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Multimedia-based E-Puzzle Development to Improve Visual-Spatial Abilities and Early Childhood Religious Character

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Abstract

The using of E-Puzzle media-based multimedia will combine various types of media needed in the game. For example, with images, text, and other media, students will use it directly through the computer-integration, namely E-Puzzle application software based on Adobe Flash Professional CS6. This study aims to develop E-Puzzle mediabased multimedia to improve the visual-spatial abilities and religious character of early childhood. This study used R&D (research and development) with the ADDIE (Analysis, Design, Development, Implementation, Evaluation) and the research design uses pre-experimental design. The subjects in this study were 12 students of group B Raudhatul Athfal Tawang Rejosari and Raudhatul Athfal Terpadu Al-Qolam. Data collection techniques was used observation, interviews, questionnaires, and tests. The data analysis technique in this research is descriptive test and prerequisite test. The results showed that visual-spatial stimulation includes an increase in the ability to perceive image patterns and colors. Simultaneously, the religious character is about knowledge of moral values, moral feelings, and moral actions through prayer movement images in the form of puzzles as an integrated learning medium with Adobe Flash Professional CS6 applications. This development is effectively used to improve children's visual-spatial abilities and religious character aged 5-6 years. Based on the results of expert validation with a mean score of 69.33%, while the N-Gain score results of the experimental class of 77.00 are in the high category and N-Gain in the controllerclass is 44.06, which belongs to the moderate category. This research can be an innovation related to multimedia in early childhood education, especially for researchers, and can be a reference for future researchers.

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INTRODUCTION

Pandemic conditions are not an obstacle for some educators and researchers to improve and develop learning innovations at both the formal and non-formal education levels, especially using relevant media to optimize the learning process. One of them is using a multi strategic approach and multimedia as a learning resource supported by the surrounding environment and adequate technology (Rahmaibu, 2016). The process of using learning media can also be carried out smoothly, namely through interaction efforts between teachers and students, so that learning takes place effectively and efficiently (Karo, 2018).

The development of science follows the flow of the technological age in every scientific field, from simple to robotics that can be implemented in higher education institutions in early childhood education. Early Childhood Education is education aimed at preschool children to develop their potential from an early age so that they can develop naturally. The hope is that children get stimulation, including religious and moral values, motor, intellectual, language, social and emotional according to their age level. There are several types of early childhood development: religious and moral development, social-emotional development, cognitive development, language development, physical motor development, and creativity development. All aspects of development occur at an early age and will continue throughout the child's life span. Still, stimulation can be done or given to optimize the development at an early age by preparing various stimulations, approaches, strategies, methods, media or tools, other educational games (Khaironi, 2018).

Based on observations made in Raudhatul Athfal (RA) Tawang Rejosari, West Semarang, there were 30 group B students. That during the learning process at school, students are provided with learning materials following the Daily Learning Program Plan (RPPH) designed by each class teacher by adhering to the curriculum and following the concept of playing while learning. In this case, children are taught using educational props (APE) media, according to the topic in the daily lesson plan when learning certain themes. In learning specific themes, there are times when interactive media are needed to convey material to students via computers as a form of introduction to information technology from an early age. But this only applies once a week. Even then, it is done with audio-visual media without involving active students, namely training the child's sensitivity or expressiveness.

The results of interviews that researchers have conducted with school principals and class teachers at RA Tawang Rejosari. Showed that there is no use of learning media with computers specifically developed by institutions on specific themes to help educators improve aspects of intelligence, including spiritual, religious, moral, social-emotional, cognitive, motoric, language, and art through interactive media puzzle's image via computer integration. Alternative media are needed to make it easier for teachers and students to interact to create a fun and interesting learning process to be applied by educators to students efficiently by developing multimedia-based E-Puzzle media.

Media can carry information and knowledge indirect interaction between educators and students. As'ari (2019), learning media is categorized as well, integrating components such as animation, images, audio, and video. According to Karsono (2019), the learning process by utilizing various learning media in each meeting can have a positive impact on students. Meanwhile, Widyaningsih (2020) states that media use has an essential role in learning as part of the media to help teachers facilitate the learning process to make it more meaningful.

Wulan (2019) and Silmi (2017), puzzle/crossword puzzle media effectively enhance and foster student character through interesting and fun learning. Meanwhile, Widyatmoko (2019) explains that learning media in the form of puzzle games with flash are considered effective and good to use based on the results of the t-test in terms of local wisdom

for student characteristics. The bingo puzzle game is an effective learning media due to the nature of the puzzle game, which consists of various kinds of pieces of pictures, boxes, shapes, letters, and numbers which are usually made of wood, making it attractive to students (Abdullah et al., 2016). Meanwhile, according to Hompu et al. (2016), multimedia using Adobe Flash Professional CS6 is interesting and can be used to make it easier for students to understand the procedures for prayer, ablution, and hijaiyah makhraj in learning. The same thing was explained by Ahmadi., et al. (2017), that the use of Macromedia Flash media in the Indonesian Culture Multimedia learning model can shape the students' character towards national cultural values. According to Wiguna et al. (2020), interactive media is an innovation in learning methods that allows children's attention when learning because the media contains images, text, graphics, sound, animation, and video processed through computer integration. Arnada (2018) also explains that interactive multimedia combines images, audio, video, text, animation, and art delivered interactively through computer-integration or digitally manipulated to become part of a message or information to users.

Therefore, the use of multimedia-based e-puzzle media will combine various types of media needed in the game. For example, with images, text, and other media, students will use it directly through the computer-integration, namely e-puzzle application software based on Adobe Flash Professional CS6.

This study aims to develop a multimedia-based e-puzzle to improve early childhood visual-spatial abilities and religious character. The benefits of this research are expected to become an innovation in expressing ideas related to the use of multimedia in the field of early childhood education

METHODS

This research uses research and development. Research and development is a method used to produce specific products and test the effectiveness of the product. The development model in this research, namely ADDIE (Analysis, Design, Development, Implementation, and Evaluation) more complete, rational and can be used in various product developments such as models, learning strategies, media, and media and teaching materials (Muazzom, 2017). In the early stages the researcher made observations to find existing problems related to the implementation of the learning theme to what extent teachers and children need multimedia that will be developed by researchers and applied in the context of learning.In the second stage, the research determined the multimedia-based E-Puzzle design, that was developed referring to conventional puzzle type patterns in schools.In the third stage, the researcher carried out the design process, then continued with the development of conventional puzzle media and became an interactive multimedia-based E-Puzzle using the Adobe Flash Professional CS6 application starting from the introduction of the prayer movement fractions in the form of Puzzler pieces in the form of images, animated characters and other audio. Then the fourth stage of implementation using multimedia-based E-Puzzle products into the learning process was carried out on children aged 5-6 years of group B RA Tawang Rejosari West Semarang. And lastly, doing an evaluation related to the advantages and disadvantages of the E-Puzzle media itself. Data collection techniques using observation, interviews, questionnaires, and documentation are adapted to early childhood development. The data analysis technique in this research is descriptive test and prerequisite test.

RESULTS AND DISCUSSION

Based on the results of several research studies on puzzle media conducted above, the use of puzzle media is still conventional to improve learning outcomes and research settings and respondents by referring to a specific variable. While in this study using multimedia-based research on the use of e-puzzles with three-dimensional animation in the form of a

particular type of puzzle pattern of prayer movements in each three-dimensional image to improve the visual-spatial abilities of early childhood (ages 5-6 years) with two measured variables. The first is visual-spatial, which includes an increase in the ability to perceive image patterns and colors. The second variable is the religious character which consists of an increase in the ability to stimulate knowledge of moral values, moral feelings, and moral value actions based on multimedia with computer integration assisted by Adobe Flash Professional CS6 software through nine images of prayer movements by selecting the ADDIE model as media development.

This is obtained after analyzing according to the ADDIE model. The result data goes through several process stages according to the existing procedures, including the following.

Analysis

This stage is used to determine the extent of teacher and student needs regarding the researcher's development. This was done by distributing questionnaires to the teachers and conducting structured interviews with students. The needs analysis results show that teachers and students want media with animation and games that are easy and effective, and fun to use in learning.

Design

The second stage of this research is to determine the conventional puzzle design. The next step after that is to create a multimedia-based e-puzzle design. The following is a detailed explanation.

Creating multimedia-based e-puzzle storyboards to improve early childhood visual-spatial skills and religious character. First, determine the design before it is developed.

1. Designing assets (characters, animation, background, creating buttons, making techniques using motion tween, frame by frame, frame to the scene, and scene by scene.
2. Specify the font size for the initial intro display. There are two types of fonts, and the first is "Learning E-Puzzle," the second is "Spatial Visual and Religious Characters."
3. To determine the name of the font, there are five types of fonts in the entire application: Jokermant, Berlin Sans FB Demi, Century Gothic, Showcard Gothic, Tw Cen MT, and Snap ITC.
4. Add sound transform (voice) and set it.
5. Call up the content menu and combine the frame, scene using a specific code snippet in the application.
6. The last stage is the publish setting process (turning it into an e-puzzle product application) with the .exe file format (software).

Development

The third stage of developing a multimedia-based E-Puzzle with the results of the Figure 1 below:

Figure 1. Puzzle Conventional

Conventional puzzle consists of nine pictures of prayer movements covered with wooden planks.The display of e-puzzle media after being developed is in Figure 2 below.

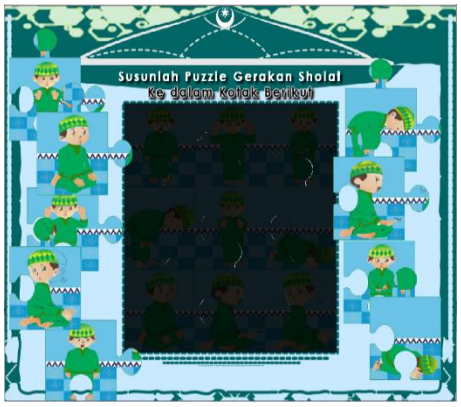

Figure 2. Multimedia-Based E-Puzzle

The electronic/digital aspect of the e-puzzle display based on multimedia has been developed using Adobe Flash Professional CS6 with additional backgrounds and three-dimensional image characters of nine prayer movement puzzles.

The display of the E-Puzzle nine prayer movements before the improvement is made in Figure 3 below:

Figure 3. E-Puzzle before Repair

When you click the navigation button, the display design of the e-puzzle development will appear inside the three-dimensional image puzzle pieces of nine prayer movements as a whole.

The display of the E-Puzzle menu after repairing the three-dimensional image of the prayer movement in Figure 4 below.

Figure 4. E-Puzzle after Repair

The display after improvement is adding ten navigation buttons in the form of numbers to the material content. Suppose selected/click will display the puzzle pieces' text description for each image of each prayer movement separately. The nine prayer movements are contained in one menu navigation button in full, displaying the image character's three-dimensional form of a specific puzzle pattern.

Interactive multimedia displays can play an effective role in developing the learning process to introduce religious and moral values to kindergarten children (Chomariyah, 2019). Animated displays in the media can help the learning process, increase learning motivation interactively through programs using flash applications (Trisyagil,. et al., 2020). The development of the animated character adapts each prayer movement's type in an orderly manner with the character of the boy's three-dimensional image to represent that the prayer leader and being a role model for others in the future.

Media Effectiveness

Before testing the effectiveness of multimedia-based e-puzzle to improve visual-spatial skills and religious character. The researcher first carried out various stages as follows.

Validity test

The validation carried out by each expert in this case, namely media experts, material experts, and practitioner experts, with each score based on the item from the multimedia-based e-puzzle development assessment questionnaire

instrument to improve visual-spatial abilities and religious character in Table 1.

Table 1. Expert Validity Test

Respondents	Total Score (%)
Material Expert	105
Media Expert	69
Expert Practitioner	34
Average	69.33

Normality test

The normality test results obtained through significant pre-test and post-test data can be seen in Table 2.

Table 2. Normality test

Class	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Pre_Eks	.240	12	.054
Post_Eks	.186	12	.200*

Based on the results of the normality test as described in table 2 above, it can be seen that the value is at a significant level based on pre-test data = 0.054> 0.05 and post-test data = 0.200> 0.05 so it can be normally distributed.

Homogeneity test

The homogeneity test results show a significant value following statistical calculations, and this can be seen based on Table 3.

Table 3. Homogeneity Test

Levene Statistic	df_1	df_2	Sig.
.372	1	22	.548

The results of the homogeneity test obtained a significant value of 0.548 > 0.05. Then the hypothesis of H0 is accepted, and it is concluded that the variance of the control and experimental classes is homogeneous.

Hypothesis testing

Hypothesis testing is done using the t-test using SPSS 23 obtained sig results. (22-tailed) = 0.000 from the learning outcomes of the pre-test and post-test experimental class. While the control class obtained a sig. (2-tailed) value = 0.000 in the pre-test and post-test. So, it can be concluded that H0 is rejected.

Effectiveness test

The results of the multimedia-based e-puzzle effectiveness test to improve the visual-spatial abilities and religious character of early childhood can be seen after the test through SPSS 23 with the N-Gain index test gets the results to score in Table 4.

Table 4. Effectiveness test

Class	N	Mean Rank
Experimental Value	12	77.00
Control Value	12	40.06

Based on the results of the effectiveness test as described in table 4 above, it can be seen that the experimental value = 77.00 in the high category, while the control value = 40.06 is included in the medium category. This can be seen based on the effectiveness of the multimedia-based E-Puzzle test to improve the visual spatial ability and religious character of early childhood through index n-gain tests so that the experimental class is higher than the control class as described in the table above.

From several stages that the researchers have carried out starting from the validity test, normality test, homogeneity test, and effectiveness test on 12 students in the experimental class, it is known that multimedia-based E-Puzzle can improve visual spatial abilities and religious character of early childhood. As done by Lin and Chen (2016), Sagita (2019), Wulan (2019), Silmi (2016), Utomo et al. (2019) regarding the use of Puzzle media to stimulate children's sensory skills, and can grow/bring out characters learners. The learning media evaluation stage is a learning

evaluation process which is an indicator tool for assessing the achievement of predetermined goals and assessing the overall teaching implementation process, which is not just assessing an activity spontaneously and incidentally, but as a form of activity to assess something planned, systematically, and directed based on the learning objectives that must be taken to determine the effectiveness of the learning itself (Bariah and Imania, 2017).

After several stages of validation and testing in the previous explanation, multimedia-based e-puzzles are said to be suitable for learning. This is based on the value obtained from each aspect showing the final result that the media developed by the researcher is in the valid and feasible category. Multimedia-based e-puzzle learning is carried out using the Flash-based ADDIE model.

This research model is similar with that conducted by Karimah (2020), Bakhri (2019) with Kindergarten/Raudhatul Athfal (RA) research subjects with three-dimensional designs and the addition of specific interactive animations. The research is at the same level, namely early childhood education. In line with Pratiwi (2017), early childhood is the golden age where it is experiencing physical, motor, social, emotional, cognitive, language, and religious, moral development by providing fun learning through a method called creative and interactive play.

Research by. Widyatmojo (2017) states that computer-based interactive media that has learning characteristics according to students' character and has a variety of learning that is used positively, both informal and entertainment forms. Meanwhile, Arham and Dwiningsih (2016) use interactive multimedia in its implementation involving various human senses. The use of interactive multimedia can be controlled directly through the user in the form of sounds, buttons, etc.

Similar to Ahmadi, et al., (2017) the development of multimedia-based learning media is an alternative effort that is very appropriate in the process of maximizing the quality of education, especially learning using media in schools, this is expected to be able to add to the process of forming student character by introducing more children through the use of audio visual software.

In line with Azrianti and Sukma (2020), the development of learning multimedia based on Macromedia Flash follows student development based on the curriculum, and existing indicators can achieve student learning completeness, especially the use of application media in increasing the positive character of students.

But Hasanah and Deiniatur (2020), character education must also be started as early as possible to support family/parents. They can be strengthened through 8 functions: educational function, protection function, compassion function, socialization function, reproductive function, religious function, economic function, and recreation function. Meanwhile, according to Lickona (2019), good character leads to moral life and individual moral maturity. In other words, the character is interpreted as a personal quality of good morals, both attitude and behavior (knowledgeable, practice scientific, and have good moral character).

CONCLUSION

The conclusion on the development of multimedia-based e-puzzle developed in this study is to provide visualization in the form of animation adjusted according to the type of each prayer movement in an orderly manner based on three-dimensional image characters. The results showed an increase in stimulating visual-spatial abilities, namely the ability to perceive patterns, images, and colors, as well as an increase in the ability of religious characters, which included knowledge of moral values and moral feelings and moral actions. This is based on the validation test results of material experts, media experts, and practitioners with an average score of 69.33%. While, the results (N-Gain =77.00) in the experimental class and the control class (N-Gain=40.06). Based on these results, the development of multimedia-based e-puzzles can improve visual-spatial abilities and religious

character of early childhood (5-6 years old), categorized as very feasible/valid and effective in learning.

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