ISSN:2320-0790

An International Journal of Advanced Computer Technology

Baby Learn with Pooh: Android application to measure the logical thinking level of kids

S.Sharmila, I,D.M.D.Sandamali, R.M.H.N.Ranatunge, H.M.U.R.Herath and S.G.S. Fernando
Srilanka Institute of Information Technology, Sri-Lanka

Abstract: In this paper we present the design, implementation, and testing of an android based game application, called Baby Learn with Pooh which is for toddlers aged 3-5. Even though there are many similar games available for toddlers, baby learn with pooh is targeted to appraise the performance of the toddler. The key purpose of this research is to achieve the goal of adding values and enjoyment to users of the Android mobile devices. After going through severe software engineering processes of specification, design, coding, and testing, we successfully developed the game. It has been tested for compatibility on the following mobile devices: Samsung grand prime, galaxy J5 and Huawei. It should run on other compatible Android handsets as well.

Keywords: Toddlers, Logical thinking, Learning Games, Android game, algorithm

I. INTRODUCTION

We are living in a modern world. The technology has been improved a lot. The technology may greatly enhance the teaching learning process. The purpose of this project is to develop an android game based application to check the logical level of the toddlers, and provide the report to the parents to identify their kid's strengths and weaknesses. This game has basic levels and hard levels each comprising 4 areas. It will make the toddler more interested in studies.

People are looking to integrate fun and interaction with educational content, causing the toddlers to have an interest to learn in an active way. The developments of teaching resources for android devices are essential for mobile learning. Parents are facing a big problem in finding their kids' knowledge level and they fail to make the kids interest in studies. The objective of this project is to present a game which covers colors, shapes, words, numbers logical thinking contents to develop this game application. Many games with this concept is already exists, but the work of this research was to add some special features such as different levels covering different areas, overall summary, and generate report. The use of this game could happen at home with the guidance of the parent. So the toddler will be performing activity with interest and pleasure.

II. LITERATURE REVIEW

P.Pinto et.al, have proposed Mathematical Teaching based on new pedagogical tool for m-learning. That research evaluates an application for mobile devices with the aim of contributing to the elementary school mathematics teachers. The objective is to present a game which covers mathematics course content according to the Parametros curricular Nacionais. This research is disadvantageous as it focuses on only the mathematical course content. Therefore the game will not give exact results to parents. So parents can check only the mathematical knowledge of the toddler[1].

V.Stojanovska and M.Vasileva have proposed Digitalized Children's games from the past in function of the realization of the mathematic curriculum in primary education. This research is aimed to achieve a set of learning goals among K-9 students at primary schools from both a rural and non-rural region across the country. This game is taught according to the cognitive skills and abilities for students. The problem of this research is that it is still in the research level. And also it does not have any levels. They just play a game using projector and observe the activities of the kids. By playing the same game again and again, the kids will feel bored. And also it is still in research level[2].

K.Thanapisitikul and T. Polkan have proposed Educational games for primary and /or high school students on android. This paper evaluates about games in android operating system,where everyone can access and enjoy the game. The objective is to create games that support students for education such as basic mathematics problem solving. But the problem in this article is that, it focuses on only the mathematical content. And also it does not have levels.

Same as snake and ladder game. And also same level with same concept. So it is disadvantageous [3].

. C.Villacis et.al discuss about multi player educational video game over cloud to stimulate logical reasoning of children. It means how to create an educational video game for children and purpose is to stimulate logical and spatial reasoning of children. This game is created using various subjects and various levels. Hence it increases the student performance and cognitive development, and also it based on fun and educational content. Theories to stimulate cognitive development of children, Computational Intelligence, OOHDM and Development Tools, Photon Cloud are the methodology is this research is applied. Video games, artificial intelligence, cognitive development, cloud computing are the keywords of this research paper[4].

Cristina Carmona and Eva Millan have proposed Implementations of a formative evaluation for improving the educational effectiveness of an educational game for spanish orthography. This research paper evaluates about how to teach the Spanish orthography to the children. Using this game application, children are motivated by embedding pedagogical activities in highly enjoyable manner. The architecture and the user modeling techniques used are too simple and therefore the adaptive capabilities leave room for improvement. Currently the system only stores the student score in each game. The solution is clearly to implement a better user model. Based on this user model, students will be classified into categories and the adaptive capabilities will be improved. So incorrectly spelt words will only be shown to advanced students. This game is advantageous because it can identify children's cognitive levels, each exercise explain briefly, the user can check answer immediately and provides feedback messages for both of correct and incorrect answer[5].

S.Wirawan et.al have proposed Analysis of child computer interaction in edutainment and simulation games application on android platform in Indonesia. This research paper includes game applications that are developed for the Indonesian children. This gives information about what types of games that children mostly like and what are the details that we consider when we build the game application. This paper also describes about cognitive development of child. Edutainment is only developing low level thinking. Simulation game is more effective because it trains affective and cognitive process at same time. Advantages of using this type of games children have been learned how to make decisions [6].

Taylor and Francis have proposed Digital Games for Young Children Ages Three to Six: From Research to Design. This research paper mainly evaluates the effects of the digital games and how they could be designed to best serve children's needs. Young children age 3 to 5 play a wide range of digital games, which available in large screen, electronic toys their time spent with game growing. So the author examines how digital games designed to the best serve children's needs. The main objectives were how to build kid's fun interactive experience, cognitive skill building, social interaction, physical activities and health behaviors through the digital games. Main disadvantage is though mobile devices are portable and more affordable in relation to computers, toddlers not have enough mental concentration to handle a mouse rather than a touch screen[7].

R.M. Bottino et.al have proposed Developing strategic and reasoning abilities with computer games at primary school level. This research paper performs a brief analysis of cognitive process involved in playing with the computer game, discussed software features and help children to tackle different cognitive tasks. Specially mind games. On the other hand fun and interaction is not involved in this application. The main forces objectives are, to perform a quantitative analysis, through direct observation of cognitive skills involving the technology based games and also they evaluating the children's performance with computer games according to parameters [8].

N.Vincent et.al have proposed in the abundance of mobile application in the world, there is less availability of study games particularly for toddlers and preschoolers. The purpose of this study is to create a mobile application for toddlers and preschoolers in terms of reading, spelling, and mathematics. The main objectives are provide a system for proper education and entertainment, to impart and expose the young children by putting up the system which will help them their abilities. The author say how the system will help children to enhance their learning areas of the study for its urgency and demand for the children in their early stage more specifically in this age of technology. The study aimed to check the effectiveness of the system in the learning of the toddlers and preschoolers in using mobile application. But this method is more costly than using the manual and computer process [9].

III. METHODOLOGY

A. Planning

Planning and controlling of the system handled in this phase. Research team developed the system within one year time frame. Research group followed the SDLC format, and figured out each task according to that. To complete the each task specific time period was assigned. Research group stick to the assessments that has presided.

In initiative sates the team considered several research ideas and came up with a topic, which is a mobile application, to improve kid's logical thinking between ages 1-5. The team clearly identified the project objectives in project registration period. Also gathered information about the project by studying similar applications and researches.

Research group created a research questionnaire. With aid of above solutions group identified the research problem and handed over to the lecture in charge

B. Requirement Gathering and Analysis

Main objective of this phase is capture the correct requirements. The team used different methods to identify the maximum satisfactory requirement that need for the application. Also choose most efficient information gathering techniques. The team identified the most suitable stakeholders like preschool teachers' doctors and parents to gather requirements. With aid of the facts that arouse in the literature review and analyzing available requirements, research group sorted out requirements that needed to be implementing in the application. Team members decided to gather information by interview sessions, and by distributing questionnaires. After every information gathering session, team planned to make interview reports for the further betterment.

C. Design

During the design phase the client side programming of the proposal system was handled. Design phase was needed to be completed before the Building Prototype phase.

To use the system the user has to login to the game. If user do not have a user account, user needs to register first and then user can login. When the user logged in, user can play the game. Interfaces are designed as separate scenes for learning section, levels and menu contents. The learning section includes lessons with videos in four areas such as colors, shapes, words and numbers. There are two main levels. One is basic level and the other one is hard level.

The basic level contains different four areas. The areas are same as the above areas. In the hard level the four areas are combined, like colors and shapes. Likewise different levels have different rules.

When user selects the correct answer the score will increase. If user selects the wrong answer score will not increase. The game have score board and performance pages. When the user selects the score board page they can check there performance individually like in which area the toddler is and in which area the toddler is weak. If the same parent has two children, two users can play the game and they can see their performance comparably using performance page. Figure 1 illustrates the software architecture diagram of the system.

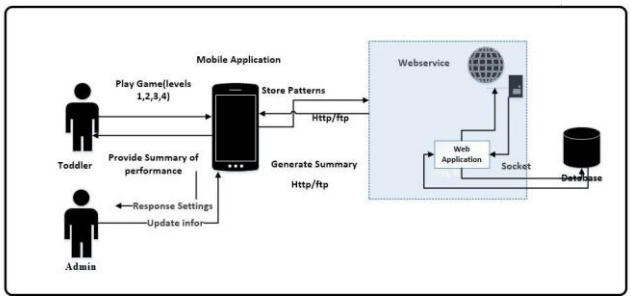

Figure 1: Software Architecture Design

D. Implementation

In this phase research team focused on implementing the application used html, php and jquery as the development languages. Furthermore the team used phone gap as the development environment.

The GUI of piggy pooh contains a menu screen, where player can direct through the game. Menu screen include all the section items to get the game start and play. In this page the team used colorful buttons, backgrounds and sounds to attract toddlers.

The lesson section presents learning materials in interactive manner. It guides kids to learn using nice video series called lessons. Those videos created using graphics and nice sounds that encourage the kids to learn.

The playing section is the main part of the game. Toddlers can play the game while they are leveling up. Playing section is again divided into two subsections as basic games and advance games. Every subsection have different areas. Basic game has only one type of logic per area. Basic games mainly focused on beginners. Beginner level contains of basic colors, basic shapes, basic word and basic numbers. Advanced game implemented using multiple lessons in the lesson section. Players have to think logically and use knowledge gained in lessons and beginner levels accordingly.

In performance analyzing section, it analyzes the player's current scores based on algorithm and displays the player status and graphs, accordingly.

E. Testing

In this phase the team used unit testing and integration testing. In unit testing project team tested each and every unit by giving to a toddler and checked their performances. Finally the project team combined every functionalities together and gave it to a toddler as a completed system and tested it.

IV. RESULTS AND DISCUSSION

A. Results

Figure 2 illustrates the login page. A registered user can logged into the system using his/ her user name and password. Wrong inputs will be result in an error message and the user cannot logged in to the system. Create Account button will direct to registration page and it will ask the user to input the information about the toddler to store in to the database.

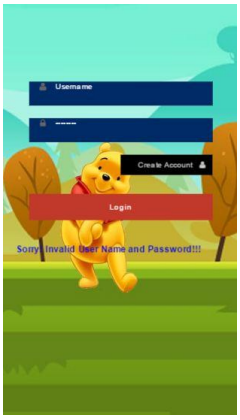

Figure 2: Login Page

Figure 3 illustrates the basic game page. A logged user can play the basic games. And if the answer is wrong, a sad face will be displayed. If the answer is correct, the score will be increased, and it will be updated into the database. The user can on/off the sound using the mute button. Furthermore, the user can go back to the main menu page by clicking the home button.

Figure 3: Basic Game page

Figure 4 illustrates the performance page. Registered users can view their toddler's performance, which is compared with the average result of a normal toddler. This page will display the performance of the toddler using a bar chart. For each and every area, the scores will be compared and, a comment will be displayed. Reset button will set the score of the toddler to 0 and reset the game from the beginning.

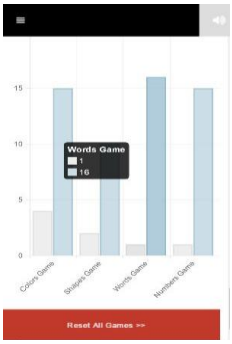

Figure 4: Performance Page

Figure 5 illustrates the hard level page. A logged user can play the hard level games. And if the answer is wrong, a sad face will be displayed. . If the answer is correct, the score will be increased. The user can on/off the sound using the mute button. To get the answer correct, the toddler should select all the answers correctly.

Figure 5: Hard Level Page

B. Discussion

Now a day's parents are facing difficulties in teaching their kids in interesting way. So our team developed a learning game to build the skills that kids need to succeed in school. The team developed an android based application to measure the logical level of kid and generate necessary reports. This game provides basic level which includes four areas and hard level game includes combination of two areas. For an example game provides the combination of shapes and number, combination of all four areas. Limited time will be allocated for the toddlers. If toddler plays 20 questions continuously it will be restricted.

The reliability of the system is that the system provides smooth and simple operations. If an incorrect operation is performed in a particular module, the system will use proper error messages and alerts for incorrect operations. The system can be used by several users at the same time using their smart phones. Any user can access the system with using even low performance android smart phones. There are few technical limitation, such as, if the game played continuously android device get heat. There should be a high processor and high internet connection. Without data connection it does not work.

V. CONCLUSION

The advantages of this project were learning development of mobile technologies, game structure and development. The only disadvantage was being constrains with a time limit and not able to fully develop as much as like however I fully intend to continue research and development.

A. *Future Work*

The game can be designed for girls and boys separately in future. This game application can be implemented by combining all four areas together as a hard level game. Moreover, some other levels can be implemented in future as extra hard level and so on. The game can be implemented by adding the feature of sending notification to the parents as an email or SMS.

ACKNOWLEDMENT

We owe a great thanks to the people who helped and supported us during the accomplishment of this research. Our sincere thanks to Lecturer in charge for guiding and correcting different aspects of our work with attention. She has taken a great care to go through the project and make necessary correction when needed. Furthermore we would like to thank the Montessori teachers and parents who shared information and their experiences with toddlers in teaching. Finally we would also like to thank our parents and friends who helped us a lot in finishing this project within the limited time.

VI. REFERENCES

[1] P.Pinto, M.Cristina, S.Oliveira, A.F.V.Machado, P.C.Santos, U.O.Santos (2012), " Educational Games for Primary and/or High School Students on Android ",<Available URL:http://www.sbgames.org/sbgames2012/proceedings/papers/cultura/C_F8.pdf>

[2] V.Stojanovska, M.Vasileva, (2014), " Digitalized Children's games from the past in function of the realization of the mathematics curriculum in primary education",<Available URL: http://www.epa.hu/01400/01428/00029/pdf/EPA01428_ptse_2014_3_236-244.pdf>

[3] K.Thanapisitikul, T. Polkan, (2013), " Educational Games for Primary and/or High School Students on Android ",<Available URL: http://ict.siit.tu.ac.th/~sgordon/css403y13s2/final/report-cn6.pdf>

[4] C.Villacis, W.Fuertes, A.Bustamante, D. Almachi, C. Procel, S. Fuertes, T.Toulkeridis, (2014), "Multi-player Educational Video Game over Cloud to Stimulate Logical Reasoning of Children", <Available URL: http://dl.acm.org/citation.cfm?id=2701025>

[5] C.Carmona,E.Millan,(2006),"Implications of a Formative Evaluation for Improving the Educational Effectiveness of an Educational Game for Spanish Orthography", <Available URL: http://www.lcc.uma.es/~cristina/papers/mito-eval.pdf>

[6] S.Wirawan, F.Muhammad, L.DSaifudin, M.Ibrahim, D.A.R,(2013)" Analysis of child computer interaction in edutainment and simulation games application on android platform in indonesia",<Available URL:http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.403.5302&rep=rep1&type.pdf>

[7] Taylor., Francis., (2009), "Digital Games for Young Children Ages Three to Six: From Research to Design", [online: 08.02.2016] <Available https://www.tandfonline.com/doi/abs/10.1080/07380560903360178>

[8] R.M. Bottino., L. Ferlino, M. Ott, M. Tavella., (2006), "Developing strategic and reasoning abilities with computer games at primary school level**"** [online: 10.02.2016] <Available URL: https://www.tlu.ee/~kpata/haridustehnoloogiaTLU/primarycomputergames.pdf >

[9] N.Vincent., P. Donna., C.Bagtaso., A. Joy., P. Soejana., (2015), "Mobile Educational Games For Toddlers And Preschoolers" [online: 10.02.2016] <Available URL: https://www.academia.edu/11517317/Mobile_Educational_Games_for_Toddlers_And_Preschooler