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Implementation Method Forward Chaining in Game Puzzle (Case Study in Paud Dini Laras Yogyakarta)

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ABSTRACT

In the early childhood education stage, children will tend to be more interested in easy-to-play games that have animated images that attract attention. Whereas currently in learning PAUD children still use the game method using paper media so that the games provided will make children feel bored. This study aims to conduct a new teaching media approach namely Puzzle educational games using the Forward Chaining method as a research topic on compiling desktop-based images and games for PAUD children at DUD Laras Yogyakarta. This research uses Forward Chaining method as an implementation in a Puzzle Game that is R1 is the first rule that is known fact is the Random Puzzle box contained in each scene, R2 is the 2nd rule of the reasoning process when the matching premise is wrong then there is a temporary premise namely the trash box that hold until all the premises are properly matched, R3 is the 3rd rule that is the time and score as a conclusion the game can continue until the game is finished. This research resulted in 2 times Game testing. The first test using black box testing game application is correct and has no malfunction on the button and is feasible to be implemented. And the second test is the quality testing that has been done by testing the choice of answer categories from the questionnaire that has been distributed in the field, it can be concluded that the Puzzle Game is made easy to use and has a pretty good appearance and content suitable for early childhood play (PAUD).

1. Introduction

In the early childhood education stage, children will tend to be more interested in easy-to-play games that have animated images that attract attention. Whereas currently in learning PAUD children still use the game method using paper media so that the games provided will make children feel bored.

Forward Chaining method is one of the inference methods used to get a conclusion using forward reasoning. The way to describe Forward Chaining is to start reasoning from facts (data) that look for suitable rules to get a conclusion from that fact [2].

Early Childhood Education (PAUD) is a coaching effort aimed at children from birth until the age of six carried out through the provision of educational stimuli to help physical and spiritual growth and development so that children have readiness to enter further education [3].

The availability of abundant data resulting from the use of information technology in almost all areas of Early Childhood Early Childhood Education is a place for teaching and learning that began

to be established since 2012. Early Childhood Early Childhood Education serves early childhood learning and teaching processes. In the learning process students by Ms. Madiati are believed to be able to provide knowledge that can be understood by young children. And like other PAUD children, the child is still accompanied by their parents in every learning process, the children learn to sing, learn Islamic prayers and play together, the games they play are as varied as playing football, playing horse, rocking and swinging swings and games to arrange images that are done using randomized paper and arranged until the image patterns match.

Arranging random images until the images are arranged accordingly or this puzzle game gives players a challenge by arranging things from the top side to the bottom. Players must arrange in such a way and there are no pictures left. This arrangement is carried out as fast and as well as possible [1].

In this study aims to carry out a new teaching media approach namely Puzzle educational games using the Forward Chaining method as a research topic on compiling desktop-based images and games for PAUD children at DUD Laras Yogyakarta.

2. The Proposed Method

2.1. Previous Research Review

Research conducted refers to previous research conducted by Moh Dzikrullah in 2015, based on the results of game testing it can be seen that 5 times the examiner and the system can run with the display test results running well as much as 80%. In this study discusses the application of the Forward Chaining method for Learning English Game Levels. Research is a leveling type game, where the strength of the game lies in different levels of difficulty for each level. This game runs on a mobile application (Android). In this game can only be played by a user.

The next study was conducted by Yogie Susdyastama Putra, M.Aziz Muslim and Agus Naba in 2013. This study only discussed up to level 4 only. In this study discusses the Chicken Roll Game Using the Forward Chaining Method. Research is a leveling type game, where the strength of the game lies in the different difficulty levels of each level, this game runs on a desktop platform (Windows). This game can only be played by a user. Basically, the Forward Chaining method is used to determine whether the user can continue the game to the next level or not. The testing process is carried out on the design of each scene display in the game the work of the Forward Chaining method will work in accordance with the input data entered.

The study was also conducted by Sidik Firdaus in 2014, namely the Implementation of the Forward Chaining Method as Determination of Food Types in Cooking Games. In this determination the problems faced in the cooking game, the player needs to prepare the tools and ingredients in advance, then the process can begin. The study requires players to follow the rules that are determined so as to produce consistent conclusions by using the inference tree engine from Forward Chaining.

Other research was also conducted by Rizky Gita Abadi in 2016 entitled Android-Based Fun Game with Physic Design. The study was conducted to design and create an android-based game application about the phenomena of everyday life related to physics. White box testing results show that the game application is correct and has no errors both in terms of logic and function and is feasible to implement. Black box testing results of game application testing are correct and have no malfunction on the button and are feasible to be implemented.

2.2. Supporting Theory

2.2.1. Game

Game is an English word that means game. The game is something that can be played with certain rules so that there are losers and there are winners. Games are very complex computer programs that stimulate the brain to perform a series of cognitive tasks and produce higher levels of thinking [9]. Various types of games circulating in the market, some of which are.

2.2.2. Forward Chaining

Forward Chaining is a reasoning that starts from the facts to get conclusions (conclusions) from these facts. Forward Chaining can be said as an inference strategy that starts from a number of

known facts. The search is carried out using rules whose premises match the known facts to obtain. new facts and continue the process until the goal is achieved or until there are no rules anymore whose premise matches the known facts and the facts obtained. The computer will analyze the problem by finding facts that match the IF part of the IF-THEN rules [11][12[13]. The basic rules of Forward Chaining can be seen in Fig. 1.

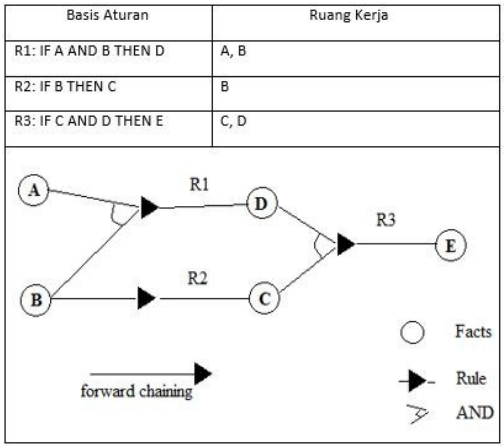


Fig. 1. The basic rules of Forward Chaining

Explanation of Fig. 1:

1. R1 is the first rule, if A and B then the fact obtained is D.
2. R2 is the second rule if fact B is C.
3. R3 is the 3rd rule if C and D then the fact obtained is E.

2.2.3. Game Early Childhood Education

Educational toys are an inseparable part of children's learning. The availability of the game tools is supportive the implementation of children's learning effectively and fun so that children can develop their potential optimally.

Mayke Sugianto stated that the Educational Game Instrument (APE) is a game tool that was intentionally designed specifically for educational purposes. Understanding the educational play tool shows that in its development and utilization not all play tools used by children are specifically designed to develop aspects of child development [3].

To be able to see and understand more deeply about whether a game instrument can be categorized as an educational game tool for children or not, there are several characteristics that must be fulfilled, namely as follows:

a. The game is intended for children.
b. Functioned to develop a variety of child development.
c. Safe and harmless to children.
d. Designed to encourage children's activity and creativity.
e. Contains educational value.

3. Method

3.1. Research Objects

The object of research is will be discussed is about applying the Forward Chaining method which is applied in a puzzle game application, and implemented into a desktop application. Software that will be used in making puzzle game applications is using Adobe Flash CS6.

3.2. Method Data Collection

3.2.1. Method References

Literature method is a method used in research to find sources reference to the Forward Chaining method. This method is passed by understanding books about Forward Chaining and

books about early childhood learning methods, previous research, documents or other sources related to the research to be conducted.

3.2.2. Interview

The interview method was carried out by asking questions from Ms. Masdiati as a teacher at Early Early Laras PAUD regarding the research to be conducted.

3.2.3. Observation

Observation method is an observation and data collection from Early Early Childhood PAUD and the observation method is done by asking questions from Ms. Masdiati as a teacher at Early Early Childhood Early Childhood Education about how the puzzle game will be implemented into a desktop application [14][15][16][17].

3.3. System Analysis and Design

This game was developed based on desktop which is specifically for children aged 3-6 years or PAUD. This game has an image model that requires the player to arrange random images until the images are arranged.

3.3.1. Scoring

To get a score the player must arrange a random picture. Each question has a different score value provisions in accordance with the provisions of each level section.

3.3.2. Timer

In this game time affects the movement of each level section. Each part of the question will be given each time each number of boxes is 10 seconds. If the player completes the game more than specified then will repeat the game at the previous level [8].

3.3.3. Level and Part

The game consists of 1 level, namely parts (1), parts (2) and parts (3). observation to determine where the player can be determined at what level the child will play, following the provisions in the game.

3.4. Implementation

Forward Chaining method in this puzzle game is applied as a process of each preparation with the following stages.

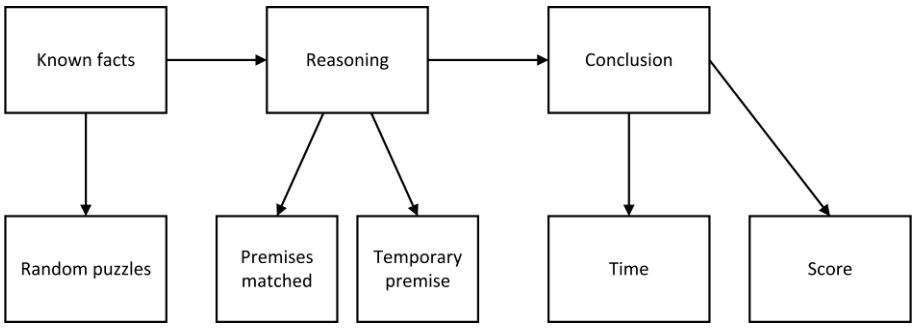


Fig. 2. The diagram block of implementation

Explanation of Fig. 2:

1. R1 is the first rule, the fact that is known is the Random Puzzle box contained in each scene.
2. R2 is the second rule of reasoning process when the matching premise is wrong, then there is a temporary premise, which is a garbage box that holds until all premises are correctly matched.
3. R3 is the 3rd rule that is time and scores as a conclusion the game can continue until the game is finished

3.5. System Testing

Tests are carried out to ensure that the system can run properly in accordance with the expected needs and goals. Tests conducted in this study include:

1. Black Box Test

   Black Box Test, this test aims to find out the errors or errors in this Puzzle Game application. Therefore, these programs and applications must be tested first to find errors that might occur.

2. Quality Testing of Game Puzzle

   The quality of the Puzzle Game is a test conducted objectively by making a questionnaire about the material presented in the Puzzle Game, whether the Puzzle Game is suitable for PAUD age.

4. Results and Discussion

4.1. Implementation Game Puzzle

In the system of determining the classification of kidney failure, a business process is made to find out the flow of the system. Business processes in this system can be seen in Fig. 3.

Fig. 3. Login Scene

Fig. 3 is a Login Scene the player fills in name and age, then the player can click on the start button, then the player starts the game at the observation level where to determine where the player can be determined at what level the child will play.

4.2. Interface Game

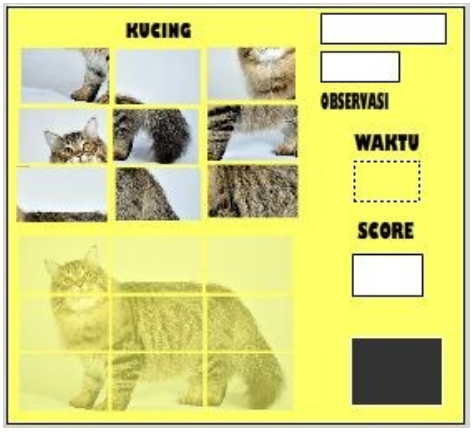


Fig. 4. Observation Problem Scene

Fig. 4 is an observation matter scene where the player must arrange 9 squares in sequence according to the original picture in each box. Every arrangement there are rules such as score and time in observation, if the player cannot arrange the entire number of boxes in the specified time, then the player must repeat the game until all the images are arranged according to the original picture and continue playing at level 1 [18][19].

4.3. Interface Level Game

In this puzzle game there are 1 level, namely parts (1), parts (2) and parts (3) where each part will increase in difficulty until the game is finished. the following explanation [20][21].

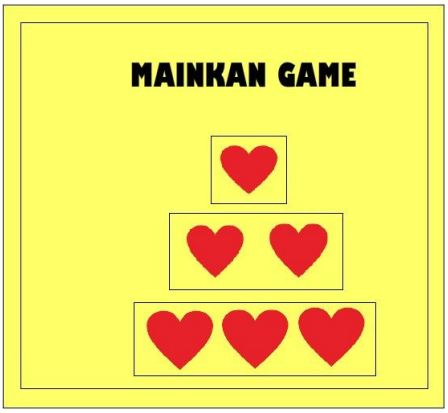


Fig. 5. Scene level 1

Fig. 5 is a Level 1 Scene Option where the player can choose which part he will play.

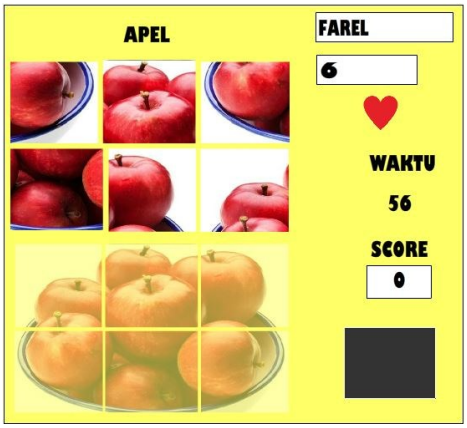


Fig. 6. Scene Problem Level 1 part 1

Fig. 6 is a level 1 part 1 scene. In the scene there are 6 game boxes that require players to arrange in accordance with the original picture and continue playing at the next level. if the player can only arrange <6 of 6 squares from the specified time then the player repeats at the observation level.

Fig. 7. Problem Scene to Level Part 2

Fig. 7 shows the scene continuing the game to level 1 Part 2.

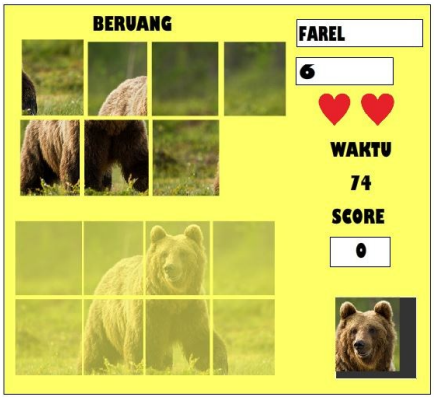


Fig. 8. Level 1 Problem Part 2A

Fig. 8 is a Scene level 1 part 2A. in the scene there are 8 game boxes that require players to arrange according to the original picture in each box and continue playing at the next level. if the player can only arrange <8 out of 8 squares from the specified time then the player repeats at level 1 before.

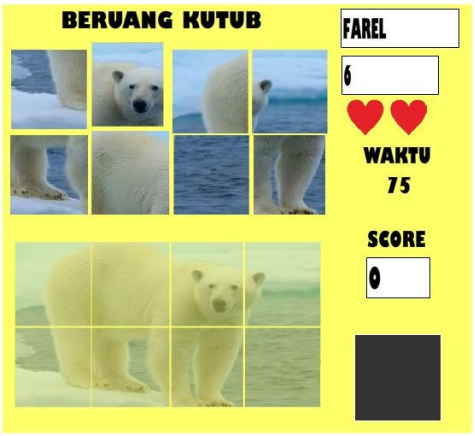


Fig. 9. Level 1 Problem Part 2B

Fig. 9 is a Scene level 1 part 2B. in the scene there are 8 game boxes that require players to arrange according to the original picture in each box and continue playing at the next level. if the player can only arrange <8 out of 8 squares from the specified time then the player repeats at level 1 before.

Fig. 10. Scene Into Level 1 Part 3

Fig. 10 shows the scene continuing the game to level 1 part 3.

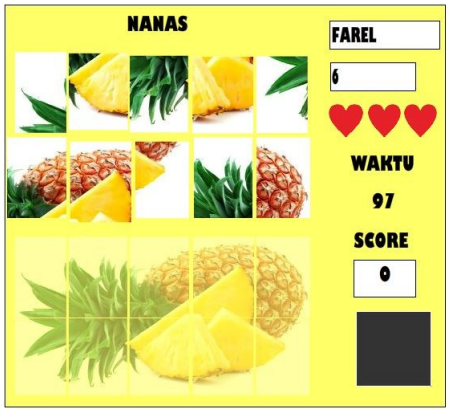


Fig. 11. Scene Level 1 Section 3A

Fig. 11 is a scene which is a level 1 part 3 scene. In the scene there are 10 game boxes that require players to arrange according to the original picture in each box and the game is finished. if the player can only arrange <10 out of 10 squares from the specified time then the player repeats at the previous level.

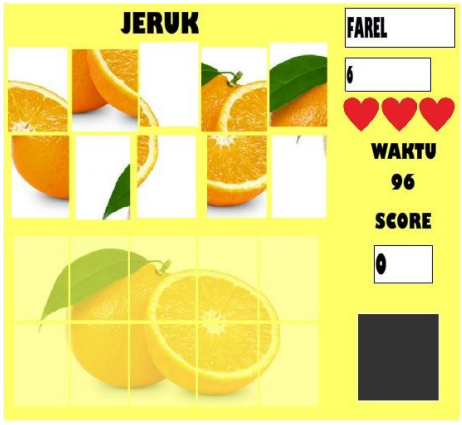


Fig. 12. Scene Level 1 Section 3B

Fig. 12 is a scene is a level 1 part 3 scene. In the scene there are 10 game boxes that require players to arrange according to the original picture in each box and the game is finished. if the player can only arrange <10 out of 10 squares from the specified time then the player repeats at the previous level.

Fig. 13. Scene Level 1 Section 3C

Fig. 13 is a scene that is a level 1 scene 3. In the scene there are 10 game boxes that require players to arrange according to the original picture in each box and the game is finished. if the player can only arrange <10 out of 10 squares from the specified time then the player repeats at the previous level.

Fig. 14. Congratulatory Scene

Fig. 14 is a congratulatory scene for completing the game at each level.

4.4. Testing Sistem

4.4.1. Black Box Test

This test aims to find out the errors or errors in this Puzzle Game application. Therefore, these programs and applications must be tested first to find errors that might occur [10]. This test uses the Black Box testing method [21].

No.	Skenario Pengujian	Hasil yang Diharapkan	Kesimpulan
1.	Mengisi form nama dan usia dengan benar lalu klik button mulai. Test Case : 	Sistem menampilkan nama dan usia pemain. Hasil Pengujian : 	Valid
2.	Menampilkan scene observasi kotak bergambar yang acak dan waktu terus berkurang. Test Case : 	Setiap kotak movie clip yang kosong dapat terisi dan jumlah score bertambah. Hasil Pengujian : 	Valid
3.	Jika dalam permainan observasi melebihi batas waktu yang ditentukan maka [illegible] ulangi permainan, maka pemain harus mengulangi permainan. Test Case : 	Sistem menampilkan scene observasi Hasil Pengujian : 	Valid
4.	Menampilkan scene opsi permainan seluruh bagian Level 1. Masing-masing button menuju ke scene permainan yang dituju. Test Case : 	Sistem menampilkan seluruh scene Level 1. Hasil Pengujian : Level 1 Bagian 1  Level 1 Bagian 2A  Level 1 Bagian 2B  Level 1 Bagian 3A  Level 1 Bagian 3B  Level 1 Bagian 3C 	Valid Valid Valid Valid Valid Valid

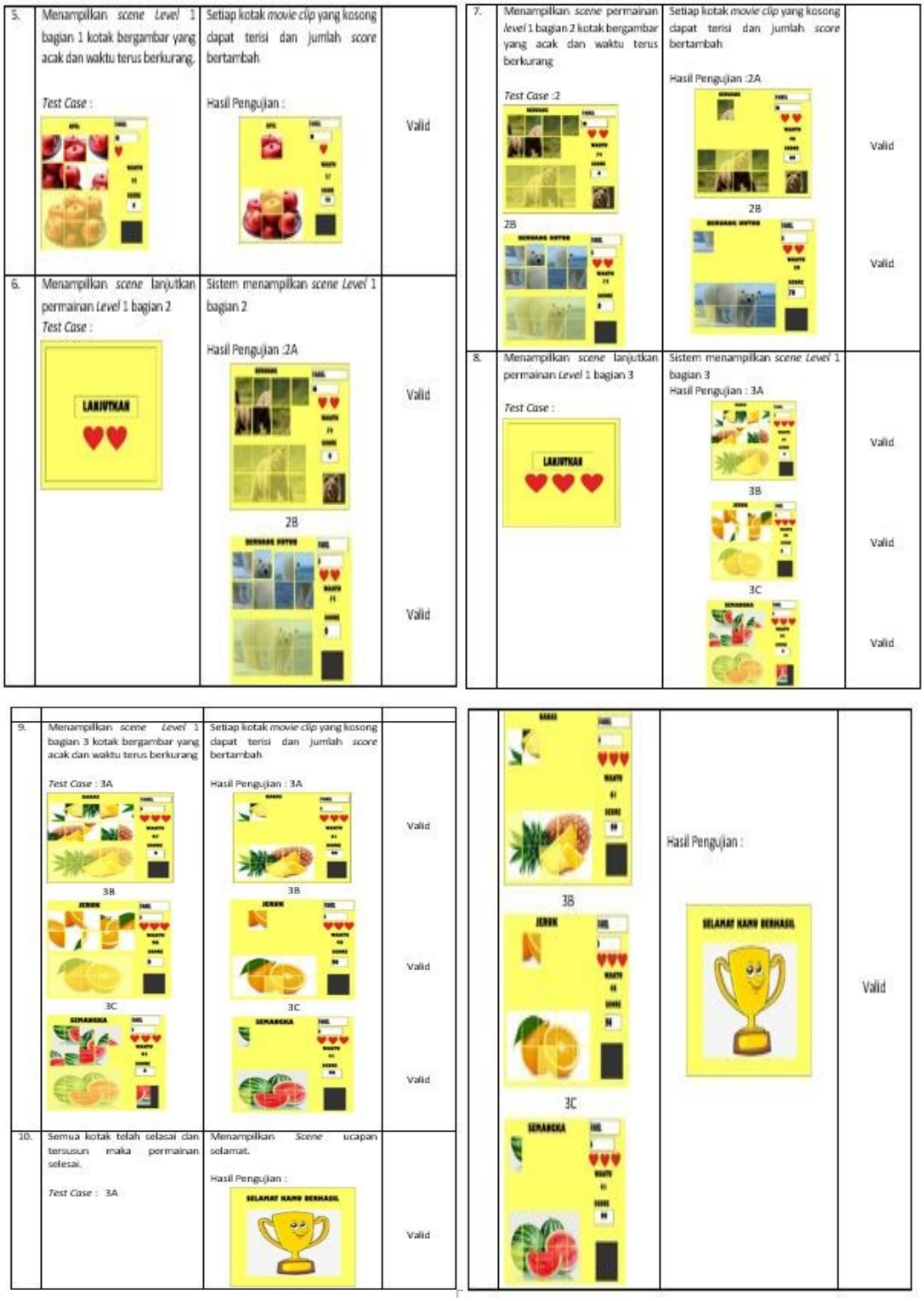
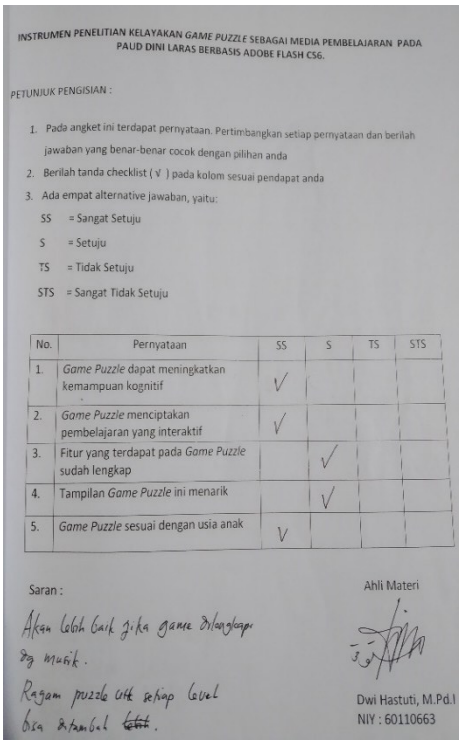


Fig. 15. Congratulatory Scene

4.4.2. Game Quality Testing

From the quality testing that has been done, namely by testing the choice of the answer categories of the questionnaires that have been distributed in the field, it is concluded that the Puzzle Game is made easy to use and has a pretty good appearance and content suitable for early childhood play (PAUD).



INSTRUMEN PENELITIAN KELAYAKAN *GAME PUZZLE* SEBAGAI MEDIA PEMBELAJARAN PADA PAUD DINI LARAS BERBASIS ADOBE FLASH CS6.

PETUNJUK PENGISIAN :

1. Pada angket ini terdapat pernyataan. Pertimbangkan setiap pernyataan dan berilah jawaban yang benar-benar cocok dengan pilihan anda
2. Berilah tanda checklist (√) pada kolom sesuai pendapat anda
3. Ada empat alternative jawaban, yaitu:
   SS = Sangat Setuju
   S = Setuju
   TS = Tidak Setuju
   STS = Sangat Tidak Setuju

No.	Pernyataan	SS	S	TS	STS
1.	*Game Puzzle* dapat meningkatkan kemampuan kognitif	√			
2.	*Game Puzzle* menciptakan pembelajaran yang interaktif	√			
3.	Fitur yang terdapat pada *Game Puzzle* sudah lengkap		√		
4.	Tampilan *Game Puzzle* ini menarik		√		
5.	*Game Puzzle* sesuai dengan usia anak	√			

Saran :
Akan lebih baik jika game dilengkapi dg musik.
Ragam puzzle utk setiap level bisa ditambah lagi.

Ahli Materi
Dwi Hastuti, M.Pd.I
NIY : 60110663

Fig. 16. Quality testing statement

5. Conclusion

Based on the game that has been made and the results of the test, it can be concluded that the Method Forward Chaining can be used to determine the rules in the Puzzle Game for young children. Based game testing results can be known the first test using black box testing game applications is correct and has no malfunction on the button and is feasible to implement.

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