

# Game-Based Learning Media Training for Early Childhood for 21<sup>st</sup>-Century Teachers

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## Article

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## Abstract

To be able to carry out learning in the digital era, teachers must be literate in technology and information. We are currently in the era of the Industrial Revolution 4.0, which demands harmony between humans and information technology in finding solutions to various problems and creating creative and innovative opportunities. One of the competencies of 21st-century teachers is to develop interactive learning media based on digital technology. However, the reality in the field is that there are limited facilities and infrastructure, so there needs to be another motivation to develop ICT in the learning process of early childhood education (PAUD). This activity uses the Participatory Action Research (PAR) method, which is a transformative approach that aims to solve problems and fulfill the orientation on empowerment and practical needs of community change. The training participants are representatives of PAUD teachers in the Astanaanyar sub-district, under the coordination of the POKJA Bunda PAUD Astana Anyar sub-district. The result of this training is the increased ability of teachers to develop learning media in the form of games using the PowerPoint program, commonly known as a presentation application.

**Keywords:** storytelling media; visual communication; creative learning; digital technology.

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## Introduction

Good Early Childhood Education (ECE) is a pillar for the progress of the nation and state. Schools are the main fortress for shaping children's personalities. Character education built in schools early on is essential for the nation's future progress. The presence of the industrial era 4.0 requires adjustments in various fields, including our education system. In facing the industrial era 4.0, there are at least four things that need to be done: First, prepare human resources to face this digitalization era. Second, innovate learning methods to create an adaptive generation (the government must prepare facilities and infrastructure that support learning). Third, information and communication technology must be kept within "CCN," namely Collaboration, Communication, and Networking. Fourth, revise the education curriculum by integrating critical thinking skills, creativity, broad communication skills, and high self-confidence (Hafil, 2018; Servasr, 2018).

The three developments in learning activities at the ECE level are the development of knowledge, attitudes, and skills. Among the three, attitude development is given priority as it requires a lot of time and is achieved by habit. Character education, also known as dominating attitudinal abilities, is best developed in infancy. In addition to teaching children good behavior, character education helps shape their attitudes, ideas, and thoughts. As stated by Edward De Roche, "As a result, character education involves more than merely learning a set of actions. It involves cultivating the heart, mind, and behavior patterns necessary for an individual to thrive" (Suyanto, 2012).

Early childhood ages 4-6 years are considered yet to be fluent in reading. Hence, teachers in kindergarten generally use teaching materials in the form of visual images since images are the most accessible language to understand. Therefore, using the concept of storytelling will make it easier for teachers to deliver the material, especially if it is accompanied by digital technology such as games. Meanwhile, to bring moral messages and local values to children, nowadays, with the help of the internet, teachers can easily find the visual materials needed to enrich the visual aspects of their learning media. Interactive games and educational movies can also enable children to think critically and creatively (Chairilisyah & Chairilisyah, 2022; Claudia *et al.*, 2020; Darmawan *et al.*, 2023; Tulasih *et al.*, 2022).

Industrial Era 4.0 is characterized by the use of information and communication technology (ICT) devices in everyday life. Currently, ICT is widely used in learning activities. Therefore, teachers must be able to adapt to this technology, considering that today's millennial generation is connected to the internet most of the time. One interpretation of teachers who can adapt to the industrial era 4.0 is those who can create creative and interactive learning media while also carrying Islamic character values toward golden Indonesia. To help teachers create game-based learning media that have Islamic character values, the research team conducted a "Game-based Picture Story Doing Training." This activity aims to improve teachers' ability in the field of teacherpreneurship and skills in ICT. Integrating ICT in teacher education can enhance student learning and provide a dynamic learning environment, benefiting both teachers and students (Hidayati, 2022; Rama, 2022).

Berry & the Teacher Solutions 2030 Team state that for future schools to succeed and become agents of change, they need self-teachers or teacher-leaders who have proven in-depth knowledge of teaching methods, a clear understanding of the strategies that must be implemented to achieve high-quality education, and the skills and commitment to share their knowledge with other teachers. It further explains that self-teachers are not just marketers or salespeople but expert practitioners who care about spreading new ideas and approaches as true mentors, teachers and educators, community organizers, and action researchers. However, it is important to understand that self-teachers are not super teachers who can make a lot of money but empower expert teachers who can increase recognition and appreciation of the teaching profession by ensuring that peers, policymakers, the general public, and other education stakeholders understand the best education for learners (Winarni, 2018). Teachers design and create teaching materials according to the needs of their students, and they should also be able to provide a direct or indirect assessment of the entire learning process. Teaching materials developed by teachers have made it easier for students to understand the subject matter delivered by the teacher (Suprihatin & Manik, 2020).

The definition of teacherpreneur can be explained through the understanding that a teacher with an entrepreneurial spirit is also ready to educate students through their main duties and functions as a good and professional teacher. They are also ready to improve the welfare of their families through various creative and innovative efforts to create business opportunities. A teacher who teaches with a heart and soul is referred to as a teacherpreneur and can develop his business to meet the community's needs. Thus, to become a teacherpreneur, the essential thing is for each individual to make innovations and creativity and create a new product through their ideas (Iswan & Wicaksono, 2020; Mulyatiningsih, 2016).

Therefore, 21st-century teachers must develop their abilities and skills in carrying out their profession to keep up with the rapid development of ICT (Marianingsih *et al.*, 2021). The classroom also needs to foster learning media creativity. We have entered the era of Generation Z, where children are so close to digital technology. So, as teachers, we must be able to keep up with the knowledge of millennial and Gen-Z children. Meanwhile, most ECE classes still apply conventional learning to students due to the limited knowledge of educators about ICT that needs to be improved, in addition to limited facilities and infrastructure (Figure 1).



Figure 1. Situation of ECE Classrooms and Teaching Media Currently Used by Most ECE Schools in Astana Anyar Sub-District (Private Documentation)

A tool that can be used to support the learning process is media-based instruction. The purpose of using this media is to make transferring knowledge from a teacher to a student easier. Learning media is a very important factor in the success of a learning process. Current technological developments make it possible to develop a variety of interactive and interesting learning media. In addition to existing learning media, other media can still be used for learning purposes, especially for ECE, for example, games. Game-based learning, often known as game-based education, can provide different learning outcomes beyond conventional learning in the classroom. In addition, it can also be used to introduce ICT at an early age (Zakiyah & Chotijah, 2023).

Educational games are interesting to develop because they have the advantage of being interactive and can be enhanced with multimedia elements that improve early childhood memory, such as animation, sound, and images. A published study explains that Microsoft PowerPoint applications are interactive, so they are very easy for teachers to use as a medium for teaching (Saudale *et al.*, 2022).

## Method

The method used to improve the skills of Workgroup (Pokja) Bunda PAUD teachers in the Astanaanyar sub-district is Participatory Action Research (PAR). PAR is a transformative approach that aims to solve problems and fulfill the practical needs of communities, oriented towards empowerment and change (Cornish *et al.*, 2023). This approach model is carried out through several stages that refer to the PAR cycle model (Figure 2). The first stage was identifying the problem and developing an activity plan. The team approached various stakeholders, in this case, the sub-district head, the local village head, and the head of the Pokja Bunda PAUD in Astanaanyar sub-district, to discuss the situation analysis and ECE teachers in the area. This was done to gather information on potential opportunities, constraints, and challenges for ECE teachers. Then, the team developed an activity plan to empower ECE teachers in the Astanaanyar sub-district and open their awareness to accepting changes that can improve their competencies and increase their income. Stage two was implementing the program to empower the development of educational games using MS PowerPoint.

The third stage was analyzing the level of change. This stage analyzes the level of achievement of the results. The purpose of this analysis was to determine the extent of the effectiveness of digital-based teaching aid-making training in developing ECE teacherpreneurship through pre-tests and post-tests. The fourth step evaluated the action to adjust understanding and provide guidance for the following cycle using the fundamental ideas of the PAR method, which include sharing experiences and mutual learning, involving all group members and information, using outsiders as facilitators, optimizing results, having a practical orientation, and maintaining the program over time.

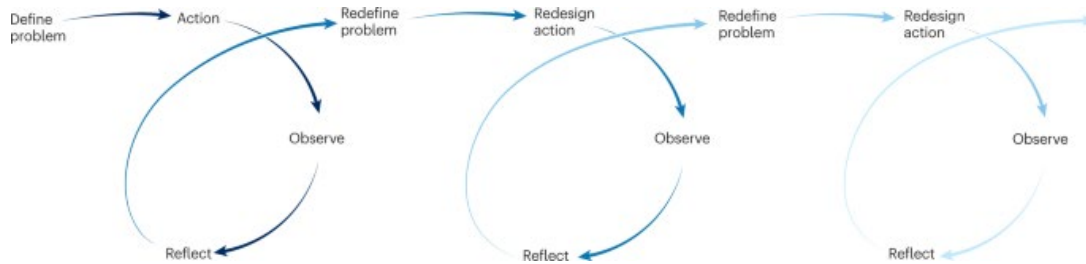


Figure 2. *Cycles of Participatory Action Research: Building Relationships is an Ongoing Practice as the Field Evolves through Several Cycles* (Cornish et al., 2023)

## Results & Discussion

The trainee teachers understand the benefits of playing games in early childhood, including improving critical thinking and problem-solving skills (questionnaire results, 2023). Therefore, it is important to understand that game-making is adjusted to the level of child development and learning objectives. Teachers' knowledge of 21st-century teacher competencies is also already good, especially in understanding the importance of digital technology in answering various educational problems in the current digital era. This can be seen in the questionnaire distribution, which shows increased related knowledge about 21st-century teachers (Table 1).

**Table 1**  
**The Most Important Competencies for Teachers in the 21st Century**

Description	Pre Test	Post Test
a. The ability to use technology in teaching	100%	100%
b. Using technology to support and enrich teaching rather than replace traditional methods	100%	100%
c. Helping children understand the concept of digital literacy	80%	95%
d. The ethics that must be considered in the use of ICT include upholding IPR	74%	94%

Source: Research Questionnaire, 2023

While some criteria remained high on both tests, certain criteria showed positive improvements after the training. This indicates that the training successfully impacted participants' understanding of digital literacy and the ethical use of ICT. In addition, the trainee teachers have also increased their knowledge about teacherpreneurship so that they understand that teachers in the current digital era must have competencies as follows: having an entrepreneurial spirit where teachers must be able to develop educational innovations, improving learning quality, creating new educational products or services, and developing innovative teaching methods (questionnaire results, 2023).

The trainee teachers have used the Microsoft PowerPoint (MS PPT) application as a learning support in the classroom. However, it is generally used as a presentation medium, for example, displaying illustrated teaching aids or creating illustrated stories. Meanwhile, many teachers have never utilized MS PPT to create educational games for early childhood (Figure 3).



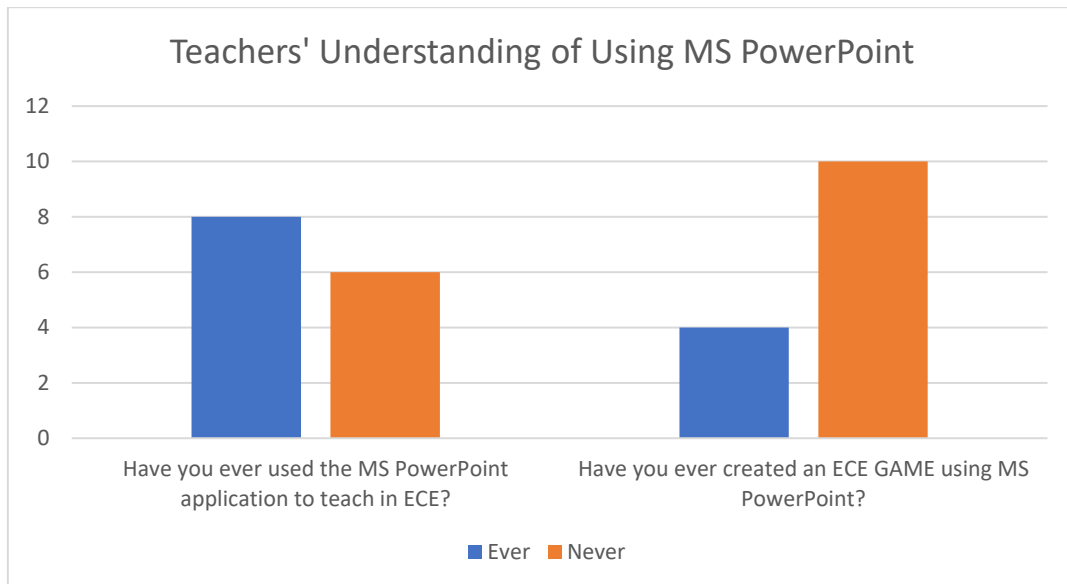


Figure 3. Trainees' Understanding of the MS PowerPoint Program (Research Questionnaire, 2023)

Training on the effective and efficient use of MS PPT for ECE teachers has been conducted for HIMPAUDI in Batam Kota sub-district by maximizing the creativity of inserting pictures, animations, or videos to increase visual appeal for students (Amrizal *et al.*, 2021). Training in making educational games based on MS PPT has never been done in a structured manner. The novelty of this activity is training ECE teachers in making interactive educational games.

### MS PPT-based Educational Game

Games are one of the learning techniques in early childhood education. Learning while playing will make it easier for children to understand processes, learn to think, and develop knowledge interactively. In the era of computerization and digitalization, teachers must have qualified ICT-related skills to develop the latest teaching media. This community service project includes training ECE teacher in computer program-based games to enhance their knowledge and abilities.

MS PPT was chosen as the application for making educational games, considering the user interface's ease of understanding. MS PPT is familiar to computer users, especially for making presentation slides. So, in terms of basic knowledge, the trainees already understand the program. In principle, what should be known from making MS PPT-based games is (1) using animation as a game visualization and setting effects and time, and (2) understanding the Action menu to connect slides through connectivity commands.

### Steps for Making Educational Games

Before creating a game with PowerPoint, the first step is to create a story concept. Teachers must create an interesting storyline and contain character values for the game to have more meaningful elements and learning; for example, the story of the game is adjusted to the aims of ECE based on the National Education System Law.

After determining the story's concept, it is outlined as a game flowchart (Figure 4). To create a game with the theme "a trip to the zoo", for example, the home page starts with a description of the game. On this page, the game will be explained briefly so that children can be directed to interact with the buttons available.

## Game Flow

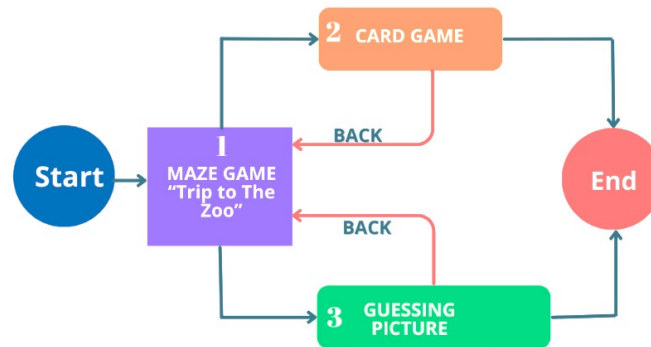


Figure 4. The Flow Chart of the Basic Concept of Creating "A Trip to the Zoo" MS PPT Game that Flows with Three Kinds of Games

On the initial page of the game, some supporting elements are given to make it attractive to children. For example, the background image uses a photo of the zoo entrance gate. Also, add a title on the game's home page so that children are trained to see the alphabet. Add music when the game is played or an introductory sound to start the game (Figure 4). Then, the "Start" button is given a picture so children can easily recognize it. For example, add a picture of a Nemo fish to the "Start" button. The position of the start button is the starting point of this Maze game, so do not change its position when switching to the intended slide. Switching this page is possible by giving an Action command to the 'Start' button so that the slide will move to the "Maze Game" when pressed.



Figure 5. The Initial Page of "A Trip to the Zoo" Game

In addition, an image of a bus with a "teeter" animation can also be added to make it look moving, which will make children interested in interacting with the image. When this "bus" is pressed, users will hear a voice explaining how to play this game. This is possible by giving an Action command to bring up the recording sound on the bus image. For example, a voice will say, "Hey kids, let's take a trip to the zoo. Now press the Nemo fish button to start." When the "Start" button is pressed, the slide will move to the first game, The Maze Game.

To make the sound, apart from recording your voice through the "Record Sound" menu, you can also utilize a website that converts text into sound, such as "soundoftext.com." Visit the page, then type the sentence to be converted into sound (Figure 6). Note that the voice supported by MS PPT is in ".wav" format, so when downloading the voice result, convert it to ".wav."

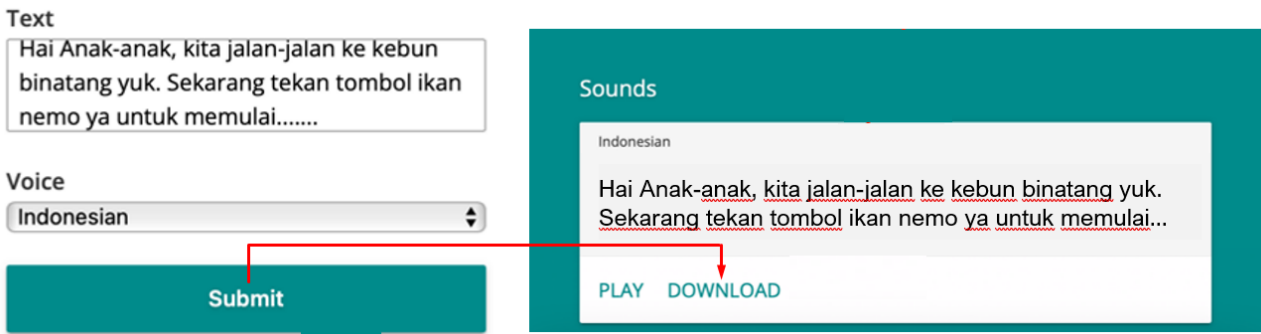


Figure 6. A Preview of the Website "Soundoftext.com" to Automatically Create Sound from Text

The next step is to create the first game, "Maze Game." This game is played by moving the mouse along the path provided to the destination. The function of this game is to train children's motor skills. The game opens with the teacher's sound explaining the type of game, such as the actions to be performed by users (children), and a description of the story theme of the overall game. In this search-for-traces game, two destination directions can be traced using the mouse.

In the maze game, some effects can be given to make it look more interesting. For example, add a background image following the theme created. In this example, trees or mountain pictures are used because they represent a trip to the zoo (Figure 7). You can also add sound effects, such as the sound of a bird when the game opens through the insert sound menu, with the previously prepared sound effects. Sound effects that can be inserted into the PPT game are in .wav format that can be searched for and downloaded online. Musical background sounds can also be used as sound effects triggered since the game starts. To have a continuous back sound effect across slides, use the "Playback" setting on the sound icon that will be used on the initial slide, then mark the "Play Across Slides" option.

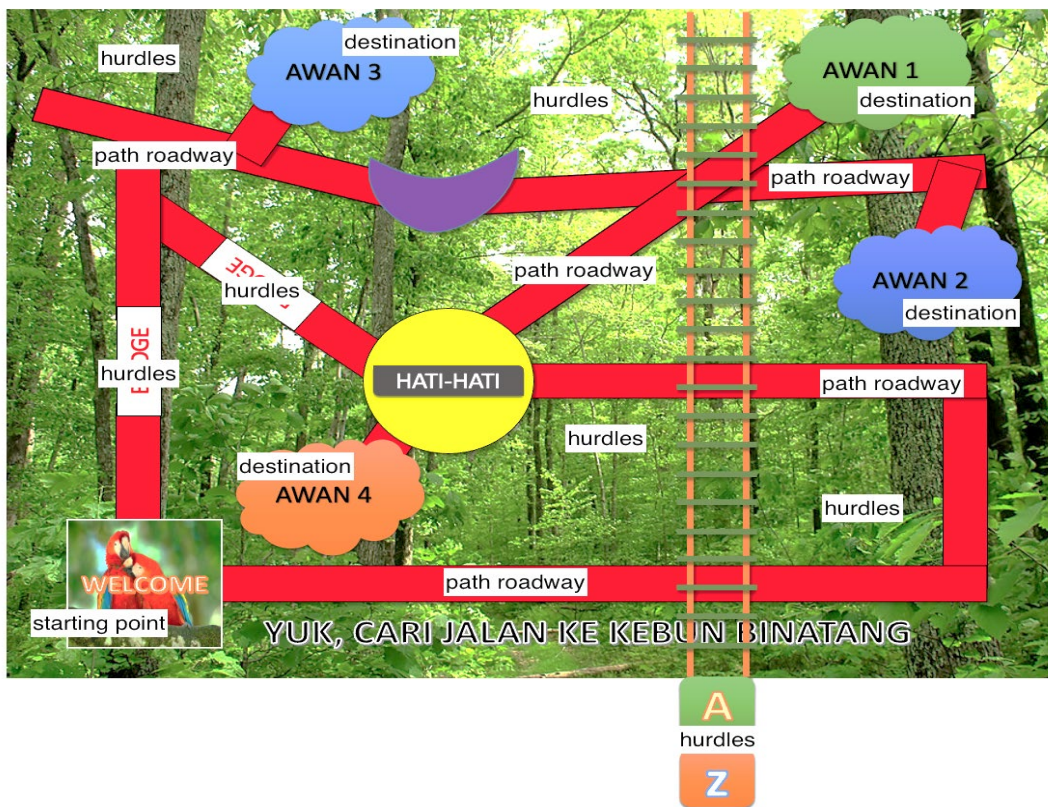


Figure 7. Some Hurdles in the Maze Game to Train Children to Think and Develop Logic Early On



In this game, there is also an obstacle: if the mouse cursor goes off track when scrolling along the maze road, it will move the slide display to the prepared "failure" slide, for example, into the tiger cage (Figure 8). To return to the game, we provide a back-to-home button slide so that the game starts over.



Figure 8. An Example of a Destination Slide to Go When the Mouse Goes off the Path in the Maze Game

After going through the trace, the game's flow goes to two or more destination points. For example, if the mouse cursor reaches the first destination point, the slide will switch to the "Card Game" slide. Here, we use the animal card game, where several cards contain pictures of animals, intending to introduce animal names to children. In this game, we can give a voice description explaining what the children should do, such as selecting an animal with the mouse, and then the sound of the animal and its image will be heard (Figure 9). Children can also be asked to imitate the animal sounds they hear. Many game variations can be added so that children can interact with the game, which can improve children's motor skills in addition to teaching them about computer devices.



Figure 9. Animal Card Game Trains Children to Recognize Animal Sounds and Remember Animal Names

To continue the game, after opening the "animal card" on the game interface, add a "back to home" button that will return to the opening page. Or you can continue the game by placing the button in the position of the "Start" button in the Maze Game (Figure 10). Here, we can use the "Dora and Booth" image to make it more attractive to children and give a "teeter" animation so the button will wiggle.





Figure 10. Place the "Dora and Booth" button as the return button to the Maze game in the same position as the start button in the Maze game so that the cursor returns to the same position.

The second destination of the "maze game" pathway is the "guess the picture game." In this game, children are trained to recognize and guess pieces of animal pictures. The function of this game is to train memory. The game displays colored boxes that can be opened by clicking on the box, and then the box will rotate open and close because it is given a "swivel" animation to show the pieces of the image below (Figure 11). To answer the guessed picture, children are asked to select the animal picture provided. If the answer is incorrect, it will only show the sound of the selected animal. If the answer is correct, it will switch the slide to the hidden animal picture. We can give a voice description of the animal that appears in the correct answer so that children get useful information. Also, create a button to go back to the beginning of the game or continue to the way-finding game. We can copy-paste the button in the "Animal Card" game for this button, and then the button function will be the same since it already contains Action (Figure 12).

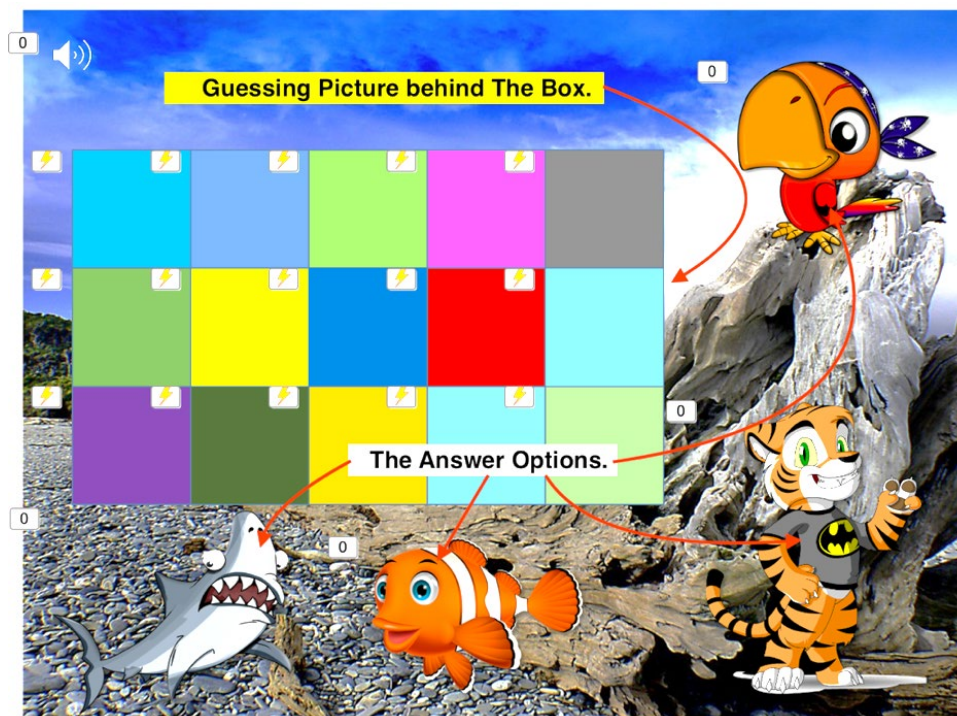


Figure 11. Picture Guessing Game

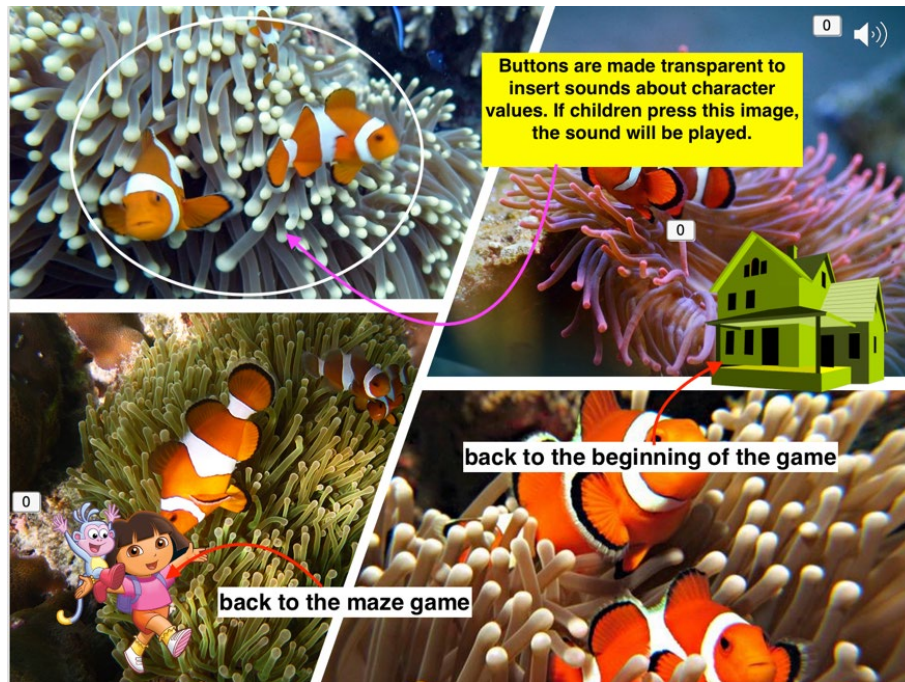


Figure 12. The Destination Slide for the Correct Answer. There is a Button to Return to the Beginning of the Game or Return to the Maze Game.

In this section, voice messages can be added when the coral reef image is clicked to complement the message of character values for early childhood (Figure 12). For example, the voice will say, "Under the blue ocean, coral reefs become a beautiful garden for fish. Children, let's take care of these coral reefs like we take care of our own homes. Don't throw garbage into the sea; treat nature with love to preserve the underwater beauty forever." Menu buttons can be created with transparent-shaped objects. Use the Action menu for the voice-filling stage, and record the sound using the Insert Sound menu.

The expected output of this activity is the increased competence and quality of ECE teachers towards digital-based learning media programs and the increased creativity of ECE students by implementing character development themes in the game.

## Conclusions

ICT training activities for 21st-century teachers are a priority in developing the skills and creativity of ECE teachers. Continuous efforts are needed so that the challenges in the era of Society 5.0 can be balanced with the knowledge of PAUD teachers, especially in the learning process. The results showed a significant increase in teachers' ability to develop learning media, especially educational games, through the use of the MS PPT program as a commonly known presentation application. It seems quite simple, but the ability to make educational games based on MS PPT is a step forward for teachers in responding to the current learning methods. This shows the value of novelty from the perspective of visual communication and Information and Communication Technology (ICT), where targeted training can overcome the technology literacy gap among educators, paving the way for more effective and engaging teaching practices in the digital era.

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