

1. Introduction

2. About mobile gaming

Mobile games are games designed for mobile devices, such as smartphones, feature phones, pocket PCs, personal digital assistants (PDA), tablet PCs and portable media players. The literature on mobile games is often technically focused, and generally moves directly to discuss the implementation of games for mobile phones and other mobile devices without clarifying the key concept itself (see, e.g., Hamer, 2007). However, there are multiple different kinds of mobile devices, and even personal computers could be considered “mobile” today, because of the popularity of small and lightweight laptop computers. The most common ways of understanding mobile games nevertheless relate to two distinct lines of game development and publishing. The first one is mobile phone games and the second relates to handheld electronic games and video game consoles.

Outside the consumer product market there is also important work that links mobile games to mobile computing and augmented reality experimentation, for example. Such research has often stimulated innovations in consumer electronics and the game industry. This entry aims to discuss the games designed for mobile phones, and while the full treatment of mobile games needs also to take into account handheld video games and many other portable electronic gaming devices, the history and economics in these various areas are so different that they invite treatment in separate entries. Handheld video games, for example, have much closer ties with the major video game console manufacturers, while mobile phone game makers need to take into account the characteristics of multiple different kinds of phone models and differences in mobile operators’ services. The distribution of handheld video games through sales in retail stores is also very different from the distribution of mobile phone games, which either come preinstalled to the handset, or are installed by the user over-the-air (OTA), using mobile data services. Some phone manufacturers have experimented with add-on memory cards as a game distribution medium, but without major success.

3. What is Xcode and IOS

First released in 2007, iOS is written in multiple language and only runs on the company’s products such as iPhones, iPads, and iPods. After Android, iOS is the most used mobile OS on Earth, available in 40 different languages. It is written in C, C++, Objective-C and Swift. The OS is closed source instead of open source and it is based on the Macintosh OS X. The first iOS was released in June 2007, when the first generation iPhone was also released by Steve Jobs. In fact, iOS stands for iPhone Operating System. Recent versions of iOS have introduced a number of powerful new features to the mobile OS, most notably Apple's Siri advanced voice recognition application, "Proactive," a contextual, predictive personal assistant that's tied in with Siri to deliver personalized information based on a user's preferences, habits and location, a built-in instant messaging client (iMessage), integrated support for Apple's iCloud personal cloud storage service, iTunes Radio, and AirDrop support.

Xcode is a complete developer toolset for creating apps for Mac, iPhone, iPad, Apple Watch, and Apple TV. Xcode brings user interface design, coding, testing, debugging, and submitting to the App Store all into a unified workflow. - So before we get into Xcode, let's talk...about what Xcode actually is....Xcode is

an integrated development environment, or IDE, for...making iOS, macOS, tvOS and watchOS apps....In short, it's an app for making apps....Xcode is also a code editor that...supports multiple languages....It's a user interface development tool...for creating apps and games as well....And finally, it is the only officially-supported tool...created by Apple for the creation of...publishing apps to Apple's app stores.... So as a code editor, Apple supports...a variety of languages, including...Swift, Objective-C, C/C++, and others....Xcode has excellent code completion for existing...and custom frameworks and allows quick...prototyping code through something called playgrounds....In addition to all of this, Xcode has...built-in version control support....So if you want to push your project to a git repository,...that functionality is already built into Xcode...and can be done with a few button clicks....

4. What is C programming

C belongs to the structured, procedural paradigms of languages. It is proven, flexible and powerful and may be used for a variety of different applications. Although high level, C and assembly language share many of the same attributes.

C has been around for several decades and has won widespread acceptance because it gives programmers maximum control and efficiency. C is an easy language to learn. It is a bit more cryptic in its style than some other languages, but you get beyond that fairly quickly. C is what is called a compiled language. This means that once you write your C program, you must run it through a C compiler to turn your program into an executable that the computer can run (execute). The C program is the human-readable form, while the executable that comes out of the compiler is the machine-readable and executable form. What this means is that to write and run a C program, you must have access to a C compiler. If you are using a UNIX machine (for example, if you are writing CGI scripts in C on your host's UNIX computer, or if you are a student working on a lab's UNIX machine), the C compiler is available for free. It is called either "cc" or "gcc" and is available on the command line. If you are a student, then the school will likely provide you with a compiler -- find out what the school is using and learn about it. If you are working at home on a Windows machine, you are going to need to download a free C compiler or purchase a commercial compiler. A widely used commercial compiler is Microsoft's Visual C++ environment (it compiles both C and C++ programs).

5. Mobile gaming past and future

The early history of mobile games does not start with the introduction of the first handheld electronic games in the late 1970s. Rather, there is a continuity that can be tracked from the early simple electronic gaming devices such as the Merlin by Parker Brothers (1978) to the earlier mechanical toys on the one hand, and to ancient travelers' game sets on the other. A deck of gaming cards or a small version of a board game are easy to use while on the road, and the portability of such analog gaming devices has no doubt played an important part in their evolution and popularity. There is evidence of traveling dice and board games being used by the Roman emperor Claudius (10 bce–ad 54; see Joannou, 2007).

The rising popularity of mobile application ecosystems can be attributed to the better quality of mobile games, the better user experience provided by touch screen-enabled smartphones, the faster access via

mobile broadband (3G and 4G networks), and the successful distribution of models provided by other, nonmobile platforms, such as Steam (developed by Valve for Windows computers), Wii Shop Channel, Xbox Live Marketplace, and PlayStation Store. In industry sources, it was estimated that the number of smartphone users worldwide exceeded one billion in 2012, far surpassing the numbers of any other gaming platform, except gaming in personal computers. Similarly, the Finnish game developer Rovio reported that their popular Angry Birds franchise of mobile games had reached the cumulative number of one billion downloads in 2012.

As a category, mobile games have developed into multiple directions on their own. The convergence of gaming platforms is also an important development: in some ecosystems, and by using techniques such as game streaming, it is now possible to change from one type of device to another and yet continue the same game, which is a development that contributes toward the boundaries between mobile, console, and PC games beginning to erode. The key characteristics of gaming on a small, mobile device nevertheless remain distinctive and unique at their core.

6. Does mobile gaming have a future?

For a long time now, gaming, in general, has been seen as quite a niche market, reserved primarily for PC and console players with more money than sense. However, in recent times, mobile gaming has seemingly taken over the industry, flooding the market with a host of new players who do not require expensive equipment in order to enjoy playing games. With this influx of new players coming into the industry, it does make one wonder: What does the future hold for mobile gaming? According to market research, a whole lot more money.

Mobile gaming has long been at the bottom of the pecking order. It's obvious that consoles dominate the market, closely followed by PC gaming. But what does the future hold for mobile gaming!? A lot can be said for the quality, it has long been dubbed the worst in terms of gameplay, graphics, loading times etc. However, if you haven't dabbled in mobile gaming recently, you won't have noticed the massive improvements that are being made as of late to the industry. The variety of games has improved, and as phones have improved, so have the graphics. More and more people are now turning to mobile gaming for some of the reasons that we're going to list below.

It's difficult, at this point, to imagine a gaming experience on mobile that comes anywhere close to that of a console, even if Nintendo's Switch is a valiant effort. Hardcore gamers may well dismiss mobile gaming, hardware issues like processing power and screen size will remain a drawback, and top game studios will continue to focus their efforts on their fuller console offerings. Even so, the mobile gaming market is vast. This explosive growth is essentially because of the convenience and ease of access of the platform. Everyone owns a smartphones these days and the same cannot be said for any other platform which is why we can expect more and more entertainment giants to invest heavy resources in the foreseeable future.

With some of the current biggest games in the world such as Fortnite and PUBG moving into remarkably accurate mobile interpretations of their base games, mobile gaming has finally crossed the threshold into mainstream integration. Mobile devices are already absurdly powerful and growing more so by the

year, even outstripping many traditional gaming handhelds. Combined with the now developed market, this means that the gaming industry as a whole has taken notice, and will no doubt increase efforts to target mobile as a primary gaming device for major IPs in the future.

7. Education using mobile gaming

The idea of using games to engage students in the process of active learning is not new. Over the past several years, educators have been increasingly incorporating various games into their teaching curriculum in an effort to create a fun and engaging learning environment for students. Although this can be very challenging and time consuming, interactive, collaborative and competitive games tend to motivate and encourage student participation in the learning process. Over the years, the format for classroom games has changed drastically. There are many more options that incorporate the use of technology and interactivity. Quinn and Iverson argued that students “need to be engaged more and to be put at the centre of the learning experience to change from ‘passive vessel’ to ‘active participant’” (as cited in Pannesse & Carlesi, 2007).

Regardless of the format of the game, students can simultaneously build their problem solving skills while having fun throughout the process if an instructional game is well-designed (MacKenty, 2006, Harris, 2009). Throughout my research, I discovered that there are many gaming formats that educators can choose from. There are many factors to consider including: 1) which game best integrates into the existing curriculum, (Harris, 2006, p.26) 2) which game meets the objectives of the topics being taught, (MacKenty, 2006, p.48) and 3) what are the instructor’s personal beliefs on teaching pedagogy (Van De Bogart, 2009). Depending on the type of game that is played, there are clear benefits to supplementing games as active learning components in the classroom. According to Franklin, Peat & Lewis (2003), when students work cooperatively on a gaming activity, “games foster group cooperation and typically create a high level of student involvement that makes them useful tools for effective teaching” (p. 82).

8. Summary