

MOBILE EDUCATIONAL GAMES FOR TODDLERS AND PRESCHOOLERS

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ABSTRACT

In the abundance of mobile application in the market, there is less availability of educational games particularly for toddlers and preschoolers. The purpose of this study is to create a mobile application that would cater the toddlers and preschoolers in terms of reading, spelling and mathematics. The system can help the children enhance their learning in the said 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 the mobile application as the base instrument of learning and game as its approach on teaching. The method that the researchers used in the system development was the scrum model as an approach. The platform used by the developers was the Android Technology using Java Programming as its base codes. A white-box testing is used to check the functionality of the system. The result was helpful and was highly effective based on the feedback from the users. The researchers believe that a mobile application is rampant in the market nowadays more specifically in the field of game, so a full implementation is highly recommended to make it accessible in the internet based store for future challenges and opportunities.

Keywords: Mobile Development, Android Programming, SCRUM Model, White-Box Testing

CHAPTER 1: INTRODUCTION

Project Context

Mobile application is commonly used nowadays in our society, more specifically in the entertainment industry where mobile infrastructure is very useful various aspect of convenience. The common applications that had been released in a mobile platform include Role-Playing Game (RPG), Community Games, etc. The challenge of the researcher is to create a mobile application that can highlight the educational factor in its mobile infrastructure to give importance to learning more specifically for toddlers.

Significantly, Liang (2011) mentioned that the intention of using a mobile application is based on the contextual factors of the users in terms of adopting one application. Then it is clear enough that mobile application may be used according to its use and preferences of the users. Also, according to Mlot (2013) that 38 percent of kids under two years old have used a mobile device

based on the recent Common Sense Media research study with parental monitoring. This could only mean that it could be possible to have this type of study to check the effectiveness of education in a mobile platform.

In a local setting more specifically in Manila, Philippines one school implemented a mobile educational technology for all levels lessons, educational materials, quizzes, examination, etc. are placed in the mobile application for educational purpose. This is in accordance to the study of Pabico (2003). On the study of Leetian et al. (2013) that the implementation of mobile application is successful but in voting system so this is so possible to do in a simple application like mobile toddlers educational game.

This capstone project aims to develop a mobile educational application intended for toddlers. This is highly important for it is based on the study of Capone & McGregor (2005) that semantic knowledge of objects can be enriched by shape or function gestures, thereby improving toddlers' object word productions therefore it is also effective to develop a mobile application for toddlers. The application provides a reading, spelling, and mathematics for toddlers. An Android Application is used because of its easy to access operating system and available in the market.

Purpose and Description

The goal of the mobile educational games for toddlers and preschoolers is to conceptualize a game that can leverage the convenient usage of technology as of this time. Researchers' goal is the same as most game developers had in mind. The purpose is to facilitate a simple but unique quality of games set by young IT researchers for the next generation of students and to access mobile educational gaming with tutorials as introduced in the curriculum and social life.

Researchers designed for mobile device that is applicable to Android Application Package to run the typical mobile educational games, real time tutorials and educational videos seemed to be the best preference.

The description of the game is that the user chooses the category what he/she wants to play and there are five categories of the game specifically alphabets, body parts, colors, shapes and numbers. Each game has its time limits and the score is dependent to the strategy and deepness of each game. Once the

player loses the game the application will give and show the score. The player should act promptly, think wisely and try to analyze the best answer to the given question otherwise its time frame will be lessened and may result to game over.

Also part of this application are the tutorials, each tutorial consists of a video and various graphical displays. There are five categories in tutorials; these are alphabets, body parts, colors, shapes and numbers. These categories are relevant to the games provided and need to be familiarized. Preschoolers and toddlers will be entertained this as assurance for a better education. To sum it up, this application will provide tutorials to understand the game within each category. Tutorials are graphically interactive to establish a catchy and informative to embed the mind of every child.

Statement of the Problem

Here are some of the problems about toddlers and preschoolers according to the contemporary research that we have conducted:

- No available mobile application for toddlers and preschoolers in the market.
- Basic education in an early stage is not accessible in the market.
- The mother as the first teacher is busy in business related to the financial needs rather than teaching the kids.
- Charts and primary toys are the manual basis of the parents or teachers in facilitating and motivating the kids.
- Common mistakes and redundancy usually occurs in the children at their early stages.

Objective of the Study

The researchers' objectives are listed below to give emphasis on our research:

- To develop and test a mobile educational game for toddlers and preschoolers.
- To provide a system that will give a proper education and entertainment for the children.
- To impart and expose the young kids by putting up the system which will help them widen their ability.
- To showcase a well-organized system that will take advantage to the children at their young ages thru proper interactive educational game.
- To give relevant exercises and challenges inside the system with enthusiastic research and standard questions.

Scope and Limitation

The research scope and limitation are subjected to the following:

Preschoolers The first subject of the research and the one who will accept the contribution of our system. They are the big beneficiaries of the said system.

Toddlers The subject of the research and the one who will benefit and use this system.

Parent The one who will guide the children using this system. They are the primary parental concerns of this research to come up with the brilliant ideas and implementation.

School The institution where the application must be implemented and inclined.

Teachers They are the benevolent individuals who will share ideas and knowledge to our dynamic toddlers and preschoolers inside the institution.

Avid Users Suggested to have applied this system in humble appearance for basic education and entertainment.

Significance of the Study

The researchers engage themselves into this subject matter with the care and love to help those children who want to learn the basic education at the early stage. Toddlers and preschoolers indulge to use this application to sustain a convenient way of teaching. The teaching strategies and techniques of our intelligent teachers speed up for the betterment of the institution.

The study needs further evidence to support our application in helping the institution. The location of this application can easily browse to the internet and install to the mobile phone and android and must be required to run the browsed application. Satisfaction of the application to the user must be abundant and highly increasing to prove the study of the researchers. Some application must be adequate and interactive in request so that users are able to manipulate the system. Thru this, toddlers and preschoolers education may have an excellent impact into the society.

CHAPTER 2: REVIEW OF RELATED LITERATURE/SYSTEMS

This chapter reviews and evaluates the current literature relevant to the use of mobile technology, using mobile technologies inside the classroom through effective learning strategies, success of using technology integration, mobile learning, android phones technology to sustain and support the based enquiry learning activities for students, Android Application Package as compatibility, Using mobile educational technologies to improve experiential learning, mobile application examples and the mobile game development process. Researchers explore the key concepts and issues as well as, key projects that are central to the research presented in this final citation.

Researchers start with a concise and brief introduction to mobile application, focusing on the use of mobile technologies nowadays to penetrate a better education processes, emphasizing the aid of technology using the knowledge where researchers acquire during the recent school years. Researchers then consider key projects in this field, looking forward to focus on inquiry-based with activities related generally to the curriculum of information technology course, over with analysis of the dynamic theoretical frameworks in this field.

Using mobile technologies inside the classroom through effective learning strategies

Using mobile technologies inside the classroom through effective learning strategies in the beginning is not an easy undertaking to the educator, there is a complementary perspective that holds the effective learning strategies through the use of technology.

Engaging learners is relatively easy, but the requirement for self-directed and self-motivated action has given rise to some judgment of the idea of effective learning, with some researchers (for example McCullan and Cahoon, 1979; Miettinen, 2000) pointing to the difficulties in achieving such self motivation in learners and suggesting that the core problem of learning environments is often the distinct lack of a mechanism to focus the learner's awareness. Another suggested problem is that learners may spend too little time reflecting on their experience (Vince, 1998).

Crompton H., 2013 cited in his blog article (Crompton H, 2013) mobile learning is defined as learning across multiple contexts, through social and content interactions, using personal electronic devices. A form of e-learning distance education, m-learners can use mobile device educational technology in many locations at their time convenience. Mobile learning technologies include handheld computers, MP3 players, notebooks, mobile phones and tablets. M-learning focuses on the mobility of the learner, interacting with portable technologies. Using mobile tools for creating learning aids and materials becomes an important part of informal learning.

Mobile learning is convenient in that it is accessible from virtually anywhere. Sharing is almost instantaneous among everyone using the same content, which leads to the reception of instant feedback and tips. This highly active process has proven to increase exam scores from the fiftieth to the seventieth percentile, and cut the dropout rate in technical fields by 22 percent. Mobile learning also brings strong portability by replacing books and notes with small devices, filled with tailored learning contents in addition to Crompton (Crompton H, 2013).

Success of using technology integration

Technology integration is the use of technology resources computers, mobile devices like smartphones and tablets, digital cameras, social media platforms and networks, software applications, the Internet, etc. Successful technology integration is achieved when the use of technology is routine and transparent, accessible and readily available for the task at hand and supporting the curricular goals, and helping the students to effectively reach their goals. When technology integration is at its best, a child or a teacher doesn't stop to think that he or she is using a technology tool it is second nature. And students are often more actively engaged in projects when technology tools are a seamless part of the learning process (Castaneda, 2009).

In addition to Castaneda, before we can discuss how to shift our pedagogy or the role of the teacher in a classroom that is integrating technology, it is important to first define what "technology integration" actually means. Seamless integration is when students are not only using technology daily, but have access to a variety of tools that match the task at hand and provide them the opportunity to build a deeper understanding of content. But how we define technology integration can also depend on the kinds of technology available, how much access one has to technology, and who is using the technology. For instance, in a classroom with only an interactive whiteboard and one computer, learning is likely to remain teacher-centric, and integration will revolve around teacher needs, not necessarily student needs. Still, there are ways to implement even an interactive whiteboard to make it a tool for your students (Castaneda, 2009).

Willingness to embrace change is also a major requirement for successful technology integration. Technology is continuously, and rapidly, evolving. It is an ongoing process and demands continual learning.

Mobile Learning

Crompton H. also defined in his article (Crompton H, 2013) learning is the act of acquiring new, or modifying and reinforcing, existing knowledge, behaviors, skills, values, or preferences and may involve synthesizing different types of information. The ability to learn is possessed by humans, animals and some machines. Progress over time tends to follow learning curves. Learning is not compulsory; it is contextual. It does not happen all at once, but builds upon and is shaped by what we already know. To that end, learning may be viewed as a process, rather than a collection of factual and procedural knowledge. Learning produces changes in the organism and the changes produced are relatively permanent.

In addition to Crompton that states human learning may occur as part of education, personal development, schooling, or training. It may be goal-oriented and may be aided by motivation. The study of how learning occurs is part of educational psychology, neuropsychology, learning theory, and pedagogy. Learning may occur as a result of habituation or classical conditioning, seen in many animal species, or as a result of more complex activities such as play, seen only in relatively intelligent animals. Learning may occur consciously or without conscious awareness. Learning that an aversive event can't be avoided nor escaped is called learned helplessness. There is evidence for human behavioral learning prenatally, in which habituation has been observed as early as 32 weeks into gestation, indicating that the central nervous system is sufficiently developed and primed for learning and memory to occur very early on in development (Crompton H. 2013).

Play has been approached by several theorists as the first form of learning. Children experiment with the world, learn the rules, and learn to interact through play. Lev Vygotsky agrees that play is pivotal for children's development, since they make meaning of their environment through play. 85 percent of brain development occurs during the first five years of a child's life.

Mobile Game Development

Nowadays games may be the leading platform in consoles, but the games still appeal to the console like PSP and Nintendo. Games is somewhat never really disappeared; as a fact it allows the game developers to preserve such the game concept and apply modifications and features that would satisfy gamers of nowadays and also improve the quality game itself.

The gaming industry of today has reached new heights and successes over the past years. It truly had become a powerhouse industry, and it sure would be for the coming years. With so much to choose from all the sorts of entertainment games through different platforms and kinds that now dominate the market and the concept of games, which are also being adapted now by many games.

Android Application Package as compatibility

Android application package (APK) is the package file format used to distribute and install application software and middleware onto Google's Android operating system, and certain other operating systems, such as Blackberry 10 Devices with the OS version 10.2.1 or higher.

APK files are analogous to other software packages such as MSI packages in Windows or Deb packages in Debian-based operating systems like Ubuntu. To make an APK file, a program for Android is first compiled, and then all of its parts are packaged into one file. An APK file contains all of that program's code (such as .dex files), resources, assets, certificates, and manifest file. As is the

case with many file formats, APK files can have any name needed, provided that the file name ends in ".apk". APK files are a type of archive file, specifically in zip format packages based on the JAR file format, with .apk as the filename extension.

Using mobile educational technologies to improve experiential learning

Microworlds have been hailed as flexible tools for enabling powerful insights through the construction of precise (diSessa, 1986). And they have been used to teach children about the concepts and relationships involved in a wide range of topics, from geometry and mathematics and interactive ecosystem simulations. The power of these microworlds comes from their capacity to provide children with a context in which to explore discrete space as real and not as abstraction away from their normal everyday experience of physical reality (Pufall, 1988).

Early work seeking to employ experiential, constructivist approaches made use of computers available at the time, in the form of microworlds that could be created through the programming of graphical representations and systems (Papert, 1980). These microworlds were originally conceived to provide children with a kind of computational sandbox; a virtual world in which they could manipulate virtual objects and observe their interactions.

Recent work has seized upon the opportunities offered by mobile technologies to enable these sandbox contexts into through virtualworld on the screen but in real physical spaces that can be explored by learners using mobile and wearable devices. Colella's seminal work on participatory simulates using wearable, networked tags drew Dewey's original principles of experiential learning to develop a learning activity that allowed learners to experience directly a simulation of a physical space with the underlying rules that governed the underlying simulation (Colella, 1998; et al., 2000). This work has since inspired a number of projects seeking to exploit the capacity of mobile devices to provide a way of linking physical experience with the behavior of an information system. Environmental Detectives (Squire and Jan, 2007), Savannah (Facer et al., 2004).

Reflection

As long as an over-arching approaches, it is important to explore particular aspects of learning that are relevant to developing situated, experiential learning activities. As has been noted by several researchers, reflection is a key component to learning from experience. For example, Ackerman (1996) says that the reflection stepping back from an experience and inspecting it is essential in order to learn from that experience. Thus, enabling reflection should be a key part of designing a learning activity that is experiential to nature. Reflection can be considered to be an essential component in developing skills that help the learner in regulating their own learning processes (Bransford et al., 2000) skills which are known as a meta-cognitive skills. Dewey (1910) defined reflection as "Active, persistent, and careful consideration of any belief or supposed form of knowledge in light of the grounds that support and further conclusions to which it tends". Dewey used this term to describe and define a model of deductive reasoning, e.i. reflecting on new and existing knowledge to apply it to the current situation.

By managing this process, we can help students learn through a process of knowledge building (cf. Scardamalia and Breretier, 2003), rather be than just the knowledge acquisition. Prensky refers to an implicit assumption that games do not naturally provide opportunities for reflective learning, and this has to be designed in (Prensky, 2001). There are examples of designers going to great lengths to include structured reflective activities to

get the most out of off-the-shelf games (Squire, 2004). However, learning if not specifically reflection is increasingly considered to be an inherent component of gameplay and hence commercial game design (Gee, 2003). This does not mean that commercial games designers have recently decided to start including learning as part of their designs, rather that learning has always been an inherent quality of digital game play, and the very processes of discovering how to play a game requires and engenders learning (Crawford, 1982). For a game to be fun, it must have just the right amount of challenge (Malone, 1980; McFarlane et al., 2002) and hence the game designers must have pay attention to their learning curves within their games, ensuring that they are neither too hard nor too easy to learn to play the game, or they may be prompted to reflect on associated aspects so that they learn through the game. So the issue of whether games inherently foster reflection by virtue of requiring learning in order to play them remains an open one.

Synthesis

With the above and aforementioned reviews of related literature and related studies, the researchers are highly persuaded that the proposed research study, which is to implement a game adaption of mobile educational gaming, will be implemented accordingly with the purpose of encouraging the mobile game's fundamentals and principles to the consciousness of its players specifically the young learners from toddlers to preschoolers. Given that construct of mobile educational gaming is free and has many technical features such as its built-in physics engine, scripting/ programming functions and modeling functions that would facilitate and designing and development process of the game especially the mobile game is proposed to be in a android/mobile perspective, not to mention the support features and tutorials that can be obtained from the format of android application package or known as the APK format.

CHAPTER 3: TECHNICAL BACKGROUND

Mobile Game Design and Infrastructure

The concept in designing the game with its terms, storyboard and gameplay, the other step, requires the whole infrastructure. A functional mobile application system description of the study's function and its involved processes was the task of the researchers to be embarked on, the results of which are graphically represented below. In addition, a simple discussion on the multimedia content creation (graphics, characteristics etc.) for mobile educational games for toddlers and preschoolers to emphasize and correlatively affects the human imaginations and creative learning strategies of every individual. Software design analysis follows, describing the basic modules that are used in mobile game programming.

Specification

Mobile gaming environment consists of many specifications starting from the programming content, multimedia content (video, audio, graphics, etc.) up to the software design. These designs are highly compatible to android phones, smartphones and tablets. The researchers are not wholeheartedly nor hundred percent convinced since the researchers are coping the best, genuine and exact study.

Android Is an operating system based on the Linux kernel with a user interface based on direct manipulation, designed primarily for touch screen mobile devices such as smart phones and tablet computers. The operating system uses touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching,

and reverse pinching to manipulate on-screen objects, and a virtual keyboard. Despite being primarily designed for touchscreen input, it also has been used in televisions, games consoles, digital cameras, and other electronics.

APK Android application package is the package file format used to distribute and install application software and middleware onto Google's Android operating system, and certain other operating systems, such as Blackberry 10 Devices with the OS version 10.2.1. APK files are analogous to other software packages such as MSI packages in Windows or Deb packages in Debian-based operating systems like Ubuntu. To make an APK file, a program for Android is first compiled, and then all of its parts are packaged into one file. An APK file contains all of that program's code (such as .dex files), resources, assets, certificates, and manifest file.

Manifest Files In software packaging, it is common to list the contents of a distribution in a manifest file. This file simply enumerates the files which are included in the distribution, either for processing by various packaging tools, or for human consumption. The term is a loan from shipping, where a ship's manifest would list the crew or cargo of a vessel. The manifest may optionally contain a cryptographic hash or checksum of each file. By creating a cryptographic signature for such a manifest file, the entire contents of the distribution package can be validated, as altering any of the files will invalidate the checksums in the manifest file. The manifest files usually have a .MF extension, or a .manifest extension in Windows.

Programming Tools Programming tools or software development tool is a computer program that software developers use to create, debug, maintain, or otherwise support other programs and applications. The term usually refers to relatively simple programs, that can be combined together to accomplish a task, much as one might use multiple hand tools to fix a physical object. The ability to use a variety of tools productively is one hallmark of a skilled software engineer.

Basic4Android This is a rapid application development tool for native Android applications, developed and marketed by Anywhere Software Ltd. Basic4android is an alternative to programming with Java and the Android SDK. Basic4android includes a visual designer that simplifies the process of building user interfaces that target phones and tablets with different screen sizes. Compiled programs can be tested in AVD manager emulator or B4A Bridge, which enables testing within a real phone.

Application Software is a set of one or more programs designed to carry out operations for a specific application. Application software cannot run on itself but is dependent on system software to execute. Examples of application software include MS Word, MS Excel, a console game, a library management system, a spreadsheet system. The term is used to distinguish such software from another type of computer program referred to as system software, which manages and integrates a computer's capabilities but does not directly perform tasks that benefit the user. The system software serves the application, which in turn serves the user. Examples of types of application software may include accounting software, media players, and office suites. Many application programs deal principally with documents. Applications may be bundled with the computer and its system software or published separately, and may be coded as e.g. proprietary, open-source or university projects.

Mobile application development by which application software is developed for handheld devices, such as personal digital assistants, enterprise digital assistants or mobile phones. These applications can be pre-installed on phones during

manufacturing platforms]], or delivered as web applications using server-side or client-side processing (e.g. JavaScript) to provide an "application-like" experience within a Web browser. Application software developers also have to consider a lengthy array of screen sizes, hardware specifications and configurations because of intense competition in mobile software and changes within each of the platforms. Mobile app development has been steadily growing, both in terms of revenues and jobs created. A 2013 analyst report estimates there are 529,000 direct App Economy jobs within the EU 28 members, 60% of which are mobile app developers.

An Integrated Development Environment (IDE) or interactive development environment is a software application that provides comprehensive facilities to computer programmers for software development. An IDE normally consists of a source code editor, build automation tools and a debugger. Most modern IDEs have intelligent code completion.

Some IDEs contain a compiler, interpreter, or both, such as Net Beans and Eclipse; others do not, such as Sharp Develop and Lazarus. The boundary between an integrated development environment and other parts of the broader software development environment is not well-defined. Sometimes a version control system and various tools are integrated to simplify the construction of a Graphical User Interface (GUI). Many modern IDEs also have a class browser, an object browser, and a class hierarchy diagram, for use in object-oriented software development.

A Mobile Game is a video game played on a feature phone, smartphone, PDA, tablet computer, portable media player or calculator. This does include games played on dedicated handheld video game systems such as Nintendo 3DS or PlayStation Vita.

Multimedia Content

Multimedia subject matter has been one of the most significant modules of the mobile educational gaming in checking the order to represent its best concept and keep the players interested and the learners more benefited and fascinated on this study. Best examples are, in development of complex educational games, the creativity of this context requires the perseverance and cooperation of a highly presentable quality of graphics, captures, models, level designs, sound effects engines, directories and videos created by modelers, engineers, architectures and many professionals. In the research context that was used inclined graphics and sound effects as it is described in the following sections in the proceeding.

Sounds

- The game was designed to provide player with sound effects in the following events:
- Application starts within the start menu when the application is being used by a player to add the entertainment and amazement subject.
- During the game, every time the player want to proceed to the next level, plays the level and exit the game level.
- When the player wants to see the video tutorials and on –click tutorials in every category.

These sound effects were found on the internet and innovated or edited by using Audacity (cross platform open source software for recording and editing sounds). The sounds are available to be heard and to be listened at mobile phone, smartphones and tablets.

Graphics

In requisites of graphics, the researchers was decided to create a .png format for the game, after taking into account the fact that the educational gaming concept had to be amalgamated effectively into the structure of the mobile game. Macromedia Fireworks and Photoshops was used to design and transform (by colours, sizes, shapes and text) logos and images. The basic models developed for the mobile gaming are described and shown below.

This sculpt was used to represent the mobile game logo when entering the application this is compatible in smartphones and tablets.

Figure 1: Mobile Game Logo



These images below are created to represent in the number category from vedio tutorials, on-click tutorials and its game.

Figure 2: sculpts represents number 10



Figure 4: sculpts represent number eight.



Figure 5: sculpts represent number seven.



Figure 6: sculpts represent number six.



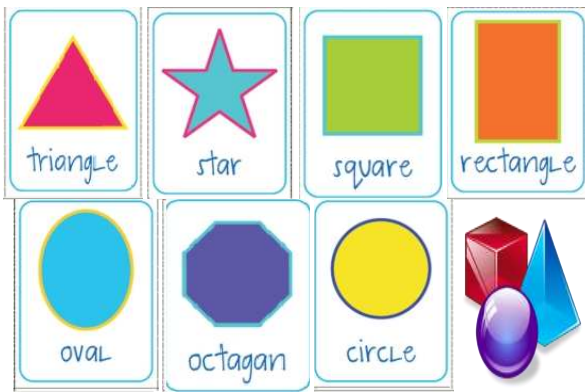
These images below are created to represent in the alphabets category from vedio tutorials, on-click tutorials and its game.

Figure 7: sculpts represents the twenty six alphabets in English



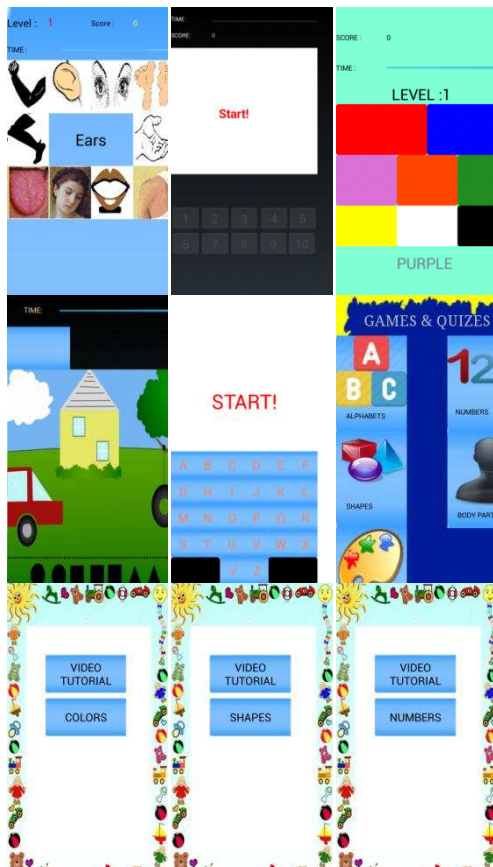
These images below are created to represent in the shapes category from vedio tutorials, on-click tutorials and its game.

Figure 8: sculpts represent inside the shapes category.



These images are selected to be the background in the mobile application gaming inside the screen. As it can be easily understood not only from this one, but also from the models above, the user would have a educational view of the game and the other events inside the application. More details about the background below as follows.

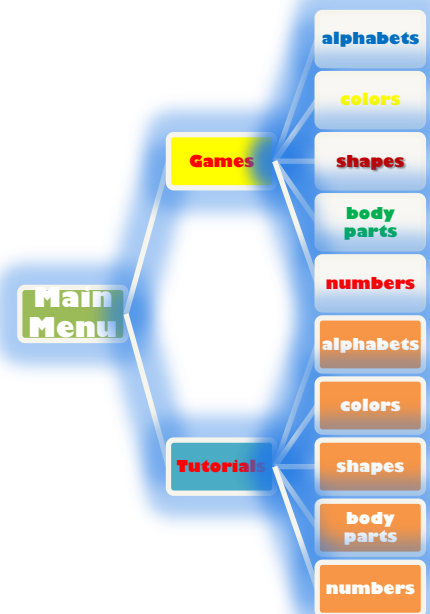
Figure 9: realistic view of the application



Conceptual Framework

The illustration below shows the conceptual framework of the researchers' study. The application is categorized into five parts each of this category has a video and on-click tutorial that will facilitate the young learners and users.

Figure 10: sculpt shows the conceptual framework of the mobile game.



Development tools

Basic4Android –the researchers used this rapid application development tool for native Android applications, developed and marketed by Anywhere Software Ltd. Basic4android is an alternative to programming with Java and the Android SDK. Basic4android includes a visual designer that simplifies the process of building user interfaces that target phones and tablets with different screen sizes. Compiled programs can be tested in AVD manager emulator or B4A Bridge, which enables testing within a real phone.

Adobe Photoshop- The researchers used this application in making, editing, altering designs and graphics for the best and educational presentations. This is high- technological editor that can be used at all times.

Adobe Fireworks - The researchers used this application as the same as, the adobe Photoshop, in making, editing, altering designs and graphics for the best and educational presentations. This is high- technological editor that can be used at all times at the most convenient way.

Power Director- The researchers used this application for creating, editing and designing videos and graphics for the best and educational presentations. The researchers chose this application because it is easy and convenient to use.

Software Design

The software design includes a wide range of studies for the best results of the system from planning, designing and implementation processes to create well-developed software that will cater the entire subject and limitations. The context can be categorized into the following elementary components: User Interface, Interaction and Game Logic.

Design Components and Game Flow

In the study itself, in order to accomplish the stage of the development of the genuine game, an in- depth research on how these three components (User Interface, Interaction with the player and game logic)should be act as a team and properly had to be done.

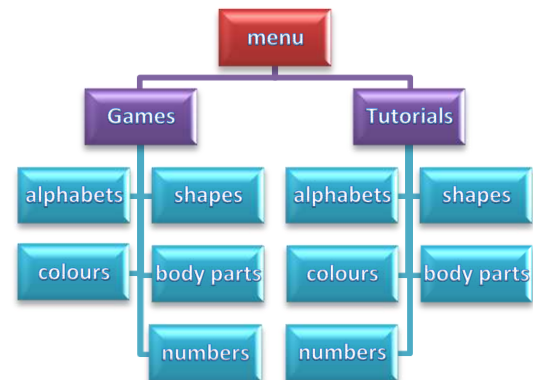
Figure 17 underneath give relevant images of the general structures of the mobile application and the participation of the said three components. The application is a planned to be downloadable and to be installed in the smartphones and tablets for it is badly needed as the requirements procedures in using the application. Mobile educational games for toddlers and preschoolers are designed to emphasize the mobile gaming through interactive education and learning strategies. The game flow is sub divided into five categories such as alphabets, numbers, shapes, colours and body parts. These all are the main requirements of the basic education through toddlers and preschoolers.

These are the procedures in accessing and using the mobile application:

- Browsed and download the mobile application and it is a file formatted to android application package or .APK.
- Installing into smartphones, tablets which are the two most compatible requirement models.
- Open the application with the slogan “Play to Learn” and suddenly the main menu appears.

- Play the game which is categorized into five games and corresponds by its video and on-click tutorials.

Figure 11: sculpt shows the game flow of the mobile application



CHAPTER 4: METHODOLOGY

Requirement Specification

In order to come up the concept of mobile applications the researchers need to complete these requirement specifications. From the materials needed the software and the hardware to coordinate its system outputs.

Materials Needed

The materials needed in the system to facilitate the concept of the researchers are the following:

Software

The intangible part of computer is what we called software. Software is any part of computer readable instructions that directs a computer's processes to perform specific task or operations. These are the following software requirements used by the researchers in their study:

Basic4android. Developed by Anywhere Software and its operation software is Microsoft Windows. It is a native for programming with the Java and SDK Android. Is a rapid application development tool for native Android applications. Basic4android includes a visual designer that simplifies the process of building user interfaces that target phones and tablets with different screen sizes. Compiled programs can be tested in AVD manager emulator or B4A Bridge, which enables testing within a real phone. The language itself is similar to Visual Basic and Visual Basic .Net though it is adapted to the native Android environment. Basic4android is an object oriented and event driven language. Basic4android generates standard signed Android applications which can be uploaded to app stores like Google Play, Samsung Apps and Amazon Appstore. There are no special dependencies or runtime frameworks required. (Wikipedia, 2014)

Adobe Photoshop. The researchers used this software for the best results of photos and graphics. It is a raster graphics editor developed and published by Adobe Systems for Windows and OS X.(Wikipedia, 2015). The researchers used Adobe Photoshop for creating and designing sculpts and pictures that to be embedded inside the mobile application. Researchers use this software for the best results of images in using the application and to enhance the abstract formation of the application. Photoshop was created in 1988 by Thomas and John Knoll.

Adobe Fireworks. The researchers used this software for the best bitmap and vector graphics it adds a high definition on it. This is easy and convenient to use and has a lot of features to be explore.

Cyberlink Power Director. The researchers used this software for the high quality of videos. It is powerful in multimedia editing suite where you can add the best features of the videos what you want.

Hardware

From the definition itself, according to Wikipedia (Wikipedia, 2014) hardware is the collection of physical elements that constitutes a computer system. Computer hardware refers to the physical parts or components of a computer such as the monitor, mouse, keyboard, computer data storage, hard drive disk (HDD), system unit (graphic cards, sound cards, memory, motherboard and chips), etc. all of which are physical objects that can be touched (known as tangible). In contrast, software is instructions that can be stored and run by hardware.

The researchers study aims to provide adequate and high technological application to sustain the effective learning strategies. The physical requirements of the study are the following:

Memory Card. This hardware is used as the storage device where the file format application is being saved. This includes the location of the mobile application and its dissemination into other devices via Bluetooth or other sharing devices. Lastly, the installation and the proper usage and conduct of the mobile application also have dependable on the storage capacity.

MPT Device. This device represents an MTP or PTP device connected on the USB host bus. MTP object information encapsulates information about an object on an MTP device. This library provides APIs that let you interact directly with connected cameras and other devices using the PTP (Picture Transfer Protocol) subset of the MTP (Media Transfer Protocol) specification. Your application can transfer and delete files and metadata from an MTP device. You cannot however create or modify files or folders on the MTP device as the Android API does not implement this.

iPhone & Android. Defined by Wikipedia (Wikipedia, 2014) that in 2007, Apple Inc. introduced the iPhone, one of the first mobile phones to use a multi-touch interface. The iPhone was notable for its use of a large touchscreen for direct finger input as its main means of interaction, instead of a stylus, keyboard, or keypad typical for smartphones at the time. 2008 saw the release of the first phone to use Android called the HTC Dream (also known as the T-Mobile G1). Android is an open-source platform founded by Andy Rubin and backed by Google. Although Android's adoption was relatively slow at first, it started to gain widespread popularity in 2010, and now dominates the market.

Development concept

In this technological environment, mobile application development is ascend and has a rapid growth in the mobile market. Almost all the institutions, innovative companies and even small developing firms are involved in mobile application development in a different podium. The competition is very robust between all software companies. Their developer gives full enthusiasm to create and develop most commendable applications. The diagram below shows the development concept of the research study.

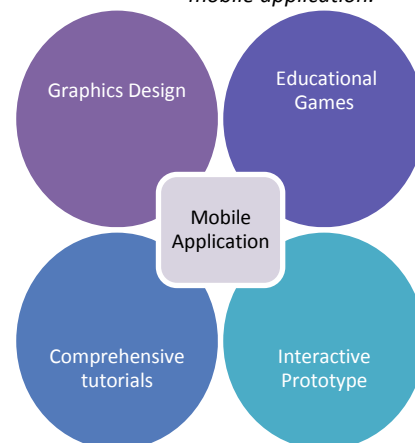
Figure 21: sculpt shows the mobile game development process



Designing the HCI

The researchers have put and create a well- established human-computer interaction design to make sure the essence of the mobile application. It helps to provide a very important roles or functions of the mobile gaming through education in a thorough effective and interactive learning kit model. The diagram below shows the human-computer interaction processes.

Figure 13: sculpt shows the processes on how people interact to mobile application.



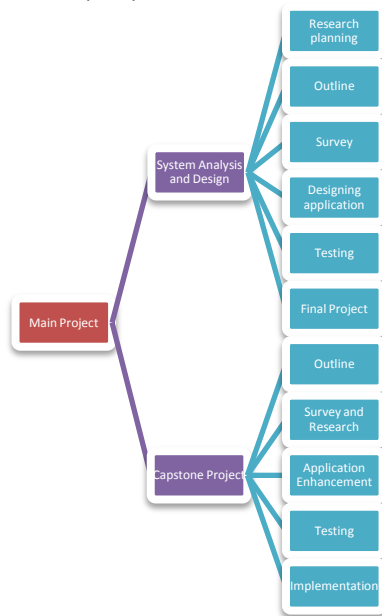
Analysis

This page will discuss the research analysis as the most important part in the mobile application development which are the Work Breakdown Structure and the Cost and Benefit Analysis. This includes also the (1) Device Compatible Requirement (2) Device Common Problems (3) Testing Methods and the Guidelines (4) The Emulator.

Work Breakdown Structure

The research could not be mean as a study itself without a breakdown structure, the researchers also done with this process to come up with a great study and case analysis. The tasks are never been easy as lifting as a one kilo of rice but instead a tons of rice, as it goes it exerts and needs effort to accomplished every task. The diagram below shows the work breakdown structure:

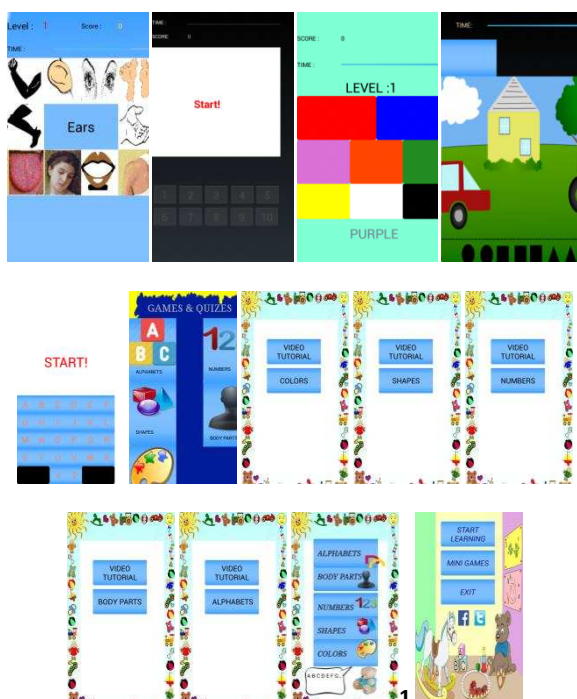
Figure 14: sculpt represents the work breakdown structure



Cost and Benefit Analysis

The cost and benefit analysis shows the comparison of the three examples like, Manual Process, Using Computer and the Proposed System. These shows the three elements which are the accuracy, speed and the cost. The table shows that using manual process has a 55% accuracy, 50% speed and 10% cost. In using computer the accuracy become 60%, speed become 70% and the cost more increase into 70%. Lastly, in using the proposed system the accuracy most increase into 95%, the speed most increase into 95% and its cost most increase into 80% than in using manual and using computer process. The benefit of this mobile application is that using the proposed system adds a biggest accuracy and biggest speed compared to the two processes alternatives. This means that mobile application is influential and adaptive to learning and basic education of the toddlers and preschoolers.

Figure 15: sculpts shows the system designs and actual outputs of the mobile application



Use Case Diagram

The use case diagram is a visual representation or overview of the usage requirements of the system. This also shows the specification of the system on how the user interacts with it. The use case diagram also will enlighten the user itself on how the mobile application go through the flow on its availability and usefulness. Somehow it is said to be a visual representation and guide to the young learners as well as, the user to manipulate the best way they can do and ease the mobile application. The diagram below shows how the use case facilitate the user.

Development and Testing

In a few months before the application have been done with its development and testing. The mobile application for toddlers and preschoolers have been done also a special testing and sampling together with the researchers, software analysts, advisers, three panellists and the subject of the research study inside the institution. The said system is very interactive and entertaining where learners and educators can easily cope up with its functions and graphics displays. A rich variety of these mobile application relates our toddlers and preschoolers for it is high-technological and educational with its contents.

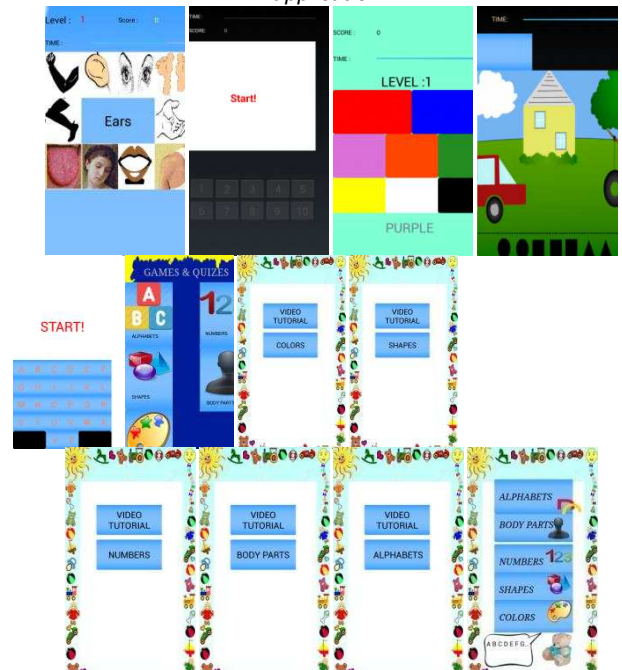
The methods used in testing is somewhat exposing the user through the well-developed mobile application and its consistency gives a definite highlight with its efficiency. Current events of development and testing was made possible through the efforts of the people who supported with this research and eventually gives the confidence of accomplishing the study.

The application is undergone with different testing in many mobile phones and devices to make sure the compatibility of the application.

Screenshots

The sculpts below represents the main concept of the mobile application. A highly comprehensive and interactive games and tutorials that will showcase a variety of innovative techniques developed by the researchers as an IT catalysts. Very fascinating as it looks like where the users satisfaction engage with a positive comments and suggestions about the mobile application.

Figure 16: sculpts shows the screenshots inside the mobile application.



The level of acceptability of the system

The research study undergone its testing and development, performance testing can be applied to understand mobile application scalability and probability. This sort of testing is particularly useful to identify performance bottlenecks in high use applications. Performance testing generally involves an automated test suite as this allows easy simulations of a variety of normal, summit and exceptional load conditions.

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