Development of Puzzle Game as Media for Learning and Profession Interest

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ARTICLE INFO

ABSTRACT

Multimedia is one of means or media, component in multimedia can be images, text, video or sound. Multimedia can be used as a communication tool or convey of information to others. In this puzzle game, multimedia is used as a learning media to introduce the profession and know the professional interest for users. In addition, in this game there are elements of education, counseling and information about the importance of education. In this game, more devoted to 9th grade junior high school students. The value contained in this puzzle game is trying to direct students to continue their education to the highest level by presenting materials that are expected to give students an idea of the world of education, job opportunities junior, senior high school and university graduates.

1. Introduction

Experience-based learning and inquiry is one of the educational models with the natural evolution of a problem-based learning theory. Problem-based learning is to look at the broad development and implementation in a curriculum since the 1980s fighting [1]–[4]. Education in Indonesia is still behind compared with other countries. Level of education the peoples is very influencing the way of thinking and acting. The lower the level of education, make the thinking will behind. Education in Indonesia for urban areas and remote areas is very different. Many people from all corners of the village are only junior high school and even elementary school graduates. Many peoples who get married at an early age, where the economy and environment are the main factors.

Following the development of existing technology and problems, so educational game is created, where this game which can be used as a useful thing to overcome existing problems. In recent years, the development of education games has become an important topic to attract domestic and foreign education researchers [5]. The development of education games is very interesting, in educational games it has advantages compared to education in the conventional form where education games can be a visualization of real problems[6]. As an initial level, educators respond positively that game development as a special stone tool for students [7], when students focus on a single element of a game [8] and when building learning for students to play the game itself [9]. Facing the existing problems and developments in delivering education the puzzle game as a learning media and to find out the of professi interest for students. Puzzles [10], [11], projects [12], and problems [13] have been used as teaching tools for thousands of years. The purpose of making this Puzzle Game is to design and develop interactive systems for solving puzzles in which there are education, counseling, information and games. With multimedia interface so this game there are multimedia elements in which such as images, text, video, sound. Multimedia in the context of computers utilizes computers

to create and combine text, graphics, audio, video, using tools that allow use to interact, create and communicate[14].

2. Literature

In previous studies, puzzles were widely used as one of the media in learning. In this research Puzzle is used to study the learning process [15]. The purpose of this study is to test and discuss the learning process through the application of puzzles as learning media. In this case, use some examples of selected puzzles. In addition, many studies that use puzzles as learning media such as puzzles are used as an introduction to data structures [16], in game-based research used in an introduction to a simple data structure. Puzzle-Based Learning[17], this research is used to increase mathematical awareness and increase skills in solving problems with various puzzles. This learning is very useful for introducing mathematics, critical thinking and problem solving skills. Puzzle-Based Learning for Engineering and Computer Science[18], in this research puzzles are used to attract and motivate and retain students to increase mathematical awareness and problem solving skills. Community crossword puzzles, used as a learning approach technique for the community[19]. In this study, game puzzle in used for gives confidence to the community in facing problems that are considered as real-world puzzles. Puzzle-Based Learning for Engineering and Computer Science[18], In this study, puzzle-based learning is used to attract, motivate, retain students and increase their mathematical awareness.

3. Method

In making this game has guides by research and development in accordance with Borg and Gall[20] which consists of several stages, namely: (1) Research and collecting initial information; (2) Planning; (3) Initial product development; (4) Initial results testing; (5) Initial product revision; (6) Main Testing; (7) Revision of operational products that produce learning tutorials on CD-ROM and can be used by students for the development of puzzle games; (8) Operational testing; (9) Final revised products; (10) Socialization and Implementation. Of the ten guidelines, only seven guidelines are used in the implementation of this puzzle game, namely (1) Research and collecting initial information; (2) Planning; (3) Initial product development; (4) Initial results testing; (5) Initial product revision; (6) Main testing (7) Operational product revision.

3.1. Research and Collecting Initial Information

Making puzzle games through the process of research and information gathering with the aim of getting information that will be used to make the game [21]. Research and information collection in this case relates to tools, human resources and information needed in the development of puzzle games where the game is aimed at areas with low education.

3.2. Planning

In building a game, planning is very important so that no obstacles occur and get the desired results. Planning in this case includes database architecture, concepts, designs, programming languages used, game architecture and the results to be obtained in the game. In making this game using the PHP programming language using the Yii framework, while the database used is using MySQL. The game will be running in all operating systems both Windows, Apple and Linux with browser support software.

3.3. Initial Product Development

The collection of materials must be carried out in parallel to support the production process, in this case the material in question can be in the form of images, videos, sounds or animations if needed. In addition, The storyboard must be made before entering the coding side. The function of the storyboard here is to provide visibility to each scene when the game is run. In figure 1 is a storyboard for each scene that explains the flow of the game and visualization of each scene.

Fig. 1. Storyboard in puzzle game

3.4. Initial Results Testing

Initial testing can be done while the production process is running, testing can be done by friends or someone where in testing can include many things such as graphics, audio, animation or even the process of running games. After getting the results of testing the next step is to carry out testing carried out by experts in the fields of computer education, visual communication and information technology [21].

3.5. Initial Product Revision

After the evaluation obtained from testing the initial results, the next step is make a initial revision. Games that have been through the preliminary results of testing must get the evaluation results. The evaluation results are combined and improved to get better results from the products that have been made before.

3.6. Main Testing

The main test is done after the revision of the initial product, in this test ensuring that the game made is in accordance with the storyboard, the elements in the game are already in it. In addition, the tutorial provided is in accordance with the game that is running. In the main test this ensures that the game is ready to be used and easily understood by the user.

3.7. Operational Product Revision

After several stages in developing puzzle games, the final stage is the final revision product. By ensuring that the game has been repaired in the previous stages, the final product can already be used and implemented.

4. Results and Discussion

Before entering the main part of the puzzle game, the game will be directed to the login page, the user must enter a username and password to strat the game, if successful it will enter the main page in the game. But for users who do not have an account, they must register by clicking on the "create account" first provided on the login page. The login page can be seen in Fig 2.
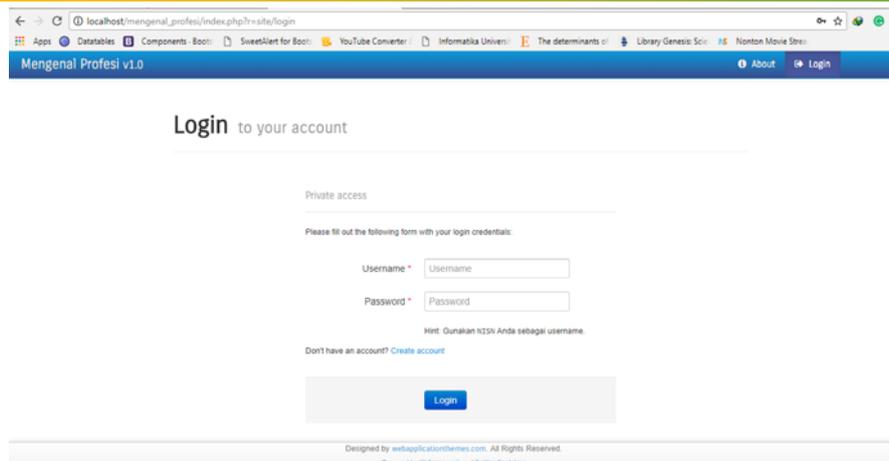
Fig. 2. Login page and create account

After students log in, users will be directed to the main menu which contains various types of professions. Every profession has a description of the tasks and requirements to become that profession. From the descriptions, users can prepare themselves if they want to choose to be one of the desired professions. To start the game, the user must select the play button, so the main menu will appear which can be seen in Fig 3.
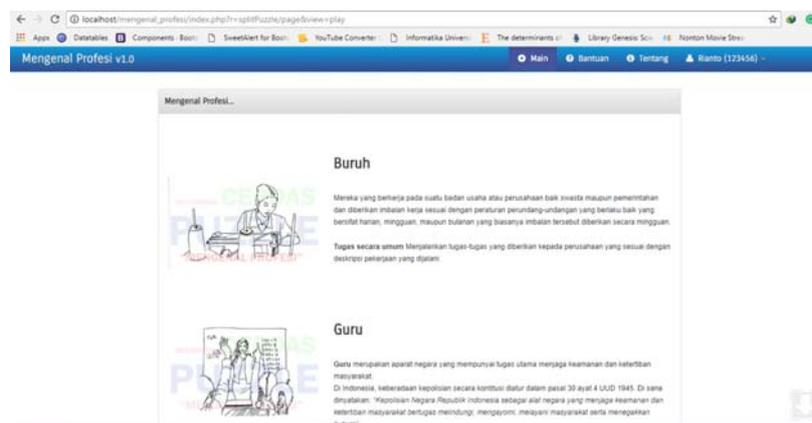

Fig. 3. Descriptions types of profession

In this puzzle game users will be faced with the question, "What will you do after graduating from junior high school?" The user must choose one answer to proceed to the next stage. At this stage users are given a brief description of the choices they choose, in this description giving opinions to users that education is very important and invites users to continue their education to the highest level.

From these choices, users will be presented with types of professions where users must choose the type of profession they are interested in. From the types of professions can be seen in Fig 4. In this section, the game will record the frequency of the profession that is in demand and display it in the form of reports. But the report can only be seen from the admin side.

Fig. 4. Type of profession

In accordance with the type of profession chosen, the next scene will display general requirements for the chosen profession. In this section, it can give a picture to the user that to become the chosen profession must have the conditions mentioned. So that it can encourage the desire of students to continue to be able to continue their education to a higher level. In fig 5 are general requirements for the type of profession chosen.

Fig. 5. General requirements for the type of profession chosen.

Obtained from the previous scene, which can be seen in Fig 5. So in this scene, there are questions about the type of profession that has been chosen. Each type of profession chosen has a different question. In fig 6 is one example of the question that is explained when choosing a pilot profession. Users must answer these questions correctly in order to continue the game. If the user answers the question correctly, the meal will enter the next scene, which is a puzzle.
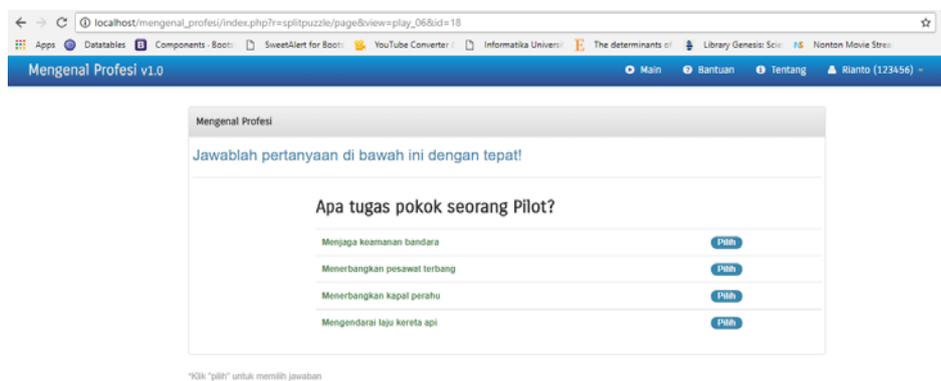

Fig. 6. Questions for the chosen profession

Algoritma yang utama dalam game puzzle ini adalah:

```php
<?php
$id_profesi= Yii::app()->request->getParam('id');
$detail= new CSqlDataProvider("select s.*, p.gambar from tbl_split_puzzle
    s, tbl_profesi p where s.id_profesi=p.id_ and p.id_profesi=
    '".$id_profesi."'");
$details= $detail->getData();
    for ($i=0; $i<count($details); $i++){
        $details[0]['load_string'];
        $details[0]['winning_string'];
    }
$string= $details[0]['winning_string'];
$image_names= $details[0]['load_string'];
$images = explode(',', $image_names);
shuffle($images);
$new_width = "750";
$new_height= "450";
$split_size= "150";
echo "<ul id='sortable' style='width:" . $new_width . "px;height:" .
    $new_height . "px;'>";
foreach ($images as $key => $image_name) {
echo "<li class='ui-state-default' id='recordArr_$image_name'
    style='border:none;width:" . $split_size . "px;height:" . $split_size
    . "px;'>
<img src='".Yii::app()->baseUrl."/images/split/$image_name.jpg' /></li>";
}
echo "<div class= span3><img class=well src=".Yii::app()-
    >baseUrl."/images/profesi/".$details[0] ['gambar']." width=250
    height=250></div>";
        ?>
<script type="text/javascript">
$(function() {
$("#sortable").sortable({
    opacity: 0.6,
cursor: 'move',
update: function() {
var winningString = '<?php echo $string; ?>';
var currentString = '';
$('#sortable li').each(function(){
var imageId = $(this).attr("id");
currentString += imageId.replace("recordArr_", "")+",";
});
currentString = currentString.substr(0,(currentString.length) -1);
console.log(currentString);
}
});
});
</script>
```

From the algorithm snippet obtained an overview of a puzzle game that can be seen in Fig 7. Taking from the type of profession chosen, it is used as the background in compiling a puzzle game. Users begin to be able to compile puzzles based on the image of the profession they have chosen.

Fig. 7. Put together a puzzle game

There were 23 students use this application, from the results obtained: 2 students wanted to be police, 4 students wanted to become TNI, 1 student wanted to become an architecture, 12 students wanted to become doctors and 4 students wanted to become pilots. The results of profession interests for students are shown in Fig 8.
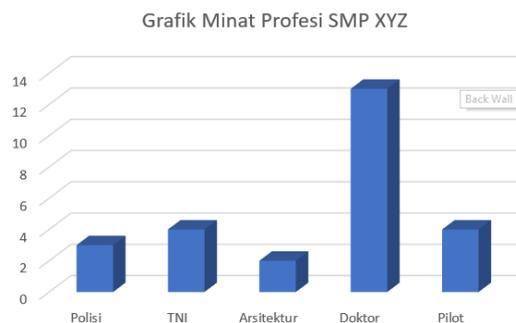

Fig. 8. Profession interest graph

In addition to collecting data on student profession interests, this application also collects data students "What students do after completing junior high school education?". From the data collection, can be obtained the level of education of a region and mapping can be done to areas that must get special attention. The results of data collection can be seen in fig 9.
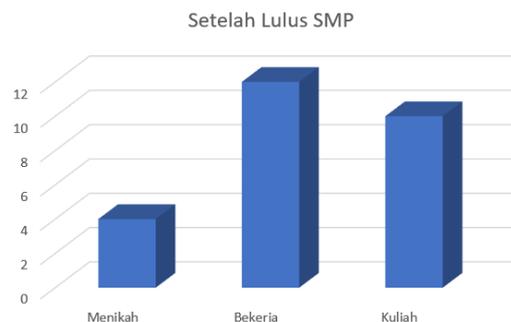

Fig. 9. Data collection after completing junior high school education

5. Conclusion

This puzzle game is a type of multimedia category in which there are images, video, sound, tech and animation. In this puzzle game including the type of educational game, besides this puzzle game can provide motivation to students to continue to be able to learn to the highest level. In this puzzle game, it is intended for junior high school students, especially grade 9. Besides being an educational game, this game can also gather information on the level of student profession interest in a school environment.

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