

Design and Evaluation of Guessing Game for Learning English as Second Language

Juliana Aida Abu Bakar, Yam Shin Hoey, Idyawati Hussein

Abstract: Video games and mobile games have received tremendous attention especially in developing countries due to its positive and negative influences on child and adolescent development. However, there is continuing concern that video games violence may increase risk of aggression in school students. Less often discussed is the possibility that playing video games may promote certain positive developments particularly related to learning English. The objective of the article was to propose an educational guessing game called I-Pro Guess (English Idioms and Proverbs Guessing Game) to assist school students in learning English as second language. This article describes the process of designing and developing an educational guessing game on a mobile platform. It provides the background of this study by discussing the educational benefits of the game. It explains how this concept is integrated into the game play in order to achieve its goal; which is to give players knowledge of similes, idioms and proverbs while playing the game. Game evaluation is conducted through functionality testing and heuristic evaluation. Heuristic evaluation is conducted by five experts: a game developer, three multimedia experts, and an English teacher as content expert. While functionality is successfully tested, heuristic evaluation reveals several recommendations from the experts. This article concludes with notable findings and future research directions.

Keywords: Game design; Game evaluation; Educational game; Mobile game; English proverbs.

I. INTRODUCTION

Video games and mobile games had become one of the needs of today's society. They have contributed, developed and give impacts to our culture, history, and even the way of life. It is rather obvious that video games and mobile games became a contributing factor to the economy of a country [4][6][14].

In recent years, the spending rate of mobile games had increased significantly [8]. Mobile game purchases grew 19.1 percent in the first half of 2018 to an estimated \$26.6 billion worldwide on the App Store and Google Play, representing about 78 percent of the total spent in apps across both stores [1]. App Store mobile game spending reached \$16.3 billion for the first two quarters of 2018, growing 15.1 percent year-over-year; while comparing to \$10.3 billion spent on Google play games during the period, a year-over-year increase of 26 percent [1]. Mobile games had become the dominant category for worldwide applications [18][19].

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Due to this fact, game-based learning became increasingly popular and people tend to develop educational mobile game or mobile serious game to allow players learn extra knowledge while playing mobile games. As people of this era spend most of the time with mobile devices, this study attempts to promote the specific knowledge by translating it into the game play. The purpose is to let them learn more about English similes, idioms and proverbs which helps to improve the writing skills. Hence, the final version of the game is available for player to enhance their knowledge.

This article describes the process of designing and developing an educational mobile game on a mobile platform. It provides the background of this study by discussing the educational benefits of the game. It explains how this concept integrated into the game play and achieve the final purpose, which is to give players knowledge of similes, idioms and proverbs while playing the game.

II. BACKGROUND

Mobile Games

Mobile games are designed for mobile devices such as smartphones while educational mobile game also known as mobile serious game is the game which designed to teach players a specific knowledge [17]. It includes the skills of goals, rules, problem solving, critical thinking and others. People believe that the purpose of an educational game are learning and entertainment, while its gameplay is the strategy to motivate the players.

Educational mobile games are the mobile digital games that contain educational components and are intended for teaching and learning purposes [2]. Educational game gives positive impacts to players. Players learn knowledge and skill by playing an educational game. Playing an educational game are effective for players to learn and remember specific knowledge joyfully. They try to solve the problem or question by thinking themselves and remember it instead of rote memorization.

Playing educational game also helps players to learn foreign language. For example, a word filling game may let players learn specific words of the language, or words which is uncommon use. Some online educational games also allow players to interact with other players or friends from social media sites. It is anticipated to be able to increase the interaction between players [9].

Educational mobile games play an important role in children's development [3]. It can stimulate children's interest in learning and improve their skills of language, critical thinking, emotion, intelligence and imagination.



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Due to the fast-developing computing and network technology nowadays, these technologies had been used by both adults and children to engage in their work, educational and entertainment. Children educational applications or mobile has become a trend in society [15][16].

Among others, the design of the children educational mobile game should also be considered by developers [5][7]. These educational mobile games are more effective in grabbing their attention and using its own ways to let them think critically throughout the course of the game. Besides, pre-school children or young children need a simpler game as in this stage, they can only establish signals and objects [5]. Mobile digital learning is becoming a trend of future education, especially giving helps in the pre-school game education in the future.

Learning Similes, Idioms, and Proverbs through Games

Simile is a figure of speech in which two unlike things are explicitly compared or an instance of such a figure of speech or a use or words exemplifying it. **Idiom** is an expression whose meaning is not predictable from the usual meanings of its constituent elements, as “kick the bucket” or “hang one’s head”, or from the general grammatical rules of a language.

Proverb is a short popular saying which usually of unknown and ancient origin, that expresses effectively some common place. Such knowledge is considered essentials for primary school students, as similes, idioms and proverbs normally constitute in their examination, while for secondary school children, is useful to strengthen their writing papers. Previous research found that proverb comprehension may contribute to reading proficiency in preadolescents who are 12 years old [23].

There are currently some proverbs and idioms guessing game in the Play Store. Each of them has their own strengths and drawbacks. The highest rating for idioms application is the “Vocab App: Editorial Quiz, Grammar, Dictionary” by WifiStudy with 4.7 stars rating [20]. The strength of this mobile game besides idioms and phrases, is also including uncommon English words, Synonyms and Antonyms, and translator as depicted in Figure 1.



Fig. 1 Screenshots of Vocab App

In Figure 1, it can be seen that the most important feature in mobile game is quiz section and players can view their

test result immediately. Players can also bookmark pages that they are interested in. However, the user interface lacks appealing design.

The second highest rate is “Verbal Ability Offline” by Praveen Yura with 4.6 stars rating. The strength of this application got most good comments from users as they can learn not only idioms, but also having features like the application stated above. There is also a “Fill in a Blank” part for users to play with as depicted in Figure 2. All in all, this is an application who good for English learner. Nevertheless, the weakness is this mobile game also lack of visual appeal which probably may not attract younger users.

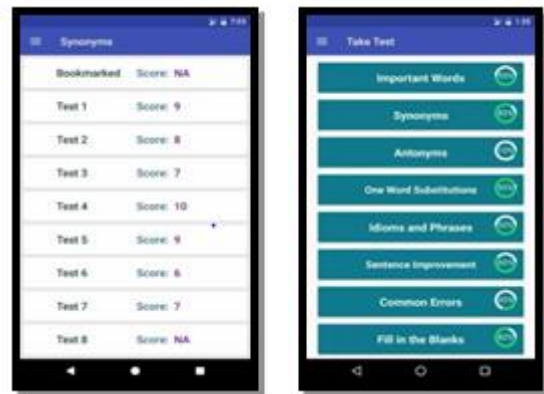


Fig. 2 Screenshots of Verbal Ability Offline

The third is “Word Saying – Idioms & Proverbs” by Smart Up Inc with 4.6 stars rating. Its strength is it includes saying, slogan, and proverb, and so on and there are interesting training games for users. The game is advancing from easy to hard levels in order to examine users’ knowledge. The design of this mobile application is merely attractive to adults as illustrated in Figure 3.



Fig. 3 Screenshots of Word Saying – Idioms & Proverbs

It is found that there is a number of similar mobile games with lower ratings, however, the above three is considered the topmost ratings [10]. These mobile games are obviously targeted to adults as the design and gameplay are particularly straightforward and heavily textual in appearance.

Previous work has shown that for similes, idioms and proverbs, children before age 10 could not understand and learn it from playing mobile games, while children between

age 10-15 are able to absorb the knowledge via playing mobile games. However, the result in students above age 15 tends to gain knowledge by reading instead of playing mobile games, as it may have had limited knowledge in the games. It concludes that learning knowledge from playing mobile games are limited for players in specific age [11].

Other than that, attractive and appropriate visual and sound effect will strengthen players' memory about the highlighted point [12][13]. It is effective to boost players memory and easy to memorize and remember those things they had seen and heard in the games. In this study, researcher attempts to explain the process of learning through educational mobile games and the effectiveness for students in learning new knowledge. Besides, this article described the technical part of this study particularly on the design and development of the educational mobile game.

III. DESIGN AND DEVELOPMENT

In this study, I-Pro Guess is developed as an education guessing game for learning English idioms and proverbs. Although I-Pro Guess is a two-dimensional game, it allows players to be the main character who had been given specific task to save the cursed forest and escape from the mysterious forest. During the beginning of the game, players realized that they had been trapped in a cursed forest and had been told by the creatures to complete the given task.

Players should give correct answers to the specific questions to pass the three levels in order to escape from the forest. Choosing correct answers will bring players to the next questions and to the next level. The challenge is that players should choose the correct answer in limited time or they will fail in that level. This may let players to trap on that question and to start again from the question with a shorter time.

The game rules for the three levels are basically same. However, the knowledge to know is different. During the first level, players need to understand about similes and answer them correctly. The following levels will be idioms and proverbs that they had learnt. Before the challenge started, there will be a window stated the definition of similes, idioms and proverbs to make sure players understand them. Table 1 stated the knowledge and game play of this game.

Table. 1 Incorporating Similes, Idioms and Proverbs to the Gameplay

Level	Knowledge	Game Play
1	Similes	Read the sentences and choose the correct answer to fill in the blanks.
2	Idioms	Read the situation and choose the correct answer to fill in the blanks for the stated idioms.
3	Proverbs	Read the situation and choose the correct answer to fill in the blanks for the stated proverbs.

In the planning stage, storyboard was prepared to sketch the main scenes and to describe the event occurred during the game. Moreover, the storyboard also included all the decisions regarding this game, such as texture materials;

background music, sound effects and interactions to do in order to finish the game. This 2D game was developed using Adobe Flash CS6, a software which allows developer to add the interaction using game scripts and to publish it in specific mobile platforms.

Based on the game play and content that developer had identified, the development process happened iteratively includes character definition, scene modelling, game scripting, platform conversion, and performance assessments.

A. Character Definition

There are few characters in this game; Amethyst the fairy, Ricky the unicorn and Witch Silver Hair the villain. The player will be the main character who needs to make decision about the correct answers to pass the levels. Amethyst the fairy and Ricky the unicorn who explains and assist the players throughout the game. Therefore, they need to read and understand the question given to make sure their answer is correct. On the other hand, there is a villain in the story too, which is the Witch Silver Hair that cursed this forest.

After defining the characters, they were developed accordingly. Colors and looks of the characters had been chosen and iteratively tested to ensure they are user friendly. The characters' main function is to assist players to the next level and to explain the game play to players. The characters had been designed with Adobe Photoshop CS6 as shown in Figure 4.

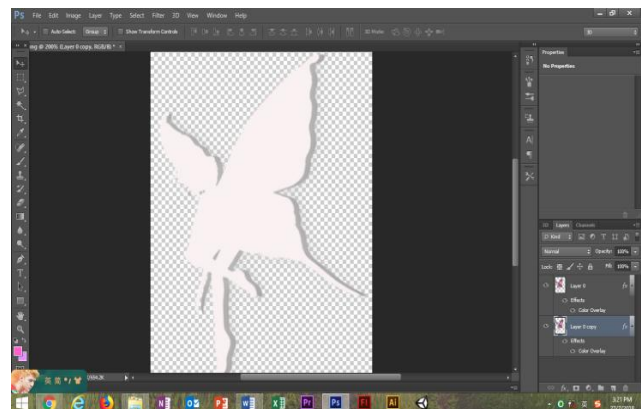


Fig. 4 Character modeling

These characters were designed refers to the examples that had found from some online platforms to make sure it was user friendly and look more familiar. As it was just a 2D game, those characters do not design to have any movement and position.

B. Scene Modelling

Creating the scene for this game is to make sure players are able to blend themselves into the theme and environment. To create a 2D game scene, background picture is needed and accompanied with interactive items, such as buttons and characters. The setting of this game was in a mysterious forest and the background chosen was mostly trees and forest. The background in level 1 is the brightest and the following levels will be darker represented more difficulties to face.



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Furthermore, the items such as buttons was created and imported into the game so that they can be applied as the assets of the game as shown in Figure 5. Once the items had been imported into the game engine, they can be used more than once by the “drag and drop” function. This ability has made easier to the developer to complete this project.

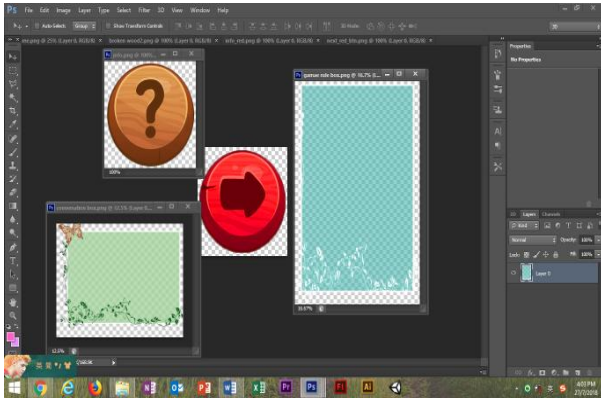


Fig. 5 Items and scenes for home page

C. Game Scripting

Game scripting stage started after the scene modelling and was done in the game engine. In the process of developing a 2D game, it includes making the scenes, make items into symbols, adding interaction and action scripts. As shown in Figure 6, players have choices to convert the items into a symbol and movie clip while they are playing this game.

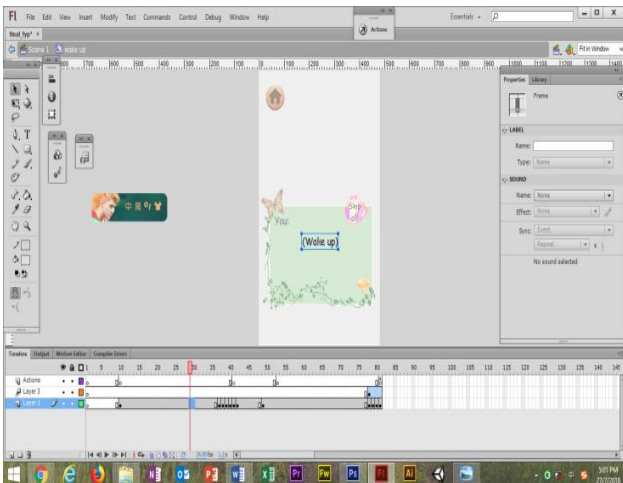


Fig. 6 Converting items into a movie clip

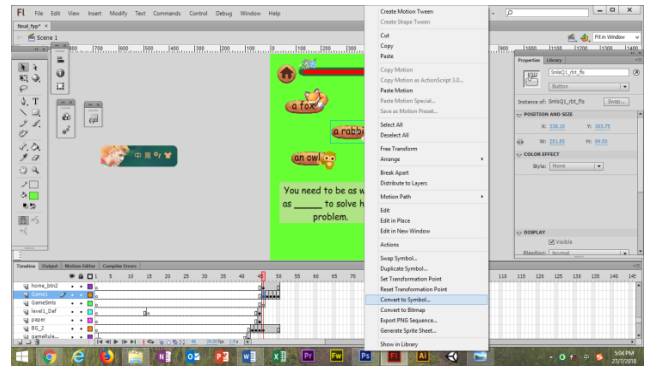


Fig. 7 Process to convert items into symbol

Figure 7 shows the process to convert items into a symbol. In this game, most of the items were made into buttons and allow players to touch on it. For example, in this game, a button is created as an option for player to choose to continue the game or back to home page, or choose which answer they think it is correct.

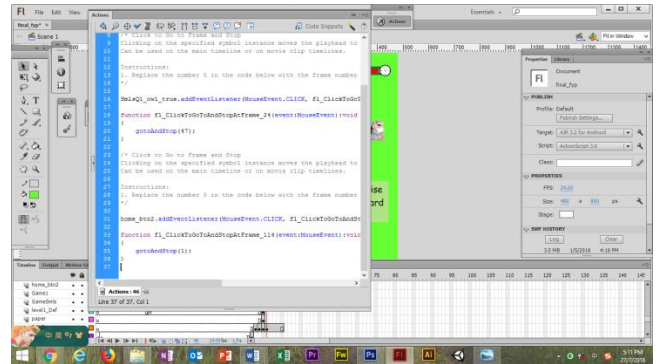


Fig. 8 Action scripts for a symbol

Some effects for the symbols had also been applied to make the game attractive. In this stage, adding action scripts (as in Figure 8) for the symbols is important as the scripts should be totally correct. Suitable scripts were chosen for specific symbols to make sure they functioned correctly and effects were timely as shown in Figure 9.

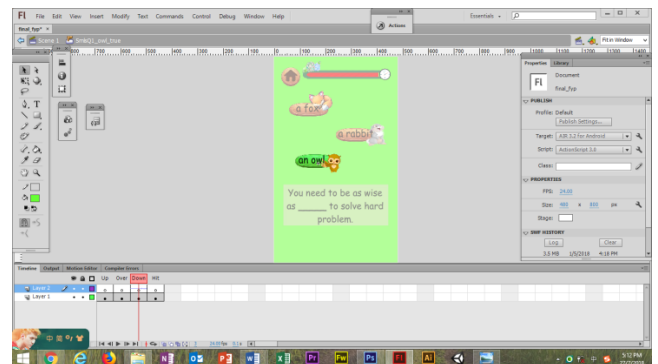


Fig. 9 Adding action scripts and effects for symbols

D. Platform Conversion

The software used to develop allows developer to publish projects in various platforms. However, this game was chosen to publish in mobile platform, such as tablet and mobile

phone especially for Android devices. At the same time, I-Pro Guess is also available in personal desktop version.

IV. EVALUATION

Functionality Testing

The “Start” button allows players to start the game by clicking on it. The storyline will be presented for to recap the players’ memories on the recent screen while players can choose to skip the storyline. Conversation between players and the characters of the game will be displayed on the screen to give a brief explanation of the game story.



Fig. 10 Both Start and How to Play buttons

In Figure 10, the “Start” button is separated from the “How to Play” button in order to differentiate the regular player with first time player. The purpose of this part is to allow first time players to explore on how to play the game. The first level of the game represented the first challenge to pass by the player in order to escape from the cursed forest. The player should read the question given and choose the correct answer to fill in the blanks.

They can move to the next question if they get the right answer within a limited time. Once the questions are completed, the screen change to the next level. However, if players fail to do so, they will fail at that level and need to start again from similar questions in a shorter time.

Figure 11 reveals the screenshot of the game. The second and third levels were differed in terms of context and interfaces, but with the same strategy and game rules. As most smart phones use touch screens as their natural user interfaces, developer decided to use virtual 2D buttons. Another reason is that this is a 2D game.

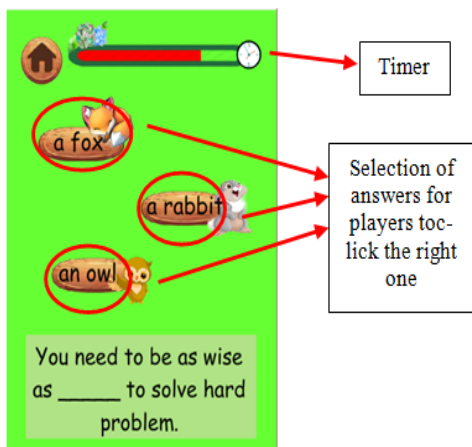


Fig. 11 Screenshots from Level 1 of the game and its game object purposes

Initial observation that had been done by developer shows that virtual 2D buttons make target players (age 10-15) easily to control, while those younger kids (age 6-9) may learn quicker with 2D buttons. Sound effects of the buttons also make it become more interactive while playing the game.

As shown in Figure 12, players need to answer question of similes in level 1, while idioms for level 2 and proverbs for level 3. They are having the same number of questions, but the time limit is shorter. Completing current level is the mandatory condition to go up to the next level.



Fig. 12 Level of difficulties are based on context and revision is provided at the end of the game

Heuristic Evaluation

Heuristic evaluation is a method to analyze the usability of interface design by asking evaluator or evaluators to comment on a user interfaces. Past studies shows only 20% - 51% of usability problems will be found if there is only one evaluator doing the heuristic evaluation [21].

According to Nielsen [21], the best results can be obtained by aggregating the evaluations from several evaluators, at least three to five people. The evaluation follows usability principles of the following categories: Game Play, SkillDevelopment, Tutorial, Strategy & Challenge, Game/Story Immersion, Coolness, Usability/Game Mechanics and Controller/Keyboard [22].

The heuristic evaluation is conducted by five experts: a game developer to test the functionality and gameplay; three computing experts to assess on user interface; and an English teacher for testing the relevance of the game content. There are minor problems need to be considered by developer, which evaluator gave a low rating on its severity level.

From the heuristic evaluation, the suggestions and recommendations are as follows:

- i. To make more storyline to the game. Storytelling is considered as the strength of this game.
- ii. To add the gamification features or awards to players, such as giving points, or coins, or any other awards based on the storyline created to motivate players to keep on playing.
- iii. To devise unique game play each level. For current version, the game play for all level is similar.

The content of the game is validated by the experts as appropriate for players to learn easily and induce learning excitement.

V. CONCLUSIONS AND FUTURE WORK

This article describes the installation of English similes, idioms and proverbs knowledge into the game play and the benefits of educational mobile games to players. It is argued that instilling awareness about educational mobile game to the public is a must for today society. Instead of developing fun game, developer should also consider the educational benefits of the game.

Apart from improving the current version, there are several research directions identified. Previous work reveals that instilling such knowledge in mobile games is anticipated to be useful. Many people including teachers and parents agreed on the educational benefits through playing games. Moreover, there comes the arguments of playing games may instill specific knowledge to players through the game play. However, certain questions had remained for us to contemplate: What kind of people may learn the knowledge from the games and, how do people learn it from the games? Future work will investigate the further interaction between human and the gadget and how educational mobile games may facilitate informal learning process. Furthermore, study of the relationship between human memory, engagement and informal learning will also be included in the future work.

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REFERENCES

1. Nelson R (2018), Global App Revenue Reached \$34 Billion in the First Half of 2018, Up 28% Year-Over-Year, Retrieved October 15, 2018 from <https://sensortower.com/blog/app-revenue-and-downloads-1h-2018>
2. de Freitas S, Savill-Smith C, &Attewell J (2006), Educational games and simulations: Case studies from adult learning practice. London: Learning and Skills Research Centre.
3. Ni Q & Yu Y (2015), Research on educational mobile games and the effect it has on the cognitive development of preschool children. 2015 Third International Conference on Digital Information, Networking, and Wireless Communications (DINWC), 165-169.
4. Baker M (2005), Mobile Marketing's Evolution. Retrieved 20 May 2018 from iMedia: <http://www.imediaconnection.com/articles/ported-articles/red-dotarticles/2005/mar/mobile-marketings-evolution/>
5. Bian W & Alf IW (2012), A guideline for Game Development-Based Learning: A Literature Review. *International Journal of Computer Games Technology* 2012, 20 pages.
6. Carroll J (2016), 10 Mobile Game Marketing Trends For 2016. Retrieved 20 May 2018 from <http://www.monastery.io/digital-marketing/10-mobile-gamemarketing-trends-for-2016/>
7. Chikhani R (2015, October 31), The History Of Gaming: An Evolving Community. Retrieved 20 May 2018 from Tech Crunch database, <https://techcrunch.com/>
8. _____ (2016), The 2016 U.S. Mobile App Report. Retrieved 15 Sept 2018 from comScore database, www.comscore.com
9. Costikyan G (2005), Toward the True Mobile Game, *Netgames*, Hawthorne.
10. Dredge S (2014, December 23), The best iPhone and iPad games of 2014. Retrieved 20 May 2018 from The guardian database, <https://www.theguardian.com/>

11. Fritsch T, Ritter H, Schiller J (2006), User Case Study and Network Evolution in the Mobile Phone Sector. *Advances in Computing Entertainment*, Hollywood, USA.
12. Fritsch T, Voigt B (2006), How Hardcore are you. *Netgames*, Singapore.
13. Kevin C, Ciaran G (2012), The Future of Web and Mobile Game Development. *International Journal of Cloud Computing and Services Science (IJ-CLOSER)* 1, 1, 25-34.
14. Klubnikin A (2016, January 21), How Much does it Cost to Develop a Mobile Game? Retrieved 20 May 2018 from R-Style Lab database, <http://rstylelab.com/>
15. Lella A (2016, September 22), Millennials Use More Apps, but Spend a Greater Share of Time on Top Apps. Retrieved 20 May 2018 from comScore database, <http://www.comscore.com/>
16. Lella A (2016, September 01), Smartphone Apps Are Now 50% of All U.S. Digital Media Time Spent. Retrieved 20 May 2018 from comScore database, <http://www.comscore.com/>
17. Mayra F (2015), Mobile Games. In Mansell R & Ang PH (Eds.), *The International Encyclopedia of Digital Communication and Society*, John Wiley & Sons.
18. _____ (2016), Mobile gaming - Statistics & Facts. Retrieved 20 May 2018 from Statista database, <https://www.statista.com/>
19. Perez S (2014, August 21), Majority Of Digital Media Consumption Now Takes Place In Mobile Apps. Retrieved 20 May 2018 from Tech Crunch database, <https://techcrunch.com/>
20. Corpuz J (2018), Best Android Games 2018. Retrieved 1 Sept 2018 from <https://www.tomsguide.com/us/best-android-games>
21. Nielsen J, Molich R (1990), Heuristic evaluation of user interfaces, Proceedings of the SIGCHI conference on human factors in computing systems: empowering people, ACM Press, Seattle, Washington, USA, pp. 249-256
22. Desurvire H, Wiberg C (2009), Game Usability Heuristics (PLAY) for Evaluating and Designing Better Games: The Next Iteration. In: Ozok AA, Zaphiris P. (eds) Online Communities and Social Computing. OCSO 2009. Lecture Notes in Computer Science, vol 5621. Springer, Berlin, Heidelberg
23. Nippold MA, Allen MM, Kirsch DI (2001), Proverb Comprehension as a Function of Reading Proficiency in Preadolescents, *Speech and Hearing Services in Schools* 32(2):9, DOI: 10.1044/0161-1461(2001)009