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The Application of Multimedia and Wireless Technology in Education

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Abstract

The various media information such as text, graphic, still picture, audio, animation and video has been generated by the combination with computer system and network by virtue of the related technology to computers. The modern technology has been also developed to the type of Social Network Service with the mobile communication, which may be represented as the symbol of smart phone. This study uses mobile and wireless multimedia tools, examines the resources available for learning and researches how to integrate such tools for education and learning. In addition, this study suggests how smart phone applications, software and other modern mobile technologies can be used for education in a learning environment, analyzes their effects and posits the optimal way to use them.

Keywords: Mobile Applications, Network, Technical Devices, Wireless Communication

1. Introduction

Many countries around the world, including countries in Europe and Asia, are focusing on developing digital learning contents and specialist devices and software in order to introduce information and communications technology to education and schools. In the United States of America, the National Information Center (NIC) was established and is being used to introduce digital technology to student learning and education. In Asia, there is innovative introduction of new technology, creating enthusiasm in computer use and integrating various information communication technologies in learning and the field of education for students. Africa has introduced the use of integrated technology for learning foreign languages but has experienced many problems due to limited exposure and interaction.

As the first step towards these goals, there needs to be ongoing research on resources that can be distributed through mobile phones for learners of English to acquire and increase their vocabulary. Smart Running consists of smart infra and smart way. Smart infra refers to clouding, network, server, smart device, embedded devices and so on[2].

In order for a communication-focused English vocabulary education with its foundation on meaning transfer to be realized, there is a need to teach systematic and appropriate learning methods and vocabulary-learning strategies that increase vocabulary and mobile could be the appropriate tools to meet these needs.

This research aims to optimize learning using learner-to-leaner, learner-to-educator, learner-to-content communication, collaboration, participation, openness, sharing features in information and communications technology and multimedia learning tools to transform one-sided and top-down approaches of learning to heighten effectiveness of more lateral and two-way, participatory and communicative approaches to learning.

As all students carry a mobile phone with them, various software and multimedia tools can naturally be integrated and used as a learning method, providing new motivation and an innovative turning point in education.

2. Use of Wireless Multimedia

2.1 General Format

A Tablet PC (TBC), excluding a keyboard and similar typing devices, is a mobile computer that uses the whole

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screen. The greatest advantage of a TPC is that it uses a digital pen and voice activated input, instead of a keyboard or mouse, to operate a PC. Using a digital pen and the input utility allows writing directly on the screen to save or convert to text to be input to different programs[1].

Using TPCs, students are able to download the resources and learning materials suggested by the professor and are able to write on or save the materials and professors are able to provide prompt feedback to students based on what the students input on their TPC.

3D projectors allow for the creation of realistic class materials to be used in-class and offer an experience that a 2D presentation on a screen cannot. Although students may not have been to a certain location found within the textbook, the 3D projectors are able to simulate the experience of having been there. When facilitating classes about the moon, the learner is able to learn the shapes and movement of the moon in a tangible way with 3D projectors and students are even able to travel into the past.

Figure 1. Types of resources utilizing images.

The network of U-Electronic Tables are connected within the classroom and can be used to transmit information of students' attitudes towards learning and can support learning through management of data analysis. It can observe students and help them improve their attitudes towards learning and provide real-time help when challenged by a certain situation or activity. Using the U-Electronic Table, professors can distribute class materials directly to students through TPCs and can also receive completed assignments from students.

Electronic boards are primarily used to show all students the class materials prepared by the professor or used during classes where students give presentations. As the boards are connected to the professor's computer, the professor's screen can be projected on the electric board, resources can be suggested and using a special pen allows the professor to write directly on the board. All notes created on the board during class time can be saved and the professor can use these notes for self-evaluation and re-use them later for supplementary classes.

2.2 Wireless Mobile Technology

There have been many developments, research and debate on wireless mobile technology. Due to such developments, the need for wireless mobile technology in studying foreign languages has come to the forefront.

For this kind of research, 100 students of the N University in Seoul have been replyed for the questionnaire survey. Approximately 80% of students own a smartphone and there is a need for recommendations on how the time that students spend on online games, internet searches and SNS on their phones should be used for online education and new approaches to learning.

There are expected to be two new versions of Bluetooth available by 2011. Bluetooth 3 can send data faster than the standard 802.11, Bluetooth 4 will enable telecommunication with external devices using sensors and low power LE (Low Energy) mode. Bluetooth is becoming an important channel to send and receive photos, videos and other high capacity data between mobile phones. In addition, there are numerous and diverse business models appearing using Bluetooth 4's low power technology that connects sensors with surrounding mobile phones, PCs and devices in the areas of fitness, health care, environmental control systems and other sensor-based industries.

Figure 2. Wireless mobile technology.

In Japan, European countries and the markets of other developed nations, smart phone sales account for up to 60% and it is expected that shipping of smart phones with web browsers and high performance feature phones will increase to more than 85% worldwide. When internet connection becomes standardized for mobile phones,

there will be no need to download apps as online websites will be easy to access, navigate and mobile websites and web-based tools will come to the forefront.

Despite the fact that widgets have not become standardized, they conveniently provide information and updates in real time such as the weather, email notifications and information feeds and they are being increasingly used.

The app store is a distribution channel and will grow into a market that will provide international contents. This is because the app store is the most foundational and, depending on the platform, only app distribution channel. As the main agency operating the app store manages transactions and various other processes, this is especially advantageous for smaller development companies.

Wireless Broadband Telecommunication Technology; The demand for high gigabyte, high-speed wireless broadband telecommunication technology will increase. Company laptops and e-book terminals, media players and other various terminals will be used in mobile communication. In order to increase and develop wireless broadband telecommunication technology, the providers will continue to adopt wireless broadband telecommunication technology.

3. Plans for Mobile App Usage

The Mobile phones, which have little spatial-temporal restriction and apps are being used for educational videos from foreign languages to staff training. Educational companies for elementary, middle and secondary schools currently utilize online lectures formatted for table PCs and are developing educational content using NFC chips.

The interest and usage in how the latest smartphone technology can be used for educational purposes continues to increase. Consequently, establishing strategies to improve the quality of teaching with active use of such technology is in demand.

The latest models of smart phones can easily capture and edit high quality videos. These devices support video lighting and high quality pixels per second. Such features are characteristic of a smart phone make it an easy to use video editing tool. Second, they allow for video clips to be combined, for the orientation on the screen to be altered and allow music or image attachment. Third, users can easily select the item they wish to see on screen, as well as adjust the focus of the item displayed. Fourth, not only the camera located on the backside of the device but the camera on the front side allows for high quality videos to be captured of the user themselves.

This study aims to present how the various technologies of smart phones can be used to increase learner exposure and participation. This study examines the ways wireless telecommunication technologies and software and various educational apps can be used.

3.1 Utilization of Mobile Applications

The internet provides overly complicated and inefficient information in the reading of English due to the limited accessibility of appropriate texts. In order to overcome this limitation and obtain highly effective results are through the utilization of smartphone applications. As we see from Figure 3, most of students are spending their time in study by virtue of mobile. Mobile activities are shown in Figure 3.

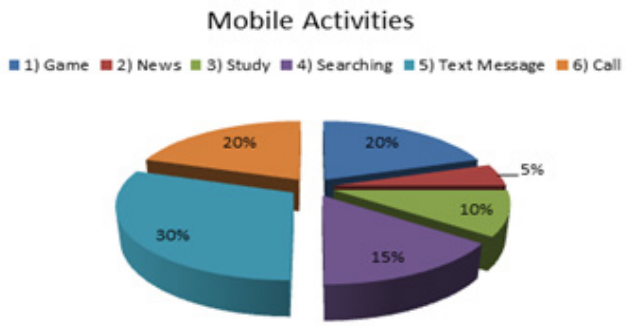

Figure 3. Percentage of hours of usage.

For instance, Simple English Wikipedia (http://simple.wikipedia.org/) provides very useful content, including text, a Wordle (www.wordle.net) is a good example of a web-based tool. Wordle can be used to make one's own work using one's won shapes and colors and style.

When a survey on smartphone applications was conducted after the users' utilization, most of the students reported that it was educational; the reasons given by the respondents on the advantage of the applications were ' diverse types of problems (33%), ease of learning (39%), repetition (19%) and others (9%) as shown in Figure 4. Furthermore, in terms of continuous academic motivations, most of the respondents have indicated that they will continue using thus realizing the objective of this study.

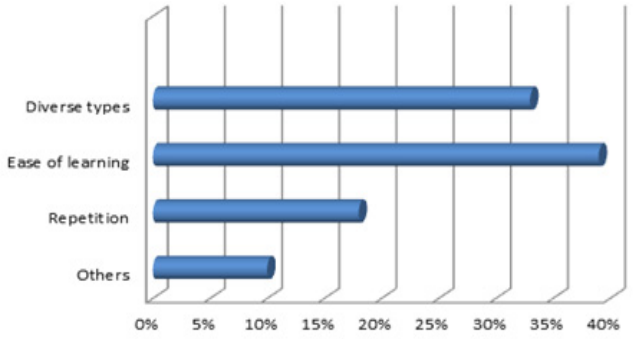

Figure 4. Advantages of the applications.

Table 1. Software Utilizing Mobile

Software	Website	Contents
Mantra Lingua	http: // uk. mantra. com	Text Scan - > Auodio Play
Text Help's Fluency	www. texthelp. com	Text Record-ing
Book Creator	http: // itunes. apple. com	Digital Book - > Story Telling
Mantra Lingua's	http: // uk. mantralingua. com	Real Time Game
Webheads in Action	http: //webheadsinaction. org	Digital Story Telling

The participants' level of satisfaction with the learning app was quite higher in the experiment. The participants have indicated that the advantage of the English learning app was its accessibility anywhere. More than half the participants' have responded that mobile learning was more interesting than the traditional way of learning and that it allowed for more self-initiatives. When asked about the elements which stimulated interest and endowed self-directed learning, there were many participants who found the variability of learning methods interesting and the accessibility of learning at any location empowering self-initiative as shown in Figure 4.

There are a great variety of applications that maximize the mobile nature of the smartphone and amplify its possibilities in a way that is incomparable to a simple mobile phone. The smartphone technology and features have been changing rapidly over the last few years; the use of smart phones with 3G (Generation), GPS (Global Positioning System) technologies have become widespread. And recently, technological advances which bring about new changes for users such as retina high-resolution display, multitasking high-definition video editing, WiFi video calling have been thoroughly released. Thus, in this era of rapidly changing technology and learning environments, the development of smart phones necessitates analysis and strategic configuration for utilizing its educational value is needed.

There are various types of software which have website and contents for the users may access by means of utilizing smartphone apps as shown in Table 1.

There are audio CDs utilizing smartphone apps and methods for on-line version of audiobooks. For example Mantra Lingua (http://uk.mantralingua.com/) produces a device that can play audio when the text is scanned. Software such as Screen-readers can be another good alternative.

An effective reading program which allows the learners to record text is Text Help's Fluency Tutor (www.texthelp.com/UK). This application provides a simple quiz for testing the comprehension level of the learner. Program such as Pearson's Rapid Reading program (www.pearsonschoolsandfecolleges.co.uk/Primary/Literacy/AllLiteracyresources/RapidReading/RapidReading.aspx) provides real-time feedback to the user when reading the text using the microphone connected to the computer.

Software application for story books offers a very effective learning method using the smartphone. Book Creator (Http://itunes.apple.com/gb/app/book-creator-for-ipad/id442378070?mt=8) and more specialized software applications such as Adobe Creative Suite (www.adobe.com/) software, and 2 Simples's Create-a story (www.2simple.com) are good professional softwares for storybooks. Story books made with such presentation softwares can be published in blogs or websites or as electronic books. Moreover, learners can utilize "digital mind mapping" activity which allows them to make sentences they have learned and connect learning with real life and offers them the opportunity to cultivate proper English expressions. Additionally, being able to locate and insert appropriate pictures from the internet or picture files for the expression to boost learning is an advantage and an effective utilization of multimedia tools. Using a device such as Mantra Lingua's (http://uk.mantralingua.com) PENpal and phonics tiles (Talking Phonics Pack 1), learners can learn pronunciation through real-time games for vocabulary learning.

Softwares such as Cricksoft's WriteOnline (www.cricksoft.com/uk/products/tools/writeonline/default.aspx) and TextHelp's Read & Write Tutor (www.texthelp.com/UK/Our-products/Readwrite/features-PC) provide voice synthesis features such as conversion of text to speech. When the user writes, words appropriate for the

context are automatically inserted into the document through word prediction.

Webheads in Action community of practice (http://webheadsinaction.org) has been providing learning technologies. A wide-ranging variety of tools are used for digital storytelling. In addition, Windows Movie Maker is used to create animated slide shows; learners can record stories with images and soundtrack. Another method is to take photographs of the street using a mobile phone and create a cartoon video slideshow using Windows Movie Maker.

Animation software called Zimmer Twins (www.zimmertwins.com) can be used to make an animation.

'Toontastic' and 'Puppet Pals' applications allow users to create a story using cartoon characters and recorded speech and share their work online. Applications such as 'Comic Life' can be used to make cartoon format templates using the photographs taken with the camera of the mobile phone. 'Phoster' app provides templates which allow the users to create posters using the text and graphics.

3.2 Video Conference using Smartphone

Mobile video phone solutions using video-conferencing applications allow the learner to implement correct pronunciation by watching the instructor's shape of mouth and facial expressions making them particularly suitable for beginners. Video-conferencing is considered to be one of the most effective learning methods by enabling people from all over the world to participate in the classroom through long-range wireless communication for smartphones. It provides opportunities for the learners to not only partake in cultural exchanges, but allow them to meet native speakers face-to-face and as a group.

Figure 5. Multiple resources for video conference.

Video calls and conferencing can be made using multiple resources such as Skype, iChat, FaceTime or Flash Meeting thus making various learning methods possible through short-range and distance wireless video conferencing. Not only that, Adobe Connect can be used without any extra expense and applied to the study program while catering to the preferences of young learners.

First, it's the simplicity of operating Facetime with only a button without a separate account or screen name. However, one of the reasons FaceTime is receiving more attention is that it can be used in Wi-Fi areas. Wi-Fi is a local area network that enables high-speed internet within a certain distance where wireless access device is installed. This is often compared to 3G whereas 3G uses a frequency of 2G Hertz in accordance with the communication technology standards of International Telecommunication Union with data transmission speeds of up to 2Mbps allowing users to send and receive videos. It signifies the appearance of various applications utilizing Facetime especially it is anticipated to have an impact on VoIP (Voice over Internet Protocol) field. VoIP is a telecommunication service technology which allows communication using the general telephone network by using data communication packet network for internet phone through converting audio data into internet protocol data packets.

Skype is the most representative VoIP provider which hopes for expansion of its domain in mobile video calling from not only smartphones but to computers, TV, or other connecting devices based on iPhone 4 in collaboration with Apple. Skype is very effective in improving listening skills since the user must focus on conversing. It is very useful for practicing vocabulary and everyday conversations in a natural way. In the future, the implementation of video calling system which alternates between smartphone, computer and TV can be expected.

4. Digital Game

4.1 Game Development and Smart-learning

Smart-Learning games are 3D content-based hands-on learning that prompts interest and curiosity through colorful 3D graphics and avatars in carrying out hands-on activities. It also strengthens concentration while learning English through online English learning games and game-oriented content.

The development of mobile applications should first enable game conversion in order to make learning possible through mobile platforms; secondly, mobile flash cards need to be developed to enhance learning; thirdly, it needs to be equipped with speech recognition features to enable speaking in words and sentences.

Figure 6. Mobile application development.

Upon examining online tool for game development, Simple's 2Do It Yourself '(https://www.2simple.com/2diy/) software is one of the online tools for game development. http://larryferlazzo.edublogs.org/2008/04/21/the-best-websites-for-creating-online-learning-games/ is a useful blog for language learning game development. Along with the functional effects of games and methods using games, Gamification and Edutainment, Funware can be included in this scope of being goal-driven. The word gamification is a new word which comes from adding "-fication"(production; making) to game or "-tion (indicating state, condition, action, process) to "gamify." It was coined to describe methods using the potential of games to induce behavioral changes by adding the elements of game to individual systems. Edutainment is a combination of the word education and entertainment, a form of educational learning content to learn as if one were playing a game. In edutainment, game-like factors such as entertainment, flow, adventure are considered important. The goal of edutainment is to use the entertainment value to enhance the learning motivation and increase the effect of learning rather than to just rouse interest for enjoyment.

Funware is a method of using mechanics of game within the context of non-game contexts. This is based on the theory that boring and uninteresting website and increase participation when elements of game are added; eBay and Facebook are examples of this. Gabe Zichermann applied such theory and implemented Funware techniques to produce more effective results.

Simulation is a game created to imitate a real situation and enable the user to experience it using computer technology and is a game closest to reality. Unlike other game genres which have codes and rules of conduct, the core of the simulation game depends on how well reality is reproduced.

4.2 Functional Games

Digital games are very popular with the students who have grown up in an environment with computers and games. Therefore, curriculum content utilizes such text, audio, video, animation and various media types in a fun way. Functional games refer to games which borrow the format of the game for a specific purpose (education, treatment, promotion, training, etc.) rather than for simple enjoyment. Games created for educational purposes even among functional games are known as educational games or G- learning (Game-Based Learning).

Figure 7. Digital game configuration.

Functional games encompass objectives of a wide range of fields such as health and preventive diseases, promotion of health, social and cultural issues related to the ripple effect; it provides assistance in the process of learning and training. Numerous studies have proven the advantageous effects where functional games have been applied. Now then, such cases of the games will be examined.

Kyle, an EFL teacher in Barcelona created an 'Edugaming' for primary school students consisting of 12 students ranging from 9 years old to 10-year-olds and introduced an online game called N through a company called 3wish (www.3wish.com/game/game.htm). The

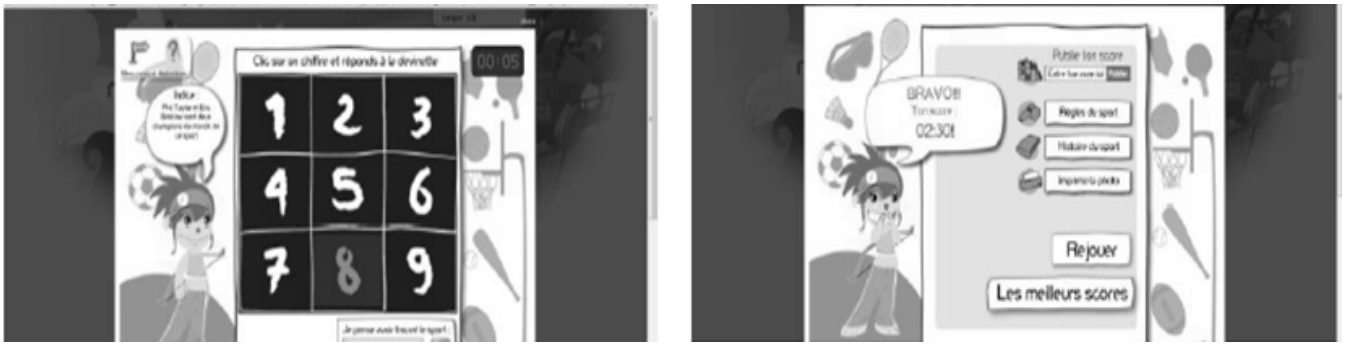

Figure 8. Functional educational game: Mondokiddo. * Website: www.mondokiddo.com

graphics were cartoon format and the users could easily connect to the online content. The content was also found to be very effective.

Interactive fiction is a digital game based on the text. Magic Voca Bakery game is an educational game which combines English learning. Winning the grand prize was an opportunity to demonstrate the quality and learning outcomes of the G-learning content. This is played by touching the suggested words according to English spelling word order; along with this, its features enable the user to select the vocabulary appropriate for the level of the player making it attractive for Asian users who require English instruction.

Mondokiddo is a game which uses web platform to provide various games to improve understanding of a new international culture. Each game helps children develop an understanding of a new international language and culture based on vocabulary and cultural references.

The training package game of Mindty Ant (2010) was created for Neurosky with the objective of creating intuitive user experience through training and gameplay for the improvement of concentration. Players encounter obstacles at various levels which help to enhance concentration through brain wave training in the process of overcoming these obstacles. Playing History: The Plague is a historical game released in 2010 designed to help students learn world history. The first episode in this series of games is 'The Plague', an adventure game set in a time of plague outbreaks.

Quest Atlantis is a three-dimensional multimodal learning space with the goal inducing active interest and participation in the formation of social relations and coursework. The learners are directly involved in the game narrative via an avatar and connecting simultaneously enable them to interact with other users to accomplish a mission, chat and send e-mails.

4.3 Korean Game Content Industry

Seongnam City and Seongnam Industry Promotion Foundation have dispatched Game Content Company Trade promotion jointly with KOTRA from October 14 to 20 in 2012 in Turkey and France, reaching 450 million dollars in consultation and 3.8 million dollars in contract performance. From late 2010 to the present, cooperation between different companies have been in progress in which the capacities of educational content and infrastructure of educational enterprises and developmental capabilities held by game developers and content service capacities have been combined to make entry into the education market in regards to functional game content development and service in the field of education.

Cheongdam-learning, in collaboration with Barunson Creative developed English vocabulary learning content <Magic chunks and Magic Castle> for Nintendo DS. This game which was developed for Nintendo DS contains vocabulary selected from the analysis of 15 kinds of middle school English textbooks. It was also voted the "Best Game of the Month" in the second quarter of 2011 by Korea Creative Content Agency.

Sign Shooting which was released in April 2011 enables sign language learning through the gameplay. This content, sponsored by KT & G Welfare Foundation is played by shooting the discs that correspond to the right picture of the sign language. In June, an app for learning English vocabulary called <Funtris> was launched.

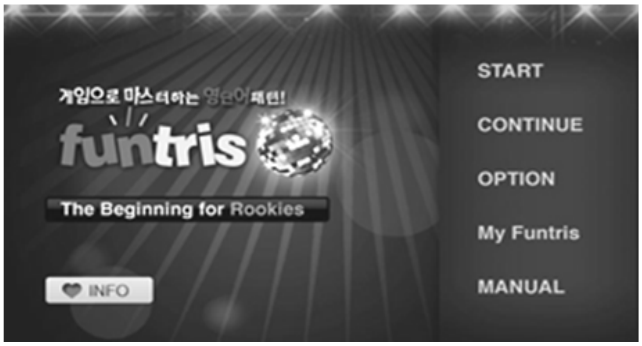

Figure 9. Funtris Game.

Doosan Donga has developed a mathematics educational game called Yamyam math for computational learning. The content of Yamyam Math consists of 5 kinds of apps such as Banana Disco and Naughty Mouse. Museducation has developed Talklish: New York Story which reproduces New York in 3D virtual environments. It provides a simulation of English Language exchange program in New York enabling the user to practice English conversation. Due to recent proliferation of smart devices, the type of content has been changing rapidly from existing mobile content into the form of apps. Functional app content accounts for much of the content in the education sector.

5. Conclusion

Learning methods which utilize smartphone apps and software prove the important roles various technologies have. Many mobile devices are equipped with the internet and make wireless video conferencing possible.

Through the introduction of a wide range of various technologies regardless of the classroom, home or place, the educators can provide the students with the most efficient and effective learning methods based on various multimedia utilization.

Students have stated interest in learning through educational materials sent to their mobile phones. The experiment shows that if the students are provided with learning materials through the mobile devices, the learners will participate with more interest. It aroused learners' motivation and increased the effects of the applications by using recast strategy in which the wrong problems were given again.

Mobile vocabulary learning has the potential to become a supplemental learning at locations other than the school. The advantages and features of the mobile technology such as flexibility and accessibility to a wide range of use results in a positive effect on the education environment. Transmission of video files which utilize the characteristics of the smartphone can be used as a tool for collaborative knowledge formation. In other words, when published in YouTube or an online community, feedback and opinions from a variety of learners can be shared.

Thus, mobile technology has been assessed as having characteristics which can make a great contribution in the efficacy of learning through the utilization of distance education and enhanced multimedia technology and the development of game-based learning which students may access by means of the various multimedia and software which are suggested in this paper.

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