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Implementation of Creativity Media for Mathematics, Science, and Technology in Early Childhood Education During Flood Periods at Ra Al Huda Kayen Pati

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Abstract
Flood periods require special attention, particularly in affected areas such as Pasuruhan Village, Kayen, Pati, which experiences annual flooding. This event disrupts public facilities, including education services. RA Al Huda faced a two-month hiatus in learning activities during the flood, leaving early childhood students (ages 4–6) to play at home without structured learning. Creativity in teaching mathematics, science, and technology (MST) for early childhood education became a critical innovation in a community service program under the KOSABANGSA 2024 initiative by DRTPM Kemendikbudristek. This program was implemented by the Universitas Ivet team in collaboration with Universitas Negeri Semarang as the advisory team. The initiative aims to develop learning media to sustain education during floods. The implementation strategy involves management and social empowerment aspects, including flood-period management for early childhood education, parenting programs, and partnerships with parents. The development of this community service project follows the ADDIE model, which includes five stages: analysis, design, development, implementation, and evaluation. The study sample consists of the principal and teachers of RA Al Huda Pasuruhan, Kayen, Pati, along with parents. The innovation was validated by experts, achieving a score of 3.59 in the "excellent" category. The outcomes of this community service include enhanced management capabilities and social empowerment for teachers and parents in implementing creative MST learning media for early childhood education during flood periods. The novelty of this project lies in the technological innovation of learning media specifically designed for early childhood education during floods.

Keywords: *Creativity, Technology, Learning Media, Early Childhood, Flood Period*

INTRODUCTION

The continuity of learning is a crucial aspect of education implementation. In line with the goal of national education to shape well-rounded Indonesian citizens, the process must proceed optimally (Sisdiknas, 2023). Parents play a vital role in monitoring their children's learning progress to ensure the optimal continuation of education (Isnaeni et al., 2022). The diverse natural conditions across Indonesia influence the quality of education in achieving the minimum standards outlined in Regulation of the Ministry of Education and Culture No. 12 of 2024 (Permendikbud, 2024). According to the 2024 Kosabangsa guidelines, certain disaster-prone areas require special attention, including the disaster-prone regions of Pati Regency, Central Java.

Pati Regency, located in Central Java, Indonesia, is one of the focus areas for the Kosabangsa 2024 program due to its disaster-prone nature. Pati, characterized by flat and concave topography, is highly vulnerable to flooding (BPBD Pati Regency, 2014). The region experiences almost annual flooding, affecting daily life and educational activities. Data from the National Disaster Management Agency (BNPB) in 2024 indicated that 4,521 individuals (1,094 households) were affected by floods across eleven sub-districts in Pati Regency.

Pasuruhan Village in Kayen Sub-district, Pati Regency, is one of the villages heavily impacted by annual flooding (BNRP, 2014). Surrounded by the Kendeng Mountains and situated in a basin,

Pasuruhan is prone to repeated flooding during the rainy season, often multiple times. This flooding disrupts daily routines and public activities, including early childhood education services. RA Al Huda, an early childhood education institution in Pasuruhan Village, is among those severely affected, with learning activities ceasing for approximately two months during floods.

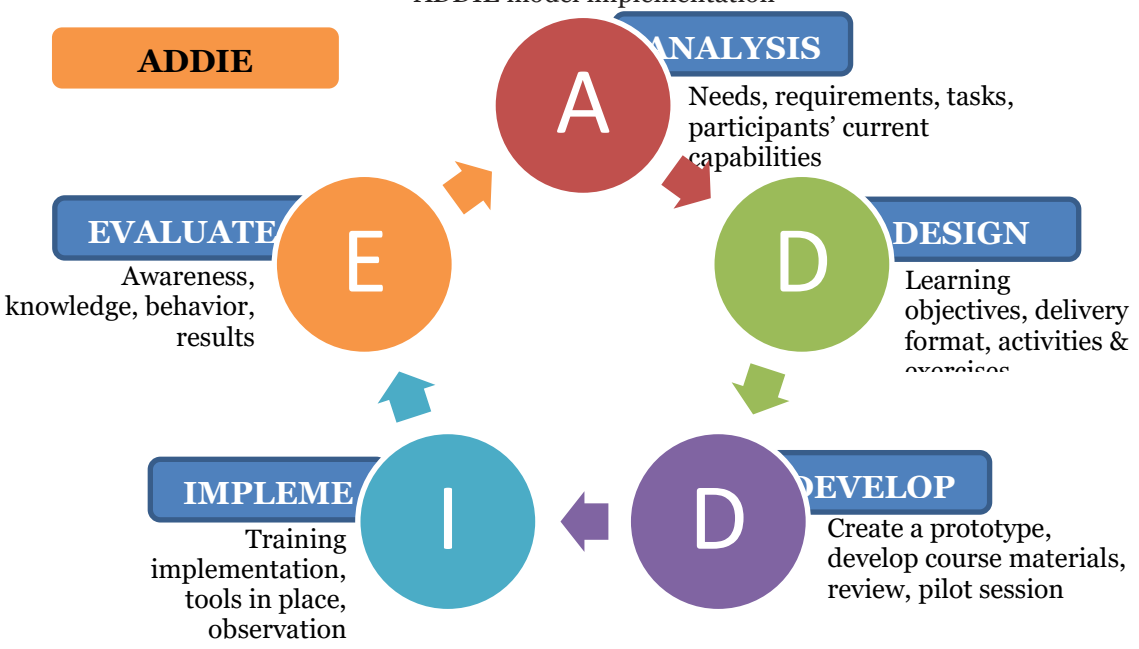
Early childhood requires continuous stimulation across six developmental aspects to achieve optimal growth and development (Elyana, 2020). The cessation of learning during floods halts this stimulation, creating a significant gap in their developmental process. This situation demands effective solutions.

The community service team from Universitas Ivet and Universitas Negeri Semarang, through the Kosabangsa 2024 program, aims to provide positive contributions and solutions to address the disruption of early childhood education during floods at RA Al Huda in Pasuruhan Village, Kayen, Pati. The Kosabangsa activities involve implementing early childhood learning media during floods, specifically focusing on the Creativity in Mathematics, Science, and Technology (MST) media (Hidayah et al., 2018). This technology-based learning media is designed for use at home with parental support during flood periods. The involvement of parents in these activities has been shown to increase children's interest in learning (Rahayuningsih et al., 2022).

METHODS

This community service utilized a development model (Ibrahim et al., 2024). Development research is a method used to create specific products and evaluate their effectiveness (Sugiono, 2015:407). This study employed the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. These stages are illustrated in the diagram below:

Chart 1.
ADDIE model implementation



The ADDIE model is an instructional design framework that provides an organized process for developing MST creativity media for early childhood education during flood periods. This media can be used for both face-to-face learning and technology-based online learning.

RESULTS AND DISCUSSION

A. Community Service Results

This community service was conducted at RA Al Huda, Pasuruhan Village, Kayen, Pati. The

development of creative learning media for mathematics, science, and technology (MST) for early childhood education was carried out using the ADDIE development model.

B. Data Presentation of Trials

This section explains the design and development of MST creative learning media for early childhood education during flood periods and the feasibility of the disaster-response media using the ADDIE development model. There are five stages in this process, as described below:

1. **Analysis Stage (Analyze)**
   The analysis stage involves planning, development, implementation, and evaluation. However, this study was conducted only up to the development stage. The first step, **analysis (analyze)**, is aimed at identifying the needs and issues present in the school related to the learning process. This stage was carried out through observations and interviews with representatives of teachers and parents at RA Al Huda, Pasuruhan. The data from the observations and interviews were summarized and analyzed to identify shortcomings in the learning process.

Figure 1. The Condition of RA Al Huda During Floods.

2. **Design Stage**
   The second stage, the design stage, involves planning and the process of creating a design for the application-based MST media. During this stage, the media or product is designed based on the data collected during observations and interviews. The development of the media or technological innovation product is carried out with the assistance of industry partners to streamline the production process. A well-designed product with strong audiovisual support is crucial for facilitating the learning process (Siregar et al., 2023). The instructional design includes elements that stimulate critical thinking and foster 21st-century skills from an early age. It trains children to think critically and find simple solutions during floods, tailored to their developmental stage.

Figure 2. Design of Early Childhood Education Learning Media During Floods.

3. **Development Stage**
   The third stage, the development stage, involves the creation, testing, and evaluation of the developed product or media. During this stage, the product is evaluated by two experts, namely lecturers with expertise in their respective fields, to gather feedback on the innovation of the MST learning application for early childhood education during floods. The development process enriches the substance and forms of support for flood-period learning, tailored to children's developmental needs (Elyana, 2028).
4. **Implementation Stage**
   At this stage, essential content in mathematics, science, and technology for early childhood education, based on technological innovation, is implemented. This stage is supported by early childhood education management skills and parenting practices during flood periods. The implementation is accompanied by a standard operating procedure (SOP) for flood-period learning guidance and hands-on learning practices to strengthen its application.

Figure 3. Early Childhood Education Management and Parenting Activities During Floods.

4. **Evaluation Stage**

In this stage, observation instruments are prepared by teachers in collaboration with students involved in the KOSABANGSA activities. Observations are carried out at the beginning, middle, and near the end of the flood period, covering evaluations of parental involvement, teacher and student engagement, and the use of both physical and technology-based tools. The evaluation also includes daily assessments during the flood period, such as checklists and documentation of activities. The evaluation results can be analyzed as follows:

Based on the assessment results from learning experts presented in Table 1, the average evaluation score for the MST creativity media for early childhood education during floods is calculated as follows.

Table 1

No.	Respondent	Comments, Suggestions, Feedback
1.	Expert 1	Develop a more detailed guide that includes the safety and comfort of children learning at home. Simplify the SOP to make it easier to use.
2.	Expert 2	Filter the use of the MST early childhood education media app with keywords to ensure more privacy and avoid misconceptions.

The review of early childhood mathematics, science, and technology learning during floods was conducted using a questionnaire instrument with a 4-point scale for each assessment component, with the following ratings:

- "Very Good = 4"
- "Good = 3"
- "Not Good = 2"
- "Very Poor = 1"

Table 2

No.	Criteria	Expert 1	Expert 2	Average
1.	MST Media for Early Childhood Education is easy to use	4	4	4
2.	Child's concentration is measured well	4	3	3.5
3.	Child does not get bored quickly	4	4	4
4.	MST material is varied and educational	4	3	3.5
5.	Active parental involvement in guidance	3	4	3.5
6.	Use of physical media in rotation	3	3	3
7.	Duration of physical MST media use is appropriate	3	3	3
8.	Physical MST media used 4 times in the beginning	3	4	3.5
9.	MST Early Childhood Education app used from meeting 4 to 12	4	4	4
10.	Implementation of MST media 3 times a week	4	4	4

11.	Daily assessments utilize documentation	4	3	3.5
12.	Daily assessments utilize checklists	4	3	3.5
13.	Monitoring of activities via WA group (parents and teachers)	4	4	4
14.	Child's reflection on being independent and guided	3	3	3
15.	Parent's reflection on being independent and guided	3	4	3.5
16.	Teacher's reflection on being independent and guided	4	4	4

M = ∑x : N = 57.5 : 16 = 3.59

Note:
M: Mean (average)
∑x: Total score
N: Total number of objects.

Based on the calculation, the average product validation score by design experts is 3.59, which, according to the 4-point scale, falls within the range of $3.25 < M \leq 4.00$, categorized as "Very Good."

CONCLUSION

The creativity media for learning mathematics, science, and technology for early childhood education during floods is an important innovation resulting from the community service program of Kosabangsa, a collaboration between Universitas Ivet and Universitas Negeri Semarang. It was implemented to provide a solution to the disruption in learning for children during floods at RA Al Huda, Pasuruhan Kayen Pati. Its implementation involved collaboration with parents at home during the flood period. Parental partnership was one of the key factors contributing to the success of this learning media innovation. The content related to this activity includes early childhood education management and parenting during floods, as well as the Standard Operating Procedures (SOP) for the implementation of learning. The development of the innovation involved expert validators and received a score of 3.59, categorized as "Very Good." Reflection was conducted both for the students, teachers, and parents, both independently and guided. Learning took place 3 times a week, using a variety of physical and application-based media. The creativity media for learning mathematics, science, and technology for early childhood education during floods has proven effective in addressing the disruption of learning at RA Al Huda Pasuruhan Kayen Pati.

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