, transition, modification, and construction, each representing a higher level of creativity. The height of creativity was found in the construction model, where teachers transformed the problem context into a new format and changed the assignments. The feature allowed the solution procedure to be altered fundamentally, and even changed the structure of the assignments to a non-routine. This model reflected divergent thinking and complex problem-solving skills, enabling children to create new and original subjects (Smith L. K., 2023). Understanding the characteristics of the mentioned creative model is important for teachers in designing and facilitating digital assignments that are appropriate to the developmental level and creative potential of children (Limbong, 2024).

6. Conclusion

The creative model in this research is positioned as a conceptual framework for understanding teacher creativity as a cognitive process that develops gradually in the development of Child-Friendly Digital-Based Assignments. The four characteristics of the model Imitative, Transitional, Modificative, and

Constructive do not only represent different levels of innovation, but also reflect an increase in the complexity of teachers' thinking from reproductive practices to the creation of original non-routine assignments. These findings confirm that teacher creativity is not an instant achievement, but rather the result of continuous interaction between cognitive processes, pedagogical demands, and the digital learning context. Although this study is limited to one regional context and level of education, the characterization of the process and indicators of the creative model produced has conceptual transferability to other educational contexts with similar characteristics.

Therefore, educators need to be systematically encouraged to move beyond the imitation phase through the strengthening of design thinking-based training, practice reflection, and professional collaboration. In parallel, policymakers are expected to integrate child-friendly digital-based pedagogical innovations into the curriculum and teacher professional development schemes. Further research needs to examine the factors that drive and inhibit the transition between creative models, as well as the implications of each model on student learning outcomes and HOTS development more broadly and longitudinally.

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8. References

- Abdallah, A. K. (2023). Induction Programs' Effectiveness in Boosting New Teachers' Intruction and Student Achievement: A Critical Review. *International Journal of Learning, Teaching and Educational Research*, 22(5), 493-517. <https://doi.org/10.26803/ijlter.22.5.25>
- Alimuddin, A. J., Juntak, J., & Jusnita, R. (2023). Teknologi dalam pendidikan: Membantu siswa beradaptasi dengan revolusi industri 4.0. *Journal on Education*, 5(4), 11777-11790. <http://jonedu.org/index.php/joe>.
- Alshammari, S.H. (2024). The effects of technical skills, attitudes, and knowledge on students' readiness to use 4.0 industrial revolution technologies in education. *International Journal of Education in Mathematics, Science, and Technology (IJEMST)*, 12(1), 40-52. <https://doi.org/10.46328/ijemst.3638>
- Amabile, T. M & Pratt, M. G. (2021). Creativity and the social environment: An updated componential theory. *Creativity Research Journal*, 33(4), 1-15. <https://doi.org/10.1080/10400419.2021.1982099>
- Aurelia, F. (2021). Students creative thinking profile as a high order thinking in the improvement of mathematics learning. *European Journal of Educational Research*, 10(3), 1247-1258. <https://doi.org/10.12973/eu-jer.10.3.1247>.
- Baer, J. & Kaufman, J. C. (2022). Teaching for creativity: Domain-specific approaches and iterative development. *Journal of Creative Behavior*, 56(3), 570-582. <https://doi.org/10.1002/jocb.527>
- Beghetto, R. A. (2017). Lesson unplanning: Toward transforming routine tasks into non-routine problems. *ZDM*, 49(7), 987-993. <https://doi.org/10.1007/s11858-017-0885-1>.
- Chen, L., Wang, Y., & Li, X. (2023). Designing Interactive Digital Learning Materials for Young Learners. *Educational Technology Journal*, 45(2), 112-125.
- Creswell, J. W. (2018). *Research Design:Qualitative, Quantitative, and Mixed Methods Approaches (5th ed.)*. SAGE Publications.

- Davis, A. & Brown, B. (2021). *The Innovative Educator: Fostering Creativity in Digital Pedagogy*. Routledge.
- Denzin, N. K., & Lincoln, Y. S. (2018). *The SAGE Handbook of Qualitative Research*. Sage Publications.
- Easterday, M. W. (2021). Design-based research synthesis: Developing design principles and theoretical contributions for learning environments. *Journal of the Learning Sciences*, 30(3), 383-418. <https://doi.org/10.1080/10508406.2020.1864052>
- Elgrably, H. & Leikin, R. (2021). Kreativitas Dwi, R. M. (2022). Activist learners' creative thinking processes in posing and solving geometry problem. *European Journal of Educational Research*, 11(11), 117-126. <https://doi.org/10.12973/eu-jer.11.1.117>.
- Johnson, R. & Lee. (2020). 21st Century Skills in a Digital Age: A Framework for Educators. *Journal of Educational Psychology*, 88(4), 567-580.
- Joklitsche J, Root B, & Schindler M.. (2022). Gagasan tentang Kreativitas dalam Penelitian Pendidikan Matematika: Sebuah tinjauan literatur Sistematis. *Jurnal Internasional Pendidikan Sains dan Matematika*, 20, 1161-1181. Doi:10.1007/s10763-021-10192-z.
- Kim, K. H. (2023). Creativity assessment: Past, present, and future. *Psychological Science in the Public Interest*, 24(1), 1-31.
- Leikin, R. & Berman, A. (2024). Mathematical creativity: Recent advances and future directions. *ZDM – Mathematics Education*, 56(1), 1-15.
- Leikin, R. & Pantazi, P., D. (2023). Creative Thinking in Mathematics Education: What is it, why is it important and how to foster it? *ZDM–Mathematics Education*, 55(2), 223-236. <http://dx.doi.org/10.1007/s11858-012-0459-1>.
- Levenson, E. (2015). Creativity and mathematics education: An intersection of two worlds. *ZDM Mathematics Education*, 47(2), 195-208.
- Limbong, C. Y. (2024). Bermain Sambil Belajar: Strategi Pembelajaran Kreatif di Pendidikan Anak Usia Dini Ramah Anak. *Kiddo: Jurnal Pendidikan Islam Anak Usia Dini*, 3(2), 520-530. <http://doi.org/10.19105/tjpi>.
- McKenney, S. &. (2019). *Conducting educational design research (2nd ed.)*. Routledge.
- Murangira, F., Uworwabayeho, A., & Twagilimana, I. (2024). Teachers' Perceptions towards Practical Instruction Approach in Teaching Mathematics: A case of Selected Teachers in Ugandan Secondary Schools. *International Journal of Learning, Teaching and Educational Research*, 23(10), 415-434. <https://doi.org/10.26803/ijlter.23.10>
- Nielsen, J. & Budiardjo, S. (2023). Observing teacher-student interaction with technology in the classroom: A participatory approach. *Journal of Educational Technology & Society*, 26(4), 112-125.
- Noble, H. & Smith, J. (2024). Triangulation in qualitative research: A systematic review. *Qualitative Research Journal*, 24(2), 154-171.
- Orbanus, N., Wullur, M.M., & Modigir, N. (2024). The Role Of Digital Technology To Enhance Creativity And Innovation Skills For Learners In The 21st Century Era. *Journal Eduvest*, 4(10), 9646-9653. <http://dx.doi.org/10.59188/eduvest.v4i10.38826>.
- Pourdavood, R. & Yan, M. (2021). Preparing Pre-service and In-service Teachers to Teach Mathematics and Science Using an Integrated Approach: The Role of a Six-Week Summer Course. *International Journal of Learning, Teaching and Educational Research*, 20(1), 64-85. <https://doi.org/10.26803/ijlter.20>
- Sandoval, W. (2020). Conjecture mapping: An approach to systematic educational design research. *Educational Psychologist*, 55(4), 204-218. <https://doi.org/10.1080/00461520.2020.1822477>
- Schindler, M. & Lilienthal, A.. (2020). Proses Kreatif Siswa dalam Matematika: Wawasan dari Wawancara Ingatan yang Distimulasi dengan Pelacakan Mata pada Pekerjaan Siswa pada Beberapa Tugas Solusi. *Jurnal Internasional Pendidikan Sains dan Matematika*, 18(8), 1565-1586. Doi: 10.1007/s10763-019-10033-0.

- Schoenfeld, A. H. (2016). Learning to think mathematically: Problem solving, metacognition, and sense making in mathematics. *Journal of Education*, 196(2), 1-38. <https://doi.org/10.1177/002205741619600202>
- Seidman, I. (2013). *Interviewing as Qualitative Research: A Guide for Researchers in Education and the Social Sciences*. Teachers College Press.
- Smith, J. &. (2022). The Impact of Digitalization on K-12 Education. *International Journal of Educational Research*, 78(1), 45-58.
- Smith, L. K., Johnson, M. A., & Davis, R. B. (2023). Divergent Thinking and Problem Solving in Early Childhood: A Longitudinal Study of Creativity Development. *Early Childhood Research Quarterly Journal*, 65(1), 123-135.
- Sriraman, B. & Dickman, B.. (2017). Mathematical pathologies as pathways into creativity. *ZDM*, 49(1), 137-145. <https://doi.org/10.1007/s11858-016-0822-8>.
- Subanji, Nusantara, T., & Rahmatina, D. (2021). Kerangka kerja kreatif statistik dalam aktivitas statistik deskriptif. *Jurnal Pembelajaran Internasional*, 14(2), 591-608. <https://doi.org/10.29333/iji.2021.14233a>
- Zamzam, K, Sa'dijah, C., Subanji, & Rahardi, S. (2023). The Creative Thinking Process of Prospective Teachers in Developing Assignments. *J. High Educ Theory Pract*, 23(1), 101-108. <https://doi.org/10.33423/jhetp.v23i1.5793>.