Digital Games and Learning

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APRESENTAÇÃO

Os estudos e pesquisas presentes nesta obra permitem ao leitor obter uma visão teórica crítica clara e concisa do campo de conhecimento dos jogos digitais e aprendizagem em uma perspectiva interdisciplinar, tendo em conta a investigação de áreas como ciência da computação, psicologia, educação, neurociência e design de jogos.

Assim, este livro sintetiza 15 trabalhos relevantes para o estudo de jogos e aprendizagem, servindo como um guia para qualquer um interessado nesta temática, especialmente para pesquisadores, designers, professores, profissionais e políticos que querem entender, projetar ou analisar melhor a relação entre jogos e aprendizagem.

Estes trabalhos trazem a reflexão abordagens importantes, tais como: o uso de tecnologia como uma alternativa na maneira de ensinar, agregando mais interatividade e dinamismo durante as práticas educacionais; um jogo de plataforma instigante e divertido, envolvendo desafios matemáticos do Ensino Médio com o objetivo de aumentar o interesse dos alunos pelas aulas de matemática neste nível específico da educação; um apanhado histórico acerca da origem de jogos analógicos, a relação da sociedade para com os jogos, algumas de suas classificações que estão em maior quantidade no mercado atual como os "Eurogames" e os "Ameritrashes", a hibridização destes jogos e a participação dos dispositivos móveis; avaliação das experiências de jogo em ambientes digitais e não digitais através de personalidades de jogadores em potencial, como seus jogos são estruturados e quais jogos atendem às necessidades de determinadas personalidades; estudo de tecnologias e os detalhes de implementação envolvidos na sua criação; um jogo em duas etapas para auxiliar na escolha de um curso de graduação onde a primeira etapa apresenta conceitos de forma lúdica e divertida e a segunda etapa explica os conceitos apresentados e sua importância; construção de um jogo focado em personagens míticos do folclore brasileiro de forma a compartilhar essa informação com alunos, motivar a discussão do tema e aumentar o interesse dos alunos pelo mesmo; um serious game do tipo Quiz dentro da temática "Urgências Endodônticas" que enfoque nas competências e habilidades que capacitam o cirurgião-dentista ao atendimento destes casos; uma avaliação heurística de um jogo criado para auxiliar crianças surdas na aprendizagem da língua portuguesa; uma experiência de negociação e desenvolvimento pela empresa Napalm Studios de dois advergames com características distintas; aspectos educacionais e de diversão de jogos voltados à educação; uma análise, a partir da perspectiva de estudantes do Ensino Fundamental, Ensino Médio e Ensino Superior, como o jogo digital pode contribuir no processo de ensino e de aprendizagem.

Aos autores dos diversos capítulos desta obra, meu agradecimento pela submissão de seus estudos na Editora Atena. Aos leitores, desejo que este livro possa colaborar e instigar uma reflexão mais aprofundada sobre a relação envolvente entre jogos e aprendizagem.

Ernane Rosa Martins

SUMÁRIO

CAPÍTULO 2

PORTAI$: SERIOUS GAME FOR FINANCIAL LITERACY IN BRAZIL

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ABSTRACT: Due to the relevance of the subjects related to financial literacy, it is shown here a way of choosing and presenting these contents based on the collection and analysis of data as a target audience and means of publication of greater scope to this one. Having defined this, it was also realized a survey and evaluation of other games related to the theme in order to know the approaches used between educators and designers. With this, defining the approach described and using it to develop a game for mobile platforms. It presents the dynamics and the mechanics used, as well as the plot developed and the systems of scores in the form of gold, silver or copper coins. The tests relied on electronic form interviews with thirty one users to assess gameplay and relevance of lessons on consumption, budget planning, debt control, and cost-benefit assessment.
KEYWORDS: Financial Literacy, personal finance, serious game, mobile game.

1 | INTRODUCTION

In Brazil, ENEF (Portuguese acronym for "National Strategy for Financial Literacy") created by a federal law of 2010, provides the creation of teaching tools for financial literacy topics for children and young people in school age through materials and lectures in schools and for adults, according to the project site (ENEF, 2018), through various media and still with the challenge of dealing with a public with diverse formed opinions about money. The teaching-learning challenges and wide range of adult-related media were the main motivations for this work. This lack of focus on adults could do the whole strategy not to deliver concrete results, which is actually occurring if we evaluate debt data provided by National Confederation of commerce (CNC, 2018) in figure 1, which evaluates data on approximately 18,000 consumers in the main capitals of Brazil since January 2010.
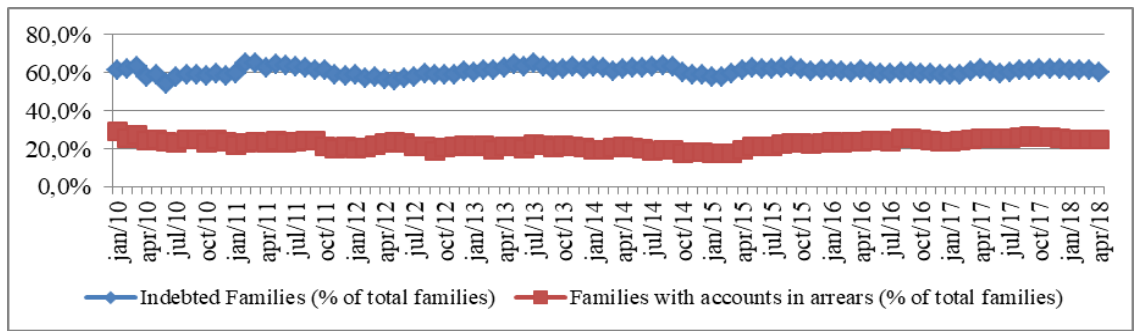
Figure 1. Indebtedness and arrears in payment data of Brazilian consumers from January 2010 to April 2018 (CNC, 2018).

The data in figure 1 show an unchanged central tendency in 8 years of analysis, with a mean of 61% of the families evaluated indebted, which can be used to demonstrate the inefficiency of the current strategy and the need for new approaches. Another factor that can be added to this analysis is the percentage of income indicated by the Organization for Economic Co-operation and Development (OECD, 2018) that points Brazil in the last position among all the countries evaluated as can be seen in figure 2.
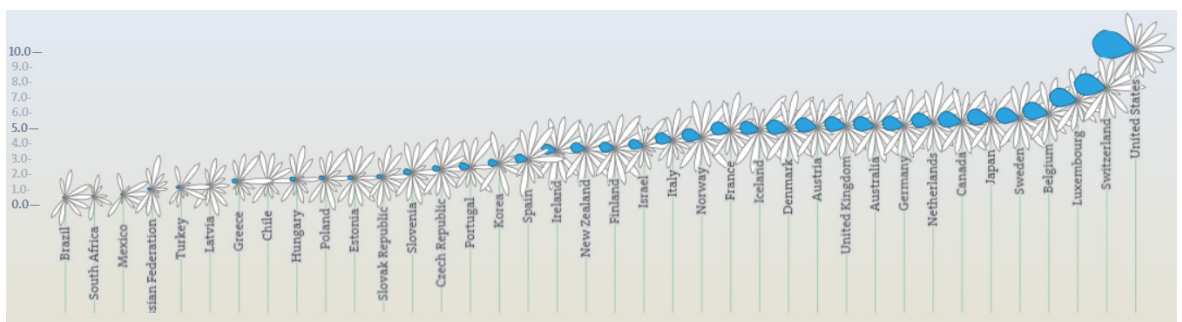
Figure 2. OECD Better Life index Income ranking (OECD, 2018)

Even with these indicators, the percentage of research by the term "educação financeira" (financial literacy in Portuguese) shows a growing tendency evaluated from 01/01/2004 to 05/31/2018 by the trends tool of google (Trends, 2018) as it can be seen in figure 3. This indicates, among other things, that the material available for adult financial literacy in Brazil may not be in line with the previous knowledge of these people, which may cause the acquired knowledge not to become practical.
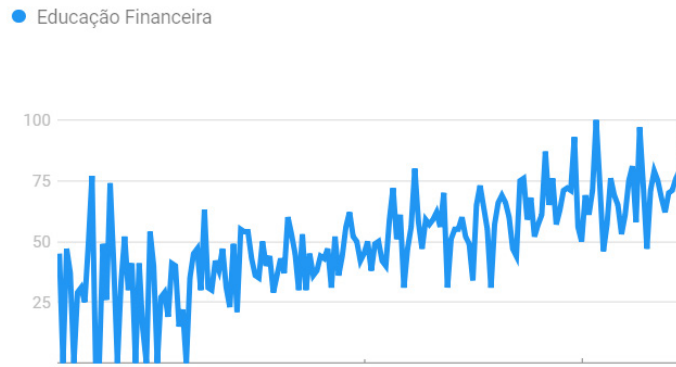
Figure 3. Trends for "*educação financeira*"

After researching literature on the subject (Brazil, 2014; Cerbasi, 2007; Clason, 2006; CVM, 2014; Kiyosaki and Lechter, 2014; Lusardi and Mitchell, 2011; Stanley and Danko, 2010). sequencing to approach related topics in figure 4. These topics were separated here in two phases related to the level of complexity. The first topics (comprised in items 1 to 5) are the basic level, where the problems related to exacerbated consumption and debt should be solved, in order to make those who use this information a saver. By conquering this initial step and beginning to save money regularly, one must move to advanced level knowledge (comprised of items 6 to 8) concerning on investments.

Figure 4. Financial Literacy topics. Adapted from (Souza and Mustaro, 2015, p. 900)

It is demonstrated a form of presentation of basic contents for financial education to follow based on software approaches evaluated for this purpose, and from their comparisons the development and testing of a serious game is presented.

2 I MATERIALS AND METHODS

In the context of financial literacy, some games were analyzed below seeking to know the dynamics that developers and educators give to the subject. Among those studied, chosen by relevance, are detailed here because they have elements that contribute to development.

Starting with Monopoly board games (Hasbro, 2014), the player receives an initial cash amount, also in credits of an electronic card in the current versions, to buy companies, stocks and estates. Receiving dividends from the other players that stop at positions of your property. It also has a mechanism of random situations called Luck or mischange, that the player stopping into this position must withdraw a card with a situation that adds or subtracts money from his equity, the game is won by those who end up with more money.

Game of Life (Hasbro, 2015), is a multiplayer game that, when rolling dice, or electronic roulette in the latest versions, players' pieces move through board positions that have everyday life situations, such as getting a job or receiving salary, and performing expenses like problem pipelines or even car overhauls. The player who has biggest amount of money at the end wins the game, which is determined by the time of retirement selected by the players.

In The Sims (EA, 2016), the player creates a character who starts his life by getting a job and learning skills such as logic, mechanics, gardening, musical instruments and more to improve his chosen career, and evolving in these skills, greater is the gains in the profession chosen. For being a simulator, the life time is also a variable, and to continue with the legacy of the character after death is necessary to marry and have children, otherwise the game ends. To stay healthy in the game and necessary to carry out expenses with food, housing, leisure, sports and studies.

In The Sims 2 Expansion Pack: Open for business and you can start your own business by choosing merchandise sales prices and marketing strategies such as better in-store shelving, attracting new customers, and hiring employees .

In The Sims 3 it is possible to become partner of companies established in the town receiving dividends each week at the time of the game. Topics such as learning to improve revenue, entrepreneurship, financial reserve for emergencies and frugality in moments of accumulation of wealth are placed, directly or indirectly, in the goals of this series of games.

PING - poverty is not a game (Looy and Grove, 2010), created by a Belgian company to help young Europeans deal with the poverty caused by the change in their lifestyle. Many everyday situations are illustrated in the format of conversations within the game in order to demonstrate the possibilities of reactions to each problem presented, such as being forced to live alone due to an adverse situation or even seeking the first job.

The game Bate-Bola Financeiro (VISA and FIFA, 2014), developed by Visa in

partnership with FIFA, is a quiz game about personal finance, the player controls the ball passes of a soccer team and with each answer correct a pass and made for the player positioned ahead and so on until the goal, incorrect answers give possession of the ball to the opposing team.

In Mesadinha (Innovation, 2016), a game about budget planning, two armies (green and red), respectively revenues and expenses, struggle to conquer a planet. A war objective is defined to help the player to save part of his income to reach a value of choosen goods, each new deposit in savings raise the bar until the balance makes possible its acquisition, like a car or smartphone by example. It has a graphical mode, which shows the occupation of the armies in the world, or a spreadsheet mode in which can be accompanied budgetary accounts defined in the game and their balances.

Based on the comparison of these games a narrative was created for the main dynamics and some mechanics that runs in this plot, these combinations are presented below.

2.1 Financial Literacy adaptation to a digital game

From an adaptation of the book The Richest Man in Babylon (Clason, 2006), the digital game is set in this ancient city, relying on plot elements such as scenarios and characters. It is not a literal adaptation, in order that some of the lessons presented are updated and adapted to the Brazilian scenario. The original format of this book was leaflets distributed in American banks and insurance companies that talked about planning and financial enrichment, these leaflets were gathered resulting in the published format. The central aspect of it, is the perceptions of Arkad (main character), who tells of his quest for financial independence, and shares his mistakes and correctness initially with his colleagues and then with his disciples. Although the book was originally published in 1926, the basis of financial education is adequately structured and widely used in other personal finance books (Cerbasi, 2007; Cerbasi, 2013; Kiyosaki and Lechter, 2014), one of his main phrases "make your money work for you" is in practically all of them. It starts with the individual will to organize financially, to seek knowledge on the subject and then apply the knowledge acquired.

Based on this, a study of the characters was carried out with the intention of defining the level of reality presented for one of them and thus follow this pattern for all the others. The character chosen for such, due to its importance in the plot was Armhed, the tutor, as can be seen in figure 5.
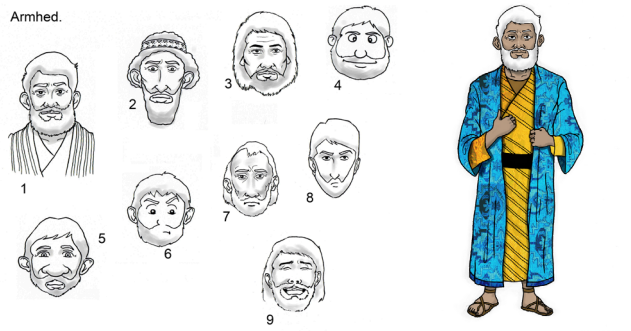
Figure 5: Facial patterns study and Final Version of Character Armhed.

The names of some of the characters are combinations of the characters' names in Clason's narrative (Clason, 2008), such as Mathish and Algathon, which are combinations of Algamish, Arkhad master and Mathon the Babylonian money lender. Each character is responsible for a game scenario within the dynamics of the game that is presented below.

2.2 Game dynamics and mechanics

Still using the comparison of other related games, the dynamics of the game focuses on making decisions about money. In the plot, the player starts as an indebted person who wants to have their dreams fulfilled, but who does not know where to start, with a help from the destiny knows the Armhed, that says to have the key to the dreams so longed by the player become reality. After passing through the stage of acceptance of his destiny (figure 6), following the hero's journey (Campbell, 2008; Vogler, 2007), the player is transported through a gateway to ancient Babylon where all mechanics of the game take place.

Figure 6. Initial Presentation of the game, following the passage through the first threshold of the hero's journey

The game begins by selecting the genre of the player to adapt the lines of the characters to male or female, then presents a sequence of conversations with the character Armhed that offers a magic coin to the player and help the player with his financial difficulties through knowledge . When accepting, the main character is transported to Babylon, where all the mechanics of the game begin. It basically consists of financial choices and accumulation of wealth through work in the camel market as an aid to the population that is impoverishing after the death of Arkad (main character of the richest man in Babylon (Clason, 2008), the player's job is to maintain the teachings on finance the population of the city of Babylon by means of answers to the questions asked by the population, a question and answer system was defined here, which

punctuates in copper coins for each correct question and also level of experience. to start answering the questions in the camel market, it is necessary to take courses at the Temple of Knowledge, where Armhed teaches lessons in lesson formats for players, in order to unlock new questions for each new training. energy, hunger and fun, these must be healed by spending at the hotel, or in the theater respectively, and in case the player encounters financial problems to continue in the game, the bank offers loans in copper coins to continue (Figure 7).

Figure 7. Main menu and Player making loans in the bank scenario

The main goal is to eliminate two phantoms that haunt the city, the phantom of monetary confiscation and the phantom of hyperinflation (Figure 8), both are Brazilian historical facts that caused consumption problems in the population, such as instant consumption (Carvalho, 1990), and treated among the teachings of Armhed in the temple of knowledge. Facing the ghosts requires two silver coins for each (in proportion 20 copper coins) and an experience level of 2 and 5 respectively. In the challenge, questions are offered on the topics addressed by each of them, so that the player must seek information from sources external to the game to beat them. In conclusion, in case the player has no debts in the bank, Armhed thanks him for freeing the city of its ills and a new portal opens that leads the player to a closing presentation.

Figura 8. Phantom of the Monetary Confiscation and Phantom of Hyperinflation respectively.

The game was developed in the Unity platform (Unity, 2018) in 2D format and can be played on several operating systems, among them Android (mobile) and Windows

(PC). These platforms were used for the version tests discussed below.

2.3 Tests

For testing purposes, versions of the game developed were made available via internet for download on Android and Windows. Versions for iOS and Linux already exist, but ease of installation by the player was taken into consideration for the initial tests. It´s because Apple restricts the installation of applications on its devices to registered developers and the linux version, depending on the distribution, may need root access to be installed.

The invitation to run the tests was made through public call via download link posted on social networks and a classroom with about twenty five university students of entrepreneurship were invited to test the interactivity and lessons of the game. Participants are mostly men of various ages, as can be seen in figure 9.
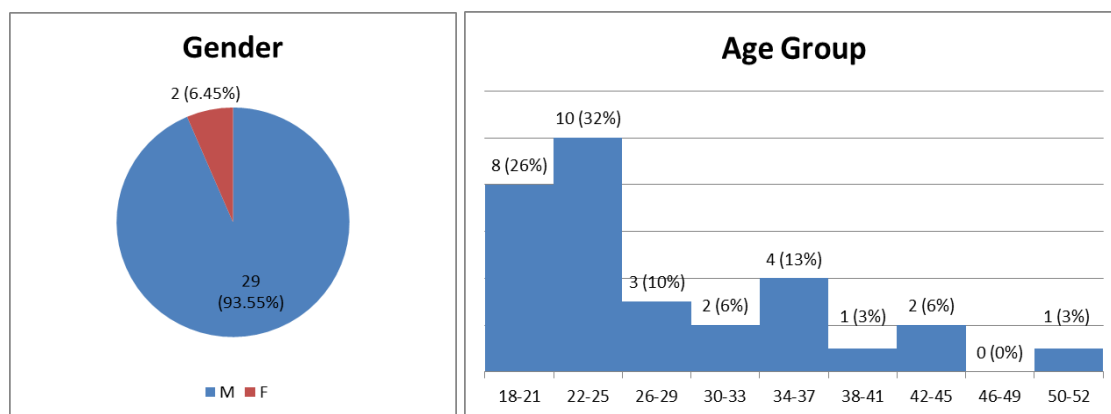
Figure 9. Gender and Age Group of participants

The family and income profile of the interviewees consists, in the most part, of families between 3 and 5 people with a family income between five hundred and four thousand and five hundred reais, as can be seen in figure 10, the question about family income was not a mandatory field, and therefore some respondents abstained in responding.
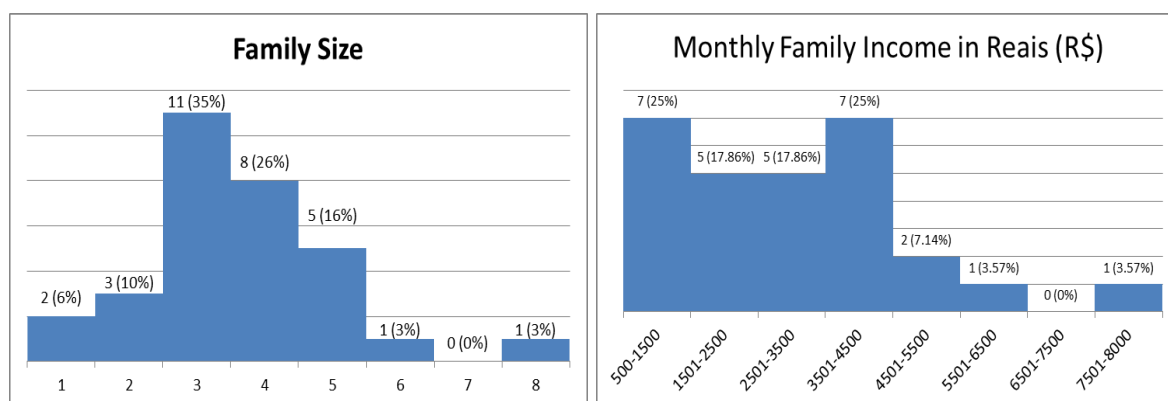
Figure 10. Family Size (in number of peoples) and monthly family income (in Reais)

The main idea of the questions is to bring out novelty factors, importance and

applicability of the information presented in the game and the player experience with the proposed format. To tabulate the gaming experience was requested e-mail, name, age, and average income of the players family in specific form and presented three multiple choice questions and an open field to describe experiences in the game. As follow, it is possible to follow the questions and the tabulation of the answers related to factors of novelty and importance of the contents.

In question 1, respondents were asked about the level of novelty of the information received during the game, with the options some and most comprehends at levels below 50% and above 50% respectively and the tabulation of responses can be seen in the figure 11, all of these responses below 50% or none were given by entrepreneurship students who receive financial education topics in the initial classes.
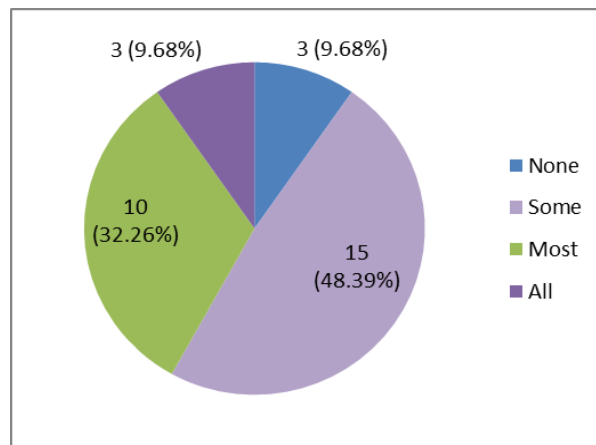
Figure 11. Answers to question 1 – "Is the information you received in the game new to you?"

In question 2, respondents were questioned about the relevance of the information for daily use, with 1 being of no relevance and 5 being completely relevant, mostly classified with a maximum level of relevance, with the responses tabulated in figure 12.
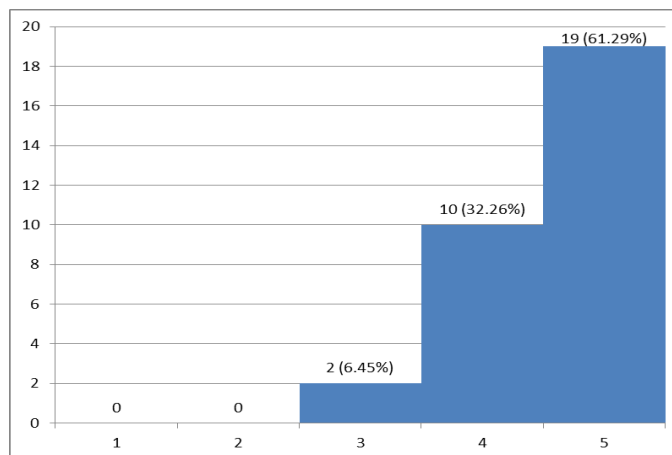
Figure 12. Answers to question 2 – "What is the importance level of this information ?"

In question 3, it was possible to mark more than one alternative, requesting the interviewee to select the lessons that are useful, the majority of respondents have selected budget planning as the most relevant and applicable of the lessons, which in

their subjects demonstrates how to leave the debtor status for saver status within some steps.

Figure 13. Answers to question 3 – "Which of the topics treated do you consider to have more benefits when applied?"

Because it is mix of open web and a direct guests survey, so far as thirty one players have responded to the form during the time of the analysis that lasted from June 3, 2018 to August 31, 2018. The survey will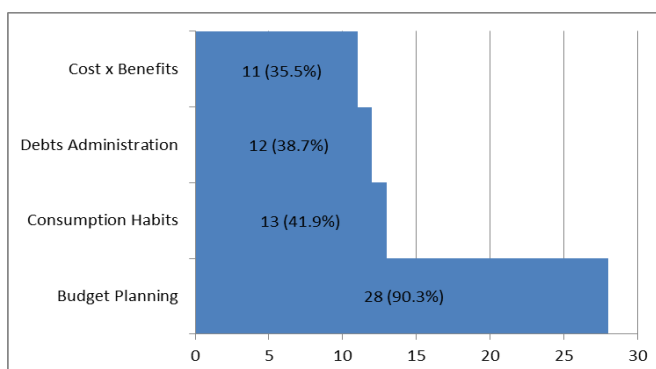 be open until at least less 271 participants within the evaluated age range, calculated according to the law of large numbers. The calculation was performed using a universe of 53.76 million cell phone users within the age group of 25 to 44 years (Cetic, 2015) with a confidence level of 90%.

CONCLUSION

Due to the need for initial financial literacy demonstrated, it was presented the structure in logical steps. With this, being possible to develop a digital game with all dynamics and mechanics properly delimited and involving related subjects. So, it was possible to create plot, scripts of speeches, characters and scenarios based on the book of Clason, following the structure described by the hero´s journey and updating the teachings of the book for the topics.

Comparing the games presented, the format chosen for the digital game developed was quiz (questions and answers) with elements of the hero's journey. For the implementation of this format, the Unity tool was used, given its better placement in relation to issues compared to some of its competitors such as the number of possible outputs for mobile devices and limitations of the free version, for example.

For the tests, some users made her selves available to evaluate the game and to respond to a simple questionnaire, which mainly aims to survey about the family size of the players, and the level of novelty, relevance and applicability of the presented information, the answers returned so far contains positive evaluations regarding the format and content, as well as the novelty factor of the information, that demonstrated the acceptance of the proposed digital game format for financial education contents.

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