Development of hybrid-based rotemz teaching media in science to foster learning interest of elementary school students

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Abstract

This research aims to develop and evaluate the hybrid-based learning media "Rotemz" in elementary schools, especially to foster students' interest in learning. Currently, hybrid-based learning media is still rarely available in elementary schools. The research method used is research and development. The development of this teaching media was carried out based on an analysis of the needs of grade 4 students using the 4D development model. The development procedure includes the Define, Design and Develop stages. Media validation is carried out by involving media experts, natural science material experts, and practitioners. The validation results are used as a basis for improving learning media. This teaching media was implemented at SDN Ketintang II Surabaya involving 30 grade 4 students. The effectiveness of the media in fostering students' interest in learning was evaluated using a questionnaire filled in by teachers and students after the learning process. The research results show that Rotemz teaching media obtained very good validation results based on several important aspects such as media appearance, material durability, language, suitability to learning objectives, and concept correctness. Rotemz teaching media is very suitable for use in learning in fourth grade elementary schools. The use of this media has succeeded in growing students' interest in learning and helping overcome students' learning concentration problems. Rotemz teaching media is different from existing learning media because this media is hybrid and 3-dimensional based with a focus on natural resource material.

Keywords: Hybrid-based teaching media, rotemz, elementary school, science, student learning interests

INTRODUCTION

Hybrid–based science teaching media in elementary schools is still not available. Currently, the availability of teaching media is only available online or offline teaching media (concrete teaching media), but there is no integrated teaching media (hybrid). Online-based science teaching media that currently exist include interactive multimedia (Juniari and Putra, 2021), video scribe (Putri et al., 2021), animated videos (Sunami and Aslam, 2021), and digital comics (Dewi Siregar, 2021). Many offline-based science teaching media (concrete media) are lost and easily damaged (37008073 et al., 2013). Therefore, it is necessary to fulfill the availability of hybrid-based teaching media called "Rotemz" to foster students' interest in learning.

Teaching media is important for arousing elementary school students' interest in learning. Students' learning interests must be well understood, because they can influence student success. Interest in learning is the tendency of students to feel happy, enthusiastic and pay attention to learning (Slameto, 2010). One effort to increase students' interest in learning is by using teaching media (Erlangga, 2022). Therefore, the use of teaching media is very important in learning because teaching media is a tool to foster elementary school students' interest in learning.

Research related to hybrid-based teaching media in fostering interest in learning is still rarely conducted. However, much research has been conducted on online or offline teaching media. Technology-based teaching media can improve elementary school students' learning outcomes Nurfadhillah, Azhar, et al., 2021). YouTube teaching media can increase students' interest in learning and learning motivation in public speaking courses (Mujianto, 2019). Quizziz teaching media on citizenship material can increase the motivation of fourth grade elementary school students (Iskandar et al., 2022). Interactive multimedia can increase reading interest (Supardi, 2014) and learning interest in class VII students in mathematics (Kirana et al., 2022). Conventional teaching media can increase high school students' interest in learning in citizenship subjects (Nurgiansah, 2022). E-learning teaching media influences student interest in e-learning courses (Oktarika et al., 2015). Monopoly teaching media can effectively increase high school students' interest in learning in geography subjects (Siskawati et al., 2016). Computer graphic teaching media and video tutorials can increase the interest and learning outcomes of students in fine arts study programs (Kartono et al., 2020).

It is hoped that the use of hybrid learning media can foster elementary school students' interest in learning. In today's digital era, learning is not only limited to space and time. In Era 4.0, education at elementary school level is required to be able to adapt to technological developments. Creating a more effective and enjoyable learning climate is one of the advantages of implementing learning with technology. Apart from that, technology-based learning equipped with games and quizzes can stimulate students who are slow learners to understand the lesson. Teachers can develop effective and efficient learning activities by utilizing technological advances. One of the hybrid-based science learning media is Rotemz (Rotation of Games and Quiz).

Rotemz teaching media is different from existing teaching media because this teaching media is hybrid-based and 3-dimensional with natural resource materials. This media is more multifunctional because it can be used in offline, online or hybrid learning by utilizing digital technology. This teaching media is more interactive because it provides opportunities for students to interact socially and solve problems directly. The aims of this research are (1) to determine the validity of hybrid teaching media and (2) to determine the effectiveness of the hybrid teaching media "Rotemz" in fostering students' interest in learning.

RESEARCH METHOD

This research is a type of research and development. The hybrid-based learning media "Rotemz" was developed based on an analysis of the needs of grade 4 students. This media development used the 4D development model. The development procedure consists of: (1) define, (2) design, (3) develop, (4) disseminate (Thiagarajan et al., 1974). The first stage is define: selecting material in

the science subject (natural resources) and analyzing the characteristics of fourth grade elementary school students. The second stage is design: choosing media, format and designing content. The third stage is develop: validating the media with experts and limited trials in elementary schools and revisions based on the trial results. The fourth stage of dissemination was not carried out in this study.

Validation activities use expert validation sheets for media experts, science material experts and practitioners as expert judgment. The validation instrument functions as a data collector regarding media suitability from material and media experts. The validity of this teaching media is calculated by averaging the assessments of the indicators given to each validator. Based on the average value for each indicator, an average is determined for each aspect with the following conditions: score 1 (very inadequate), score 2 (not feasible), score 3 (fairly adequate), score 4 (decent), and score 5 (very worthy). The validation data is used as a basis for improving teaching media. The average calculation formula is as follows: The assessment results are qualitative values based on the guidelines and converted into a five-point scale. This calculation is used to determine the feasibility of the "Rotemz" teaching media.

This teaching media is also implemented at SDN Ketintang II Surabaya. The subjects of this research were 30 students in class 4. The effectiveness of media in fostering students' interest in learning was measured using teacher and student questionnaires. A questionnaire is used to describe students' learning interests after learning using rotemz teaching media (Arikunto, 2013).

Implementation of teaching media begins with explaining the procedures for using rotemz teaching media. During learning, students play offline and online games which contain material and questions. Giving this question is used to evaluate student understanding. After learning, students are asked to fill out a questionnaire regarding student responses to Rotemz teaching media. Teacher and student response data are used to describe students' interest in learning after learning activities using the hybrid-based teaching media "Rotemz".

RESULT AND DISCUSSION
Result

Rotemz teaching media is designed based on several analyzes of student needs (analysis of learning objectives and student characteristics). Learning objectives contain competencies as evidence of achieving learning objectives and the scope of teaching material. The learning objective in this research is for students to be able to know and explain about natural resources and efforts to preserve natural resources. The idea of designing project activities that students will work on is key to this lesson. This is a form of teacher creativity. The teacher pours out the student project design on the lesson plan outline sheet. According to R: I became challenged to be able to design interesting learning projects. I'm presenting something new in my learning, and I'm sure my students will feel enthusiastic about learning. This is what I didn't find when I applied conventional learning.

This teaching media design is a hybrid-based teaching media that contains materials, games and quizzes. It is hoped that the use of hybrid learning media can provide a more interactive and meaningful learning experience for students. The name Rotemz which means (Rotation of Game and Quiz) is based on the shape of the rotemz media which is divided into 4 sides and on each side there is material like a rotating earth and on each side there is very diverse natural wealth. The games and quizzes in the Rotemz teaching media not only contain interesting material but also contain fun games and quizzes. Details can be seen in Table 1.

Table 1. Description of Rotemz Teaching Media

Picture	Description
	Side 1 This section contains an overview of renewable and non-renewable natural resources. Students can see replicas of natural resources. This side also has a QR Code that can be connected to a voice that explains the contents of side 1.
	Side 2 This section contains a replica of the process of the water cycle, where water is one of the natural resources that can be renewed. This side also has a QR Code that can be connected to a voice that explains the contents of side 2.
	Side 3 This side contains a description of activities that can cause damage and activities to preserve natural resources, so that students can easily understand what activities they should do and what they should not do. This side also has a QR Code that can be connected to a voice that explains the contents of side 3.
	Side 4 ide 4 is the last side in this media, on this side there are games that students can play directly. This side has a QR Code that connects students to online or digital games (RPG Playground).
	RPG Playground Players will act as a child who has a high curiosity about "Natural Resources" so he goes on an adventure across several regions to collect knowledge. Players will face challenges such as answering quizzes that must be completed with the help of the scientific material they have studied.

The validation results from media experts and material experts are: media display 4.5, media material durability 4.3, and language 4.6, suitability to learning objectives 4.3 and concept correctness 4.3. This shows that the Rotemz teaching media is very suitable for use in fourth grade elementary school learning. The results of the feasibility of teaching media can be seen in Table 2.

Table 2. Media Feasibility Based on Media Experts and Science Material Experts

Aspects	Average Score	Criteria
Media display	4,5	Very suitable for use
Media material durability	4,3	Very suitable for use
Language	4,6	Very suitable for use
Suitability to learning objectives	4,3	Very suitable for use
Concept correctness	4,3	Very suitable for use

The students' response after learning was: rotemz teaching media can foster interest in learning. Student responses can be seen in Table 3. This teaching media makes class IV students more enthusiastic in learning. Students really enjoy using rotemz learning media because they can play while learning. The class 4 teacher's response was that the rotemz teaching media was suitable for use in overcoming current problems where students had difficulty concentrating on learning. Therefore, there is rotemz teaching media that attracts students' attention so that students can focus more and pay attention to learning. Students play an active role in learning through educational games contained in the rotemz learning media.

Table 3. Student Responses to Rotemz Teaching Media

Aspects	Average Score	Criteria
Media display	88	Very good
Media makes learning more fun	91	Very good
Media fosters interest in learning	92	Very good
Clarity of material in the media	90	Very good

Discussion

Rotemz is a suitable teaching media for elementary school students because it is unique, interesting and contains games. Elementary school students tend to be more interested in learning media that is fun and includes games (Olisna et al., 2022; Pambudi, 2016). Unique and interesting learning media can foster students' interest in learning and can support the achievement of learning goals. Interesting teaching media can be a stimulus for students in the learning process (Nurfadhillah, Ningsih, et al., 2021; Nurrita, 2018).

One of the main uniqueness of this research compared to other research is the use of hybrid-based Rotemz as an innovative learning media in elementary schools. Hybrid-based learning media is designed so that students have knowledge about how to provide practical and realistic opportunities by combining conventional (face-to-face) learning and online learning (Verawati and Desprayoga, 2019). This is different from other research which only uses traditional teaching media (Manoppo et al., 2022; Taupik et al., 2023) or only digital teaching media (Adventyana et al., 2023; Jannah and Atmojo, 2022), without integrating the two. This hybrid approach not only enriches the learning experience and increases student participation, but also facilitates a deeper understanding of the teaching material (Wijaya et al., 2024).

Rotemz is designed taking into account the age and level of development of students, so that students can understand science concepts more easily. Teaching media (concrete and digital teaching media) must be adapted to the age and development stages of students (Zaini and Dewi, 2017). Sufficient understanding of the development of elementary school students' characteristics will support the success of the learning process (Astini and Purwati, 2020).

The results of this research show that Rotemz media can foster students' interest in learning and it makes students very happy and enthusiastic because students can play while learning. One method that a child wants is the method of learning while playing (Aminah et al., 2022). The teacher's role is very important in teaching science material and introducing teaching media to students. The value and benefits of learning media are largely determined by the teacher's skills in using teaching media (Sri, 2018). The next activity is playing offline and online games which are used to evaluate student understanding. Evaluation can take the form of educational games tailored to student needs (Ulya, 2021). After all students have finished answering all the questions in the game, students are asked to fill out a questionnaire regarding responses to the Rotemz learning media. The effectiveness of learning media can be obtained through teacher and student response questionnaires (Fitra and Maksum, 2021).

Rotemz teaching media can foster interest in learning in elementary school students. Technology-based teaching media can improve elementary school students' learning outcomes (Nurfadhillah, Azhar, et al., 2021). YouTube teaching media can increase students' interest in learning and learning motivation in public speaking courses (Mujianto, 2019). Quizziz teaching media on citizenship material can increase the motivation of fourth grade elementary school students (Iskandar et al., 2022). Interactive multimedia can increase reading interest (Supardi, 2014) and learning interest in class VII students in mathematics (Kirana et al., 2022). Conventional teaching media can increase high school students' interest in learning in citizenship subjects (Nurgiansah, 2022). E-learning teaching media influences student interest in e-learning courses (Oktarika et al., 2015). Monopoly teaching media can effectively increase high school students' interest in learning in geography subjects (Siskawati et al., 2016). Computer graphic teaching media and video tutorials can increase the interest and learning outcomes of students in fine arts study programs (Kartono et al., 2020).

Rotemz contains various interactive activities and gamification elements such as RPG playground games and quizzes so that learning is more fun. Gamification integrates game elements into the learning context, creating a more dynamic and interactive environment (Praptomo et al., 2024). Apart from that, gamification can increase students' interest in learning (Isnawati, 2021; Ardani and Hotimah, 2024) and can make learning more fun (Mursalin et al., 2024; Yulianto, Indriayu, et al., 2023). This gamification can provide an alternative to make the learning process more interesting, fun and effective (Jusuf, 2016).

CONCLUSION

Rotemz teaching media has received excellent validation results from media experts and material experts based on aspects: media appearance, media durability, language, suitability to learning objectives and concept correctness. This shows that Rotemz teaching media is very suitable for use in learning in fourth grade elementary schools. This teaching media is designed based on an analysis of student needs, including analysis of learning objectives and student characteristics.

This teaching media design is hybrid-based which combines materials, games and quizzes. The use of this hybrid teaching media can provide a more interactive and meaningful learning experience for students. Student responses after using this media show that Rotemz teaching media is able to foster interest in learning. Students feel more enthusiastic about learning, because students can play while learning. Positive responses also came from class IV teachers who stated that this media helped in overcoming students' learning concentration problems. Thus, Rotemz teaching media succeeded in attracting students' attention so that students could focus and pay more attention to learning. Students also actively play a role in learning through educational games contained in Rotemz teaching media.

AUTHOR CONTRIBUTION STATEMENT

The role of the author in this research is described as follows: A.L. create research ideas and basic concepts for teaching media design. F.V.R. D.F.A. prepare concrete teaching media plans. D.R. create teaching media designs on the RPG playground platform. F.K.H. A.L. provide guidance and supervision during the research process. M.K.F. contributed greatly to the preparation of the final manuscript. All authors are actively involved in evaluating teaching media to improve rotemz teaching media.

DECLARATION

The authors of this study certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

DATA AVAILABILITY

The datasets generated and/or analyzed during the study are available from the corresponding author on reasonable request.

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