Trash*F*un: An Environmental Awareness 2D Computer Game

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Abstract

With the rapid development of smartphones, Android system by its unique openness, rich hardware selection, convenient application development, is accepted by more and more people. The mobile game based on Android, is gradually popular in the crowd. The game in the research with a beautiful picture and a wide variety of resources has the strong playability and a strong practical value. The developers create an 2D computer educational game that can provide certain information about different kinds of waste, shows the awareness on how to properly keep the environment clean. The 2D computer game was developed in Unity, using the programming language c#.

Keywords: Smartphones, Android, 2D computer game, playability, waste, Unity

I. INTRODUCTION

Computer games is a multibillion-dollar industry and continue growing. According to research by market analysts Newzoo (2018), the computer games are course to generate to $135 billion in 2018. The $134.9 billion market value marks a 10.9% increase over 2017. Based to the study, as expected, mobile accounts for the bulk of the industry's revenue are 47% of it, in fact, at $63.2 billion (up 12.8% year-on-year). Mobile phones led the way here with revenues of $50 billion (up 14.2%), while tablets accounted for $11.4bn up 7.8%. Computer games are becoming increasingly more and more popular, and, in some situation, essential in our society and it is continue growing in our industry.

The aim of this study is to create an environmental awareness mobile game which can help the users to have a habit on cleaning the environment by playing the proposed game, it practices their mentality on doing the right thing in segregating the trash into the right trash bin. It is to offer all environmental educators an idea on how the procedure works which do not rely exclusively on measures of attitude and abstract knowledge.

Objectives of the Study

The general objective of the project is to develop an environmental awareness 2D computer educational game that help the user to be aware of insulating the environment by segregating trash. The specific objectives of the project, are: to design an environment concept game to instill awareness in keeping the environment clean by segregating the waste; to develop an interactive system using UX design (User Experience); to test the functionality of the game application using ISO/IEC 25010:2011 standard.

Related Work

TrashFun: An Environmental Awareness 2D Computer Game an environmental awareness mobile game which can help the users to have a habit on cleaning the environment by playing the proposed game, it practices their mentality on doing the right thing in segregating the trash into the right trash bin. It is to offer all environmental educators an idea on how the procedure works which do not rely exclusively on measures of attitude and abstract knowledge. We gather different studies that are related in our work and some of them are: Serios game effects, how much is the gaming industry in 2018, cross-platform app: a comprehensive study and learning unity 2D game development by example, the use of mobile games in formal and informal learning environments, assessment of educational games for health professions: A systematic review of trends and outcomes, What drives in-app purchase intention for mobile game? An examination of perceived values and loyalty, why do people play games? A meta-analysis which

helps the researcher. The idea that proponents used to project the vision of the system is in these studies such as: 3D modeling and visualization based on the unity game engine-advantages and challenges,2D and 3D virtual interactive laboratories of physics on unity platform and recomposing the Pokémon color palette in international conference on the applications of evolutionary computation. The researchers follow it and depends on the relationships among sources - essays, articles and nonwritten sources, such as methods/techniques to accomplish the studies.

II. METHODOLOGY

The software/project development methodology that the proponents used is Agile scrum methodology. It is one of the most used practices in project management in today's time. The benefits that the method comes with such as increased business value, faster go to market, greater transparency among the team, and better-quality management is enough to push several businesses across a range of industries to follow the Agile Scrum approach in their everyday work process.

Project Methodology

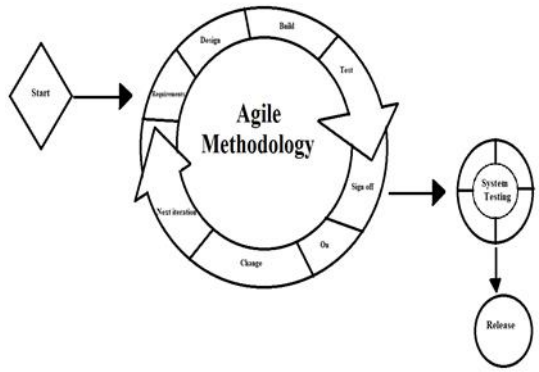

Figure 2. Scrum Methodology in Mobile App Development

Agile methods or agile processes generally promote disciplined project management process that encourages frequent inspection and adaptation, a leadership philosophy that encourages teamwork, self-organization and accountability, a set of engineering best practices intended to allow for rapid delivery of high-quality software, and a business approach that aligns development with customer needs and company goals. Scrum is a subset of Agile. It is a lightweight process framework for agile development, and the most widely used one.

There are five phases in agile scrum. Scrum processes address the specific activities and flow of a Scrum project. In total there are 19 processes in SBOK Guide which are grouped into following five phases. The five phases are Initiate, Plan and Estimate, Implement, Review and retrospect, and Release.

1. Initiate – The proponents included this phase which the processes related to initiation of the proposed project like create the project vision, identify how the scrum works, identify the users, developmental of a game, sprint backlog and conduct release planning.
2. Plan and Estimate - The proponents included this phase which consists of processes related to planning and estimating the tasks of the proposed project which include on how to create user stories, how to approve, estimate, commit user stories, create tasks, estimate tasks, and create sprint backlog.
3. Implement –The proponents included this phase which is related to the execution of the tasks and activities to create a project's product. These activities include creating the various deliverables, conducting daily standup meetings, and grooming (i.e., reviewing, fine-tuning, and regularly updating) the product backlog at regular intervals.
4. Review and Retrospect - The proponents included this phase which is concerned with reviewing the deliverables and the work that has been done and determining ways to improve the practices and methods used to do to the proposed project.
5. Release - The proponents included this phase which is emphasizes on delivering the output to the client and identifying, documenting, and internalizing the lessons learned while doing and finishing the proposed project.

System Architecture

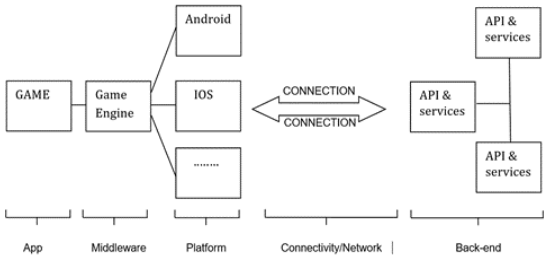

Figure 2. System Architecture Model

The planned game must communicate with back-end servers using your own or Google/Apple/other services via Wi-Fi, radio, or another style of channel. The requirement for testing the property between your mobile game and back-end services is nowadays very important. For instance, ads are shown via property and while not those running properly on your device, you are taking an additional risk in front of your core audience, the users. Sure, they might most likely prefer it higher without ads, however from the proof purpose of read, you certainly wish to check this totally before submitting your app-to-app stores, and make sure you are not losing revenue because of faulty implementation.

As said, testing connectivity ought to be one in all the key things to try and do once building mobile games. Test automation can bring you a lot of benefits for automating the connectivity testing and scaling the infrastructure from one user to many thousands of users.

Graphical user interface

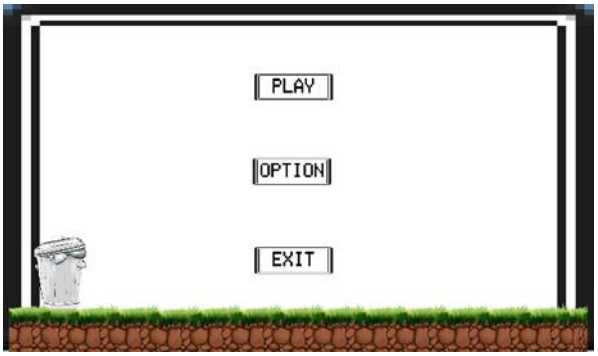

Figure 4. Main Menu

Figure 4 shows the idea of the proponents for the main menu of their proposed game. It has a play, option and exit button. If you click the option button, it has a feature: the Fullscreen toggle button, the volume adjuster, and the graphics button which you can choose if you want to lower, medium or higher the resolutions of the game. The play button will direct you to the game and the exit button will close the game.

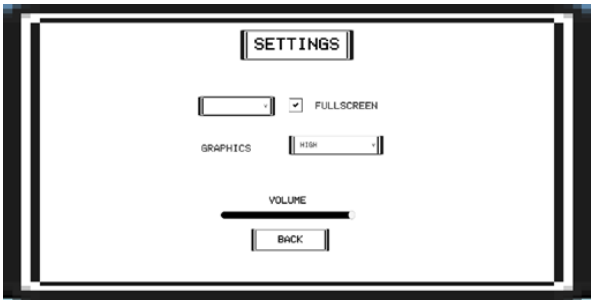

Figure 5. Main Menu

Figure 5 shows the idea of the proponents for configuration of the game settings. It is the features of the option button that shows Fullscreen toggle button which can change the size of the screen, the volume adjuster, and the graphics button which you can choose if you want to lower, medium or higher the resolutions of the game.

Figure 6. Selecting Stage Level

Figure 6 shows the idea of the proponents to start the game and how the game process. If you click the help button, it shows the guide and instructions of the game. The play button will direct you to the game which you will segregate the trash into the right trash bins by dragging it.

Figure 7. Selecting the Help Menu

Figure 20 shows the ideas of the proponents of how to play the game and the correct way to segregate the trash. It is the features of the help button that shows the different kind of recyclable materials. According to David Okole, recyclable materials are used as solid waste such as plastic which contains used plastics, paper which contains used paper, organic which contains used organics, metal which contains used metals and glass which contains used glass.

III. RESULTS AND DISCUSSIONS

Evaluation on system performance

This section summarizes the findings and results of system evaluation using software quality standards on software functionality, reliability, maintainability, and portability using ISO/IEC 25010:2011, a software product evaluation standard from the International Organization for Standardization.

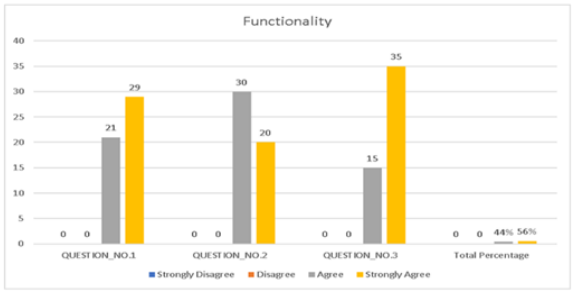

Figure 8. Functionality evaluation of the system

Figure 25 shows the total of those who agree in the functionality of the system. For QUESTION_NO.1 *"Can the app be a tool for informative learning on proper waste disposal?",* 21 of the respondents agree, following by 29 respondents who are strongly agree. QUESTION_NO.2 *"Is the app as a game does of having fun while informing?",* 20 of the respondents agree, following by 30 respondents who are strongly agree. QUESTION_NO.3 *"Can the app be installed without the help of a technical person?",* 15 of the respondents agree, following by 35 respondents who are strongly agree. Total of 30% of the respondents agreed and 70% of the respondents are strongly agreed *to the functionality of the system.*

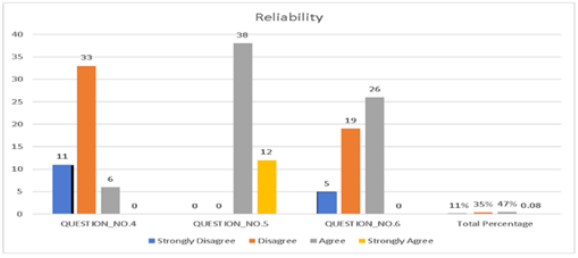

Figure 9. Reliability evaluation of the system

Figure 26 shows the total of those who agree in the functionality of the system. For QUESTION_NO.4 *"Does the app encounters error while playing?",* 11 of the respondents strongly disagree, 33 respondents who are disagree and 6 respondents who totally agree. QUESTION_NO.5 *"Does the app give correct scoring and information?",* 38 of the respondents agree, following by 12 respondents who are strongly agree. QUESTION_NO.6 *"Is the app capable of handling errors?",* 5 of the respondents strongly disagree, following by 19 respondents who are strongly agree and 26 who totally agree. Total of 47% of the respondents agreed, 35% of the respondents are disagreed, 11% of the respondents are strongly disagreed and 0.08% are strongly agreed *to the reliability of the system.*

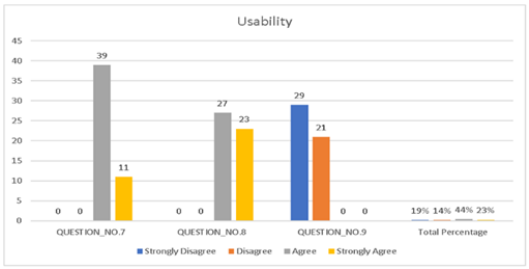

Figure 10. Usability of the system

Figure 27 shows the total of those who agree in the functionality of the system. For QUESTION_NO.7 *"Can the software resume working and restore lost data after failure?",* 39 of the respondents agree, following by 11 respondents who are strongly agree. QUESTION_NO.8 *"Can the user learn to use the app easily?",* 27 of the respondents agree, following by 23 respondents who are strongly agree. QUESTION_NO.9 *"Is the app can be used in any platform?",* 29 of the respondents strongly disagree, following by 21 respondents who are disagree. Total of 44% of the respondents agreed, 23% of the respondents are strongly agreed, 19% totally disagreed and 14% who are disagreed *to the usability of the system.*

IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The researchers were able to create an 2D computer educational game that can provide certain information about different kinds of waste, shows the awareness on how to properly keep the environment clean.

Developed more interactive usability of accessibility mobile application to understand the fragility of our environment and the importance of its protection.

In developing the system that can help to reduce the population in our environment, the proponents managed to meet the requirements of the functionality of the mobile game using the tool ISO/IEC 25010:2011.

Recommendations

Future researcher should have the knowledge and technical skills in creating a mobile application using unity to improve the system for the benefit of end users.

To future researchers, the proponents suggest building the mobile application not only in windows and android phones, but in another platform like MAC and IOS.

It is an offline 2D computer game, the proponents of this study needed to improve their skills and expand their knowledge about building a computer game to make it 3D and to make it online for better experience.

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