

Play & Fun Portal to Support “Steam” Learning Method in Early Childhood

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ABSTRACT

The Covid-19 pandemic has forced learning to change. As stipulated by the government, students of all levels of education, from early childhood to higher education, must eventually study from home through online learning. The online learning process would be effective if it is supported by media and applications that suit the needs of the students. Currently, the e-learning portals seem to be relatively limited, such as *Rumah Belajar*, *sekolah.mu*, *Zenius*, and *Ruang Guru*. Online learning particularly for early childhood is unique because in this period children learn new things that will shape themselves. One of the most popular and important methods to apply is the STEAM method (Science, Technology, Engineering, Art, and Mathematics). This method aims to stimulate these five aspects in children. Within this framework, a learning portal that is specifically used for early childhood was made. The output of this research is a learning portal specially used for early age children named the “Play & Fun” portal. In this portal, two main contents are intended to support STEAM learning, namely learning videos of scientific themes and animation-based learning media applications.

Keywords: *Learning Portal, STEAM, Early Childhood.*

1. INTRODUCTION

The current pandemic has changed education with the implementation of online learning from early childhood (PAUD) to a higher level as the policy stipulated by the Indonesian government. The implementation of online learning requires PAUD teachers to actively incorporate technology that is user-friendly and easily accessible to parents and children in virtual classrooms. Recently, PAUD teachers have commonly utilized popular online platforms such as WhatsApp groups, Google Drive, Zoom, Google Meet, websites, social media accounts such as Instagram and Facebook for sharing information, and YouTube videos as teaching resources. Yet, PAUD teachers are still facing problems regarding how to upgrade their skills in utilizing computers. Another obstacle is in making interactive instructional videos that are attractive to children and aligning the videos with relevant topics in the classroom.

Moreover, online learning is a scourge for parents. Many parents assume that online learning adds

a burden to their routines because they have to accompany their children during the online learning sessions. Not to mention the tasks given by teachers must be completed within a certain time.

As for children, online learning creates a gap between a teacher and his students. This gap could be wider if the teacher fails to establish a strong bond with their students through an interesting learning process by playing. Playing is one basic need in early childhood. By playing, children can develop all aspects of development, including religious, moral, cognitive (including science, technology, engineering, and math), language, art, physical motor, and social emotions aspects. In addition to playing, children are imaginers; provided with good stimuli, their imagination could serve as a fundamental basis for their future.

STEAM is seen as an appropriate method for optimizing aspects of early childhood development. Integrating Science, Technology, Engineering, Arts, and Mathematics into a holistic educational process, STEAM is believed to be one of

the most efficient learning methods [1]. STEM learning needs to emphasize several aspects of the learning process [2]. Furthermore, as it promotes children's curiosity and creativity, STEAM is considered suitable for early childhood education curriculum [3]. The STEAM approach can also invite children to understand phenomena that are close to themselves or the environment and can encourage children to explore their abilities in their way. STEAM-based learning planning can train children to be able to analyze problems with various approaches (science, technology, engineering, art, and mathematics) to survive in this rapid-paced era [4]. The method is also believed that can help attain PAUD Curriculum 2013's objectives; to provide students foundation to become citizens who can live independently and citizens who are faithful, productive, creative, innovative, and affective.

Obstacles faced by PAUD organizers and teachers also occur in Serang, Banten Province, Indonesia. Based on data gathered from questionnaires conducted by the Education Department of Serang, a need for platforms that contain interesting learning media, are user-friendly and not boring for children, informative according to the STEAM method, and are accessible to children. To address this issue, a learning portal was created, and it is named Play & Fun. The portal contains two main contents, namely that are science-themed learning videos and animation-based learning media applications. The contents are expected to support STEAM learning.

1.1. Related Work

Research on portals that are used to support early childhood learning has been carried out with relevant recent research. Govaerts explains a portal/laboratory online "Go-Lab" which directs the child of early age to study the field of STEAM. The Portal can help teachers find, use, and enhance inquiry learning online [5]. Lestari et al describe the design of learning in early childhood can be made and designed with the use of a web-based information system due to the website linkages between the program semester, RPPM and RPPH are effectively used [6]. Kingsley et al concluded-based an E-Learning website was built to address the gap in the system of preschool learning [7].

Based on the literature studies above, through the current study entitled "Play & Fun" Portal to Support STEAM Learning Methods, the researchers made a learning portal that is tailor-made for early childhood learners to give appropriate stimuli in supporting their development in the aspects of Science (S), Technology (T), Engineering (E), Arts (A), and mathematics (M) through fun play activities. This portal provides two main contents: animation-based learning media applications and scientific theme learning videos that support STEAM learning.

1.2. Our Contribution

The difference between the portal we created with the ones in the previous research is in terms of its contents, where the Play & fun portal has content that is relevant to the Steam learning method. Furthermore, video science teaching and learning media applications are animation-based.

There are two reasons why this theme was taken: firstly, early childhood is a fundamental period in children's growth and development and within this period, it is necessary to teach simple science to children of this age. Central in learning science is the process: children need to have hands-on experience in conducting scientific experiments. During this pandemic, as experiments cannot be conducted at school, the solution is to utilize learning videos. Through these videos, children, accompanied by their parents, can perform science experiments. Secondly, there are instructional videos of science created by students of the Early Childhood Teacher Education (PGPAUD) Study Program of Universitas Pendidikan Indonesia (UPI) Serang, as one of the assignments of Science Learning subject. Therefore, it is necessary to have a platform that can store these videos to be used by kindergarten teachers.

Animation-based learning media are increasingly being used in early childhood learning. Interactive animation media provides children with close-to-hands-on experiences and increases their imagination, which has positive impacts on their intellectual development. Children's intelligence must be nurtured from an early age as the brain acquires information optimally within the age of 1-5. Learning methods that incorporate information technology with interactive animation have more advantages than conventional teaching methods for children of this period of age. Interactive animations interface in education can help deliver the learning materials more communicatively that they are more retainable for students [8]. The animations are assessed according to the children's needs in forming the concept of thinking according to the scaffolding. Research shows that there are more positive impacts of animated films for toddlers than negative ones [9].

1.3. Paper Structure

In general, the research report consists of four sections, namely Introduction (Section 1), Research Methods (Section 2), Results and Discussions (Section 3), and Conclusion (Section 4).

2. RESEARCH METHODS

Play & Fun portal was created using the Waterfall Model stages. The application was made using visual

studio code, PHP language, CodeIgniter Framework, and MySQL database. This Portal contains Video learnings and Applications of learning media that support the learning of STEAM. Meanwhile, Wondershare Filmora software was utilized to create, edit, and convert science learning videos for the portal's contents. While the animation-based learning media application was made using Adobe Flash.

3. RESULTS AND DISCUSSIONS

3.1 Play & Fun Portal

The main components of an electronic platform to support STEAM-oriented learning must have an open system or e-learning and resources for teachers, and enable interactions between students and teachers [10] [11]. Under these conditions, the Play & Fun portal is made to be website-based and accessible through the link <http://playandfun.site/>, which has resources in the forms of video-based learning media and games that can be used by teachers in the learning process and provides FAQ section to facilitate communications.

There are three users on the Play & Fun portal, namely teacher, guest (students/parents), and admin. The teacher is the person in charge and eligible to carry out operations such as uploading materials, editing materials, and deleting materials. In addition, the teacher has the access to answer questions, collect questions, answer direct messages, and fill in the information on the portal. A guest is a person who has access to perform operations namely seeing the materials, either video material sourced from *YouTube* or any other materials that can be downloaded. In addition, a guest can ask questions, get answers, and send messages. Admin is the person who is in charge of and has access to manage users' data, materials, "About" page, "FAQ" page, and "Quotes". Sample user interfaces can be seen in Figures 1-4 below.

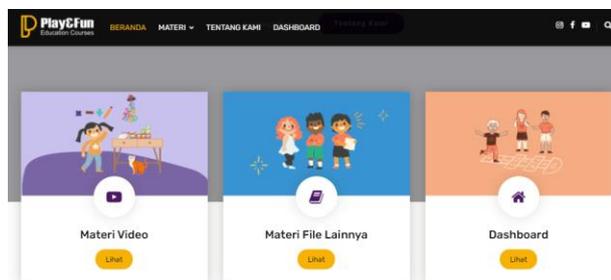


Figure 1 Menu display on Play & Fun portal (accessed on September 13, 2021)

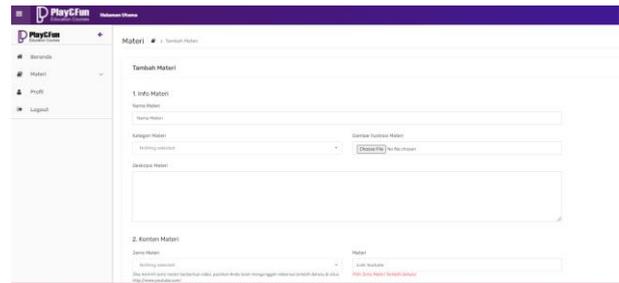


Figure 2 The user interface for adding materials by teachers (accessed on September 13, 2021)

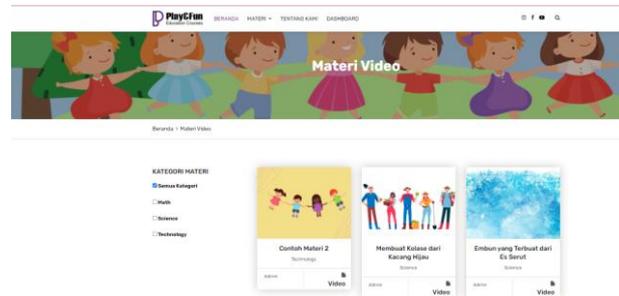


Figure 3 The user interface of video materials accessible to Guest (Student/Parents) (accessed September 13, 2021)

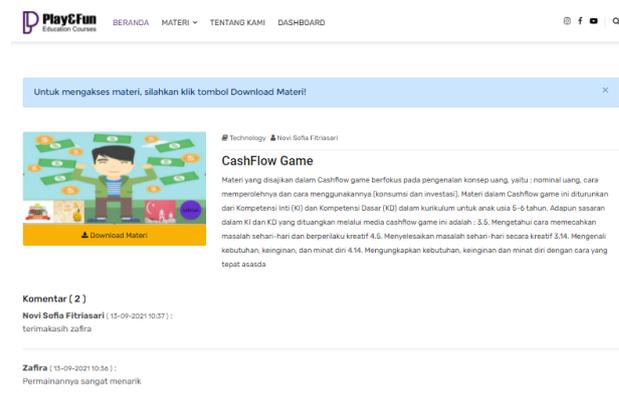


Figure 4. User Interface of FAQ (accessed on September 13, 2021)

3.2 Science Learning Video And Animation-Based Learning Media Applications That Support STEAM Learning

Utilizing various media, such as the Internet, video, games, and mobile learning to build convergent knowledge is a characteristic of STEAM [12].

3.2.1 Science Learning Videos

Science learning video is one of the main contents on the Play & Fun portal. The videos are created by PGPAUD students of UPI Serang as the products of the Science Learning Course for Early Childhood (Course Code: UD206). The scenario in the created learning videos must meet three parameters, namely introducing science, enhancing students' multiple intelligences, and

stimulating the five senses. At the stage of science, one of the scenes shows a teacher invites students to make observations, classifications, measurements, communications, conclusions, and projections. To illustrate these parameters in practice, an example of planting mung bean seeds learning video scenario is provided below:

In the observation stage, the teacher asks students to observe green beans and count the number of existing mung beans in a dish. One of the senses involved in the scene is that of sight (eyes) and these activities are expected to improve one of the students' multiple intelligences: logical-mathematical. The learning videos can be accessed through the links provided in Table 1.

Table 1. Science Learning Videos Links

No	Video Title	Link (accessed 13/09/2021)
1	Rainbow Glass	http://playandfun.site/homepage/materidetail/f457c545a9ded88f18ecee47145a72c0
2	Making a Collage from Green Beans	http://playandfun.site/homepage/materidetail/3416a75f4cea9109507cacc8e2f2aefc
3	Making Dew from Shaved Ice	http://playandfun.site/homepage/materidetail/a1d0c6e83f027327d8461063f4ac58a6
4	Lava Bubbles	http://playandfun.site/homepage/materidetail/f7177163c833dff4b38fc8d2872f1ec6
5	Planting Green Bean Seeds	http://playandfun.site/homepage/materidetail/6c8349cc7260ae62e3b1396831a8398f
6	Colorful Water Temperature	http://playandfun.site/homepage/materidetail/d9d4f495e875a2e075a1a4a6e1b9770f
7	Floating and Sinking Objects	http://playandfun.site/homepage/materidetail/642e92efb79421734881b53e1e1b18b6
8	Candles from Oil Cotton	http://playandfun.site/homepage/materidetail/c0c7c76d30bd3dcaefc96f40275bdc0a
9	Oil and Water Mixing	http://playandfun.site/homepage/materidetail/2838023a778dfaecdc212708f721b788
10	Color Mixing	http://playandfun.site/homepage/materidetail/9a1158154dfa42caddbd0694a4e9bdc8
11	Soap-powered Boat	http://playandfun.site/homepage/materidetail/d82c8d1619ad8176d665453cfb2e55f0

3.2.2 Animation-Based Learning Media Application

Animation-based learning media application is a technology supportive to Steam learning. The Learning media were created using Adobe Flash. Currently, Play

& Fun portal has two animation-based learning media applications, namely CashFlow Game (See Figure 5) and Marine Biota interactive learning media (See Figure 6). Both media are specially made for children of 4-6 years old. Cashflow Game is a learning media that focuses on introducing topics related to money, such as counting its amount and learning how to earn and use it (consumption and investment). There are three games in Cashflow game, namely Supermarkets, Piggybank, and Mosque. Supermarket game players can buy goods according to the amount of money they have. Whereas in the Piggy Bank and Mosque games, players are taught to save or donate money with consideration to the amount of money they have.



Figure 5 CashFlow Game learning media (accessed on September 13th, 2021) (<http://playandfun.site/homepage/materialdetail/a684ecee76fc522773286a895bc8436>)

Marine Biota's interactive learning media is made to enhance children's multiple intelligences. There are eight multiple intelligences (MI): linguistic, logical-mathematical, bodily-kinesthetic, musical, visual-spatial, interpersonal, intrapersonal, and naturalist intelligence. That intelligence is mapped in each activity on the interactive media (see Table 2). In addition to the media itself, the teacher's role is also very instrumental in enhancing students' MI [13].



Figure 6 Marine Biota interactive learning media (accessed on September 13th, 2021) (<http://playandfun.site/homepage/materialdetail/b53b3a3d6ab90ce0268229151c9bde11>)

Table 2. Activities on Marine Biota interactive learning media

Menu	Information
Let's Get to Know Me Better	Introducing animals' names (different colors and shapes)
Let's Count Me	Counting the number of sharks or whales and comparing them (which is more or less)
Let's Find My Shadow	Matching objects with their respective silhouettes
Let's Dance	Singing and dancing on "Baby Shark" video
Let's Guess My Voice	Guessing animals based on their voices
Let's Play with Friend	Arranging letters into words
Let's Find Fish You Like the Most	Finding the user's favorite animal
Let's feed me	Feeding healthy food for dolphins

3.3 Assessment of The Content of The Portal Play and Fun in Support of The Learning Process STEAM for Early Childhood

In this sub-chapter, one example of steam application video content is explained with the title glass of the rainbow (see Figure 7).



Figure 7 The Activity of the Teacher Model to Calculate The Number of The Colors of Rainbow (accessed on September 30th, 2021) (<http://playandfun.site/homepage/materialdetail/b53b3a3d6ab90ce0268229151c9bde11>)

Learning Science is explained by the teacher models the activity of a story the occurrence of the rainbow (minute 01:50-2:10) and color mixing (minutes 06:50-06:60). Technology is reflected in the form of the video practice theme Glass Rainbow. Engineering is seen in the activity of the teacher model to simulate the process of the occurrence of the rainbow with the experiment and model teacher suggested to do these activities with the guidance of parents (minutes 05:28-12:47). Art is seen in the activity of the teacher model name the color (minute 2:17-2:33) and sing the Rainbow song (minute

14:49-15:10). Mathematics is seen in the activity model teacher mentions and sort the amount of the composition of the colors of the rainbow (minute 2:36-02:53) furthermore, comparing the size of the cups (minute 4:30-05:15).

4. CONCLUSION

The Play&Fun portal can be used by PAUD teachers, especially those who teach A and B grades in kindergarten. This portal can support teachers who want to implement STEM-based learning through the contents of the portal comprising of eleven science learning videos and two animation-based learning media, namely Cashflow Game and Marine Biota interactive learning media.

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