

**GAMIFICATION TOOL IMPLEMENTATION**

**RESEARCH MANUAL**

**BY**

**C00224965**

**Patrick Alabi**

**Institute of Technology Carlow**

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**Abstract:**

Gamification is seen as the application of elements in games, for example points, badges and leader boards to other areas of activity. In this instance, the activity is for learning and amplifying the user enjoyment and experience. The aim of this research manual is to give an insight on what is involved in implementing a gamification tool that teaches GDPR and other cyber security content and highlights the techniques needed to develop this application.

## Contents

<b>Abstract:</b> .....	2
<b>1. Introduction</b> .....	4
<b>2. Areas Researched</b> .....	5
<b>What is Gamification?</b> .....	5
Points: .....	5
Badges:.....	6
Leaderboards:.....	6
<b>What has been happening?</b> .....	6
<b>Immersive Technologies</b> .....	6
<b>Engaging Student Learning</b> .....	7
<b>3. Scope of Application:</b> .....	8
<b>Phishing:</b> .....	8
<b>GDPR:</b> .....	8
<b>Intrusion Detection:</b> .....	8
<b>Virus and Worms:</b> .....	8
<b>Intellectual Property:</b> .....	9
<b>4. Technology Stacks:</b> .....	9
<b>Apple iOS vs Android:</b> .....	9
<b>Tools for Software Development</b> .....	9
<b>Android Studio:</b> .....	9
<b>Eclipse:</b> .....	10
<b>Xamarin:</b> .....	10
<b>Google Play Services:</b> .....	11
<b>5. Similar Applications:</b> .....	12
<b>Phishing Quiz with Google:</b> .....	12
<b>Duolingo:</b> .....	13
<b>Byju’s – Gamification for Education:</b> .....	14
<b>6. Conclusion:</b> .....	15
<b>7. Bibliography</b> .....	16

## **1. Introduction**

It is very hard to ignore the prominence of online services in our society, we now have online banking, social media, and e-commerce. It has become a necessity for users of the internet to have some comprehension of basic IT security in order to keep themselves safe and secure on internet. This is not always the case, and therefore educational content has been provided all over the internet.

Gamification has become more and more popular in recent years and is being used to educate people in several areas. Scholefield, S., & Shepherd, L. A. (2019).

The idea of using games as teaching material is not foreign to most people and is well and truly becoming one of the best approaches when aiding people to learn. Gamification has proven to be very effective.

Throwing in the element of competition along with fun, adds to a platform and it becomes very encouraging and enjoyable to learn. Li, C., & Kulkarni, R. (2016).

Successfully integrating gamification can end up with very positive results. Users being rewarded for successfully completing a task has always been a technique used by teachers and computer games as it gives the person completing each task motivation to keep going. Leaderboards allow users to compare and contrast their progress with other users and view their points as they continue to complete their select subject.

This research manual is going to present an overview of implementing gamification in an application that helps users to learn cybersecurity in a fun manner.

## **2. Areas Researched**

### **What is Gamification?**

Gamification is the implementation of game play and rewards to non-game like environments. Many businesses are continuously trying to improve the gamification on their products because it helps provide them with more customer behaviour data and brand loyalty.

(Business News Daily, 2020)

It was predicted in 2012 by technology consultancy Gartner that 50% of corporate innovation will be somewhat gamified by 2015. The elements of game mechanics are being employed in training, education and health and wellbeing initiatives to this day. (Gamify, 2020)



Figure 2.1 Gamification Loop

### **Points:**

The idea of the point system is to keep scores and determine the overall tally.

They can also be used for giving feedback to the end user and displaying their progress.

This is a mandatory aspect of the project as it helps implement the gamification in the teaching tool. (Gamification21, 2020)

## Badges:

Badges should resemble the achievement obtained by the end user. They represent importance and show credentials. This is also a mandatory aspect of the project and can be used icon or social display closer to the finish product. (Gamification21, 2020)

## Leaderboards:

This will be implemented to show ranking and return feedback on competition. It will be one of my goals to have users view other people's score and compare. Leaderboards are mandatory as they make up what gamification is meant to be. (Gamification21, 2020)

## **What has been happening?**

### Immersive Technologies

eLearning is expected to go deeper in its teaching and expand wider with its reach. A lot of experts are predicting that gamification will make longer strides with important industries that have flexible processes like education, healthcare, financial sector, pharmaceuticals etc.

eLearning gamification has become its own standalone learning strategy. The trend is becoming more and more apparent, the combining or blending of game-based learning with different experiences is growing popular. There was a study conducted on a target group and it was discovered that micro-learning and eLearning gamification can cause the user engagement to grow exponentially. (Westfall, 2016)

Gamification can blend in with other learning methods as well as making it better for engagement and more accessible to motivate students. Imagine if people were playing a firefighting game with Virtual Reality and you can learn the rights and wrongs of firefighting in the comfort of a virtual environment. (Swanson, 2021)

### Engaging Student Learning

A study that investigated the growth and potential use of gamified learning to engage third level students with a brand-new online learning platform at university in the Netherlands. The application is a gamified tool, that works as a multiple-choice quiz app. The main purpose of the university student's application was to teach them the relevant information about a variety of their student rules, policies, and societies in university. Fitz-Walter et al. (2011: 123) gathered quickly that many students often feel lost and were having problems in making new friendships and felt that games with subside the nerves of this.

A group of third level students took it upon themselves to develop a gamified learning up that was inspired by a popular version of a quiz game that would reward playing and answering questions on topics. The aspects of the game mechanics they took were points, feedback, and prizes. The application was advertised by sending out emails and presenting to as many classes as they could. Students were able to sign up by following a short link to a survey where they entered their personal information and were registered for the application. (Welbers, Konijn, Burgers, & Vaate, 2019)

The approach in which these students have taken would match the ideas and expectations I have for my project. It is inspiring to see a group of students come together to develop something like this even if it was just a field experiment. Through their results they could see that generic feedback was better than tailored feedback and limiting time on game was better than binging it.

### **3. Scope of Application:**

The aim of this application is to focus on providing a gamified tool for teaching the fundamental content of cyber security. This will help expand the user's current knowledge on this topic and provide them with the basics going forward with their study. The modules I am hoping to cover in this application are:

#### **Phishing:**

I will be covering the fundamentals of phishing as I have been lucky to learn about the topic in my modules over the last three years in IT Carlow.

Phishing is a form of social engineering attacks that is mainly used to steal user information such as login credentials and credit card numbers. This attack can have devastating results such unauthorised purchase, funds stolen and identity theft. I feel the awareness of this attack can be very beneficial to end users.

(Imperva, 2020)

#### **GDPR:**

GDPR has become an integral part of the IT sector and has been in effect since 2018.

Over the last year I have been studying a module called Cyber Legislation which covered a lot of GDPR in depth. GDPR unifies the data privacy laws across all the EU member countries and if they're not complied with, penalties will be given regarding the poor collection and use of personal data. This is an area that most people should be aware of as it can be applied to any business that collects personal data from someone living in the EU. (Wolford, n.d.)

#### **Intrusion Detection:**

An Intrusion detection system is a type of network security that was designed to detect vulnerability exploits against specific applications or computer. IDS operate outside the direct line of communication also known as "out of band". The system is passive meaning it mainly monitors and notifies traffic and reports to administration but does not automatically take action. Teaching users about how to IDS can be beneficial in the long run. (Palo Alto Networks, 2020)

#### **Virus and Worms:**

Providing the user with content about viruses and worms is good area to dive into.

The main difference between a virus and worm is that most viruses must be enabled by the activation of their host. With worms, they are individual malicious programs that can keep self-replicating and spread on their own once they have breached the system. (Kaspersky, 2021)



**Intellectual Property:**

Intellectual property refers to the creations and thoughts of the mind, this would classify as inventions, artistic works, symbols, and images that are used in commerce. Most IP (Intellectual Property) is protected in law by patents, trademarks, and copyrights. This allows people to earn their recognition or gain financially from their innovations. The IP system aims to garner an environment in which people's creativeness and innovativeness can blossom. (WIPO, 2021)

**4. Technology Stacks:**

In this section I will be focusing primarily on the research gathered when deciding which technology stack, I should progress with for the project. Below I will be focusing on the pros and cons of certain technologies and the acceptance criteria for both PlayStore (Android) and AppStore (Apple).

**Apple iOS vs Android:**

After comparing both developments I have decided to go with Androids.

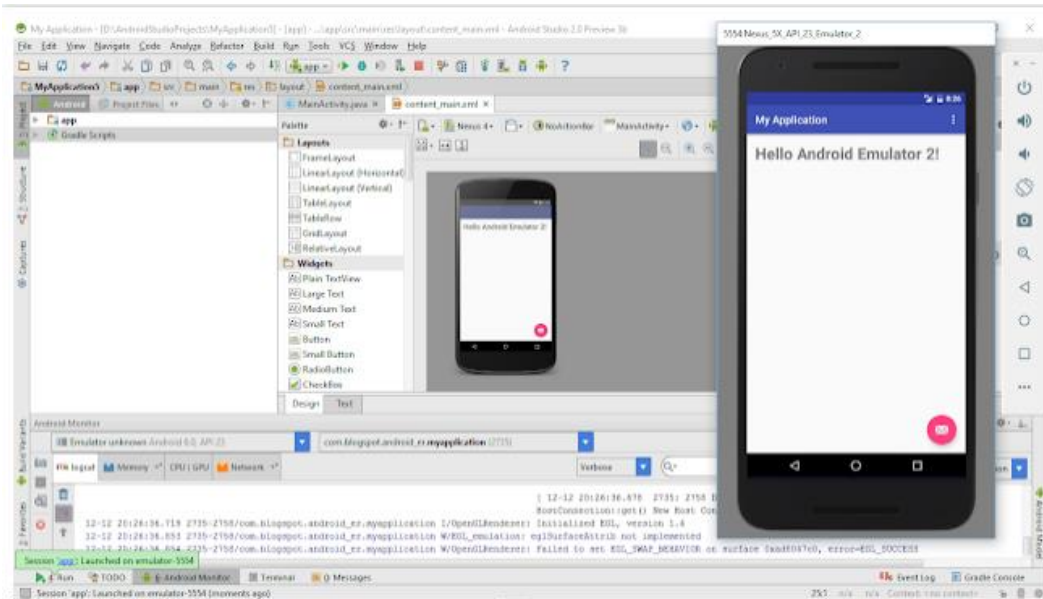
Android is open source whereas Apple has a restricted iOS making it more limited to features.

Apple iOS apps are very hard to customized because of this. Apple also have a strict review process for applications meaning the chances of your application being declined is high. PlayStore may allow you publish to Google play within a matter of hours.

(The App Solutions, 2019)

**Tools for Software Development****Android Studio:**

Prior to this research document I had little to no experience with Android Studio, but I have spent a lot of time researching about the IDE. Android Studio uses Java and Kotlin. I have experience with Java through my college modules and I have been learning Kotlin since starting this document and I'm enjoying it so far. I was planning on going the Android development route as there a lot of resources online and Android Studio has a very efficient layout editor and emulator for testing your application. You can also test the application via USB and Android device. (Developers Android, 2020)



### **Eclipse:**

Eclipse is an IDE that I would be very familiar with from college. It is mainly used for writing Java applications but can be flexible with other languages such as C, C++, and C#. It would have been the main IDE for Android development before Android Studio took its place as its successor. (Eclipse, 2016)

### **Xamarin:**

This is an open-source platform that used primarily with developing modern day applications I have no experience with Xamarin, but I know it is used for iOS, Android and Windows .NET. Xamarin is brilliant for developing apps that can scale across more than one platform, i.e. hybrid applications.

**How it works:**

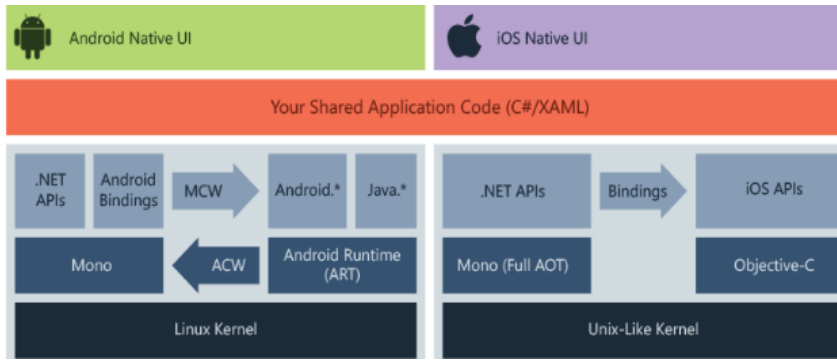


Figure 4.2.3 (Microsoft , 2020)

The diagram displays the architecture of the Xamarin application.

The applications allow you to develop a native UI on both platforms and write C# code.

Xamarin uses Visual Studio, an IDE that I have used before in college so I would be very familiar in its capabilities.

**Google Play Services:**

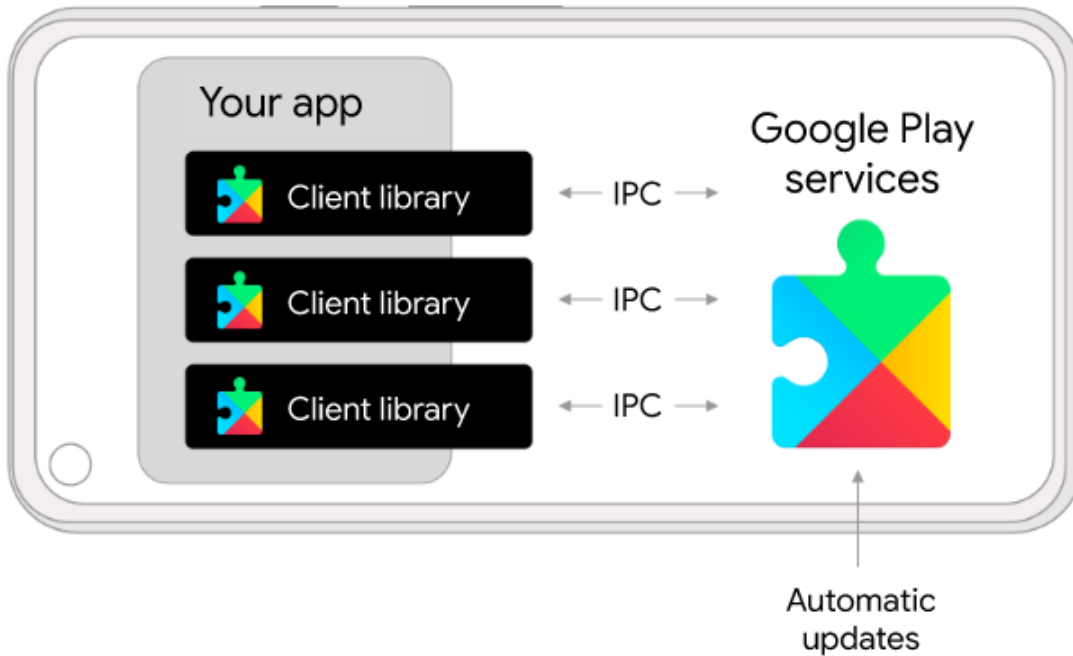


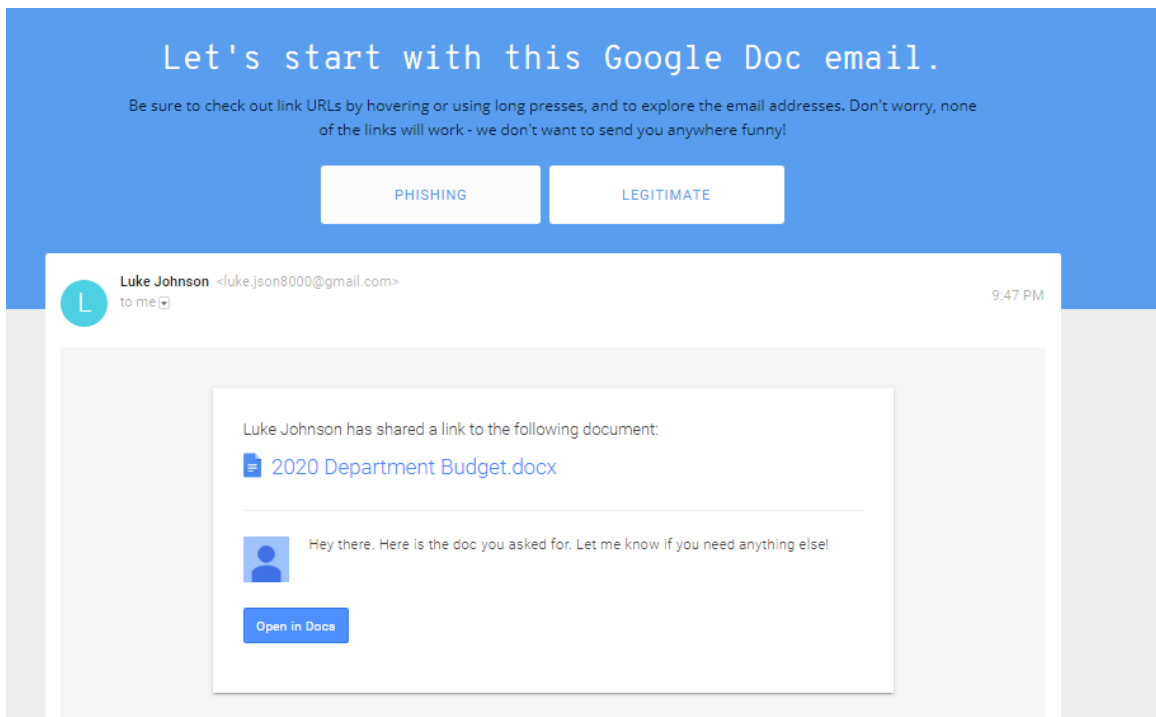
Figure 4.2.4 Google Play receiving regular updates.

The Google Play services enables a broad number of SDKs on Android that help with developing applications with privacy and security, helps user engagement, and growth of business. The SDKs are unique in that they only require a thin client library to be implemented into the application. To develop my application using the Google Play services API's, I will have to set up the project with the relevant SDKs, which are accessible on the Google maven repository. (Google Developers, 2021)

## **5. Similar Applications:**

Phishing Quiz with Google:

Gmail was a major target for phishing attacks, so their parent company Jigsaw created a quiz to test end users' knowledge on phishing attacks. Phishing is when an attacker uses social engineering to convince a user that a link is authentic in order to gain access to their account credentials. (CSO Online, 2020)

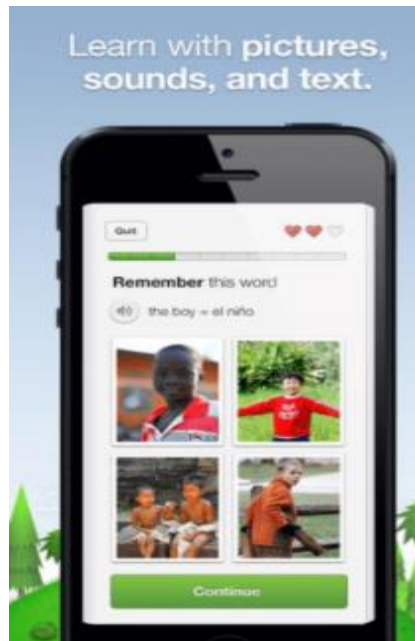


*Figure 5.1.1 (Google, 2020)*

I plan to use a similar approach when testing end users by giving them a scenario or fake phishing email and let them identify whether it is legitimate or phishing. Jigsaw did not use points or leader boards to manage the end users progress, but I hope to implement this on a mobile application and hopefully have the same success they did in delivering the application.

### Duolingo:

In November 2012, the company had launched their iPhone app after having a successful web application accumulating 250,000 active users weekly. This move gave the users access to the application anywhere on the go and more features were implemented to gamify their user experience. (Product Habits, 2019)



*Figure 5.1.2*

Similarly, to Duolingo I would like to implement the use of pictures to help users learn terms, identify issues, and become more confident in their knowledge. The mobile application has increased their engagement by throwing in features like push notifications to continuously make the application addictive. Duolingo is a prime example of a very successful gamified tool for teaching languages globally. (Product Habits, 2019)

## Byju's – Gamification for Education:

Byju is an Indian educational application that use gamification for education.

The aim is for students to master fundamentals through practice tests and videos.

Gamification is used to by allowing the students to complete games and be rewarded with points and challenge each through quizzes and other contests. The competition increases the student's motivation to strive for better results. (Clevartap, 2020)

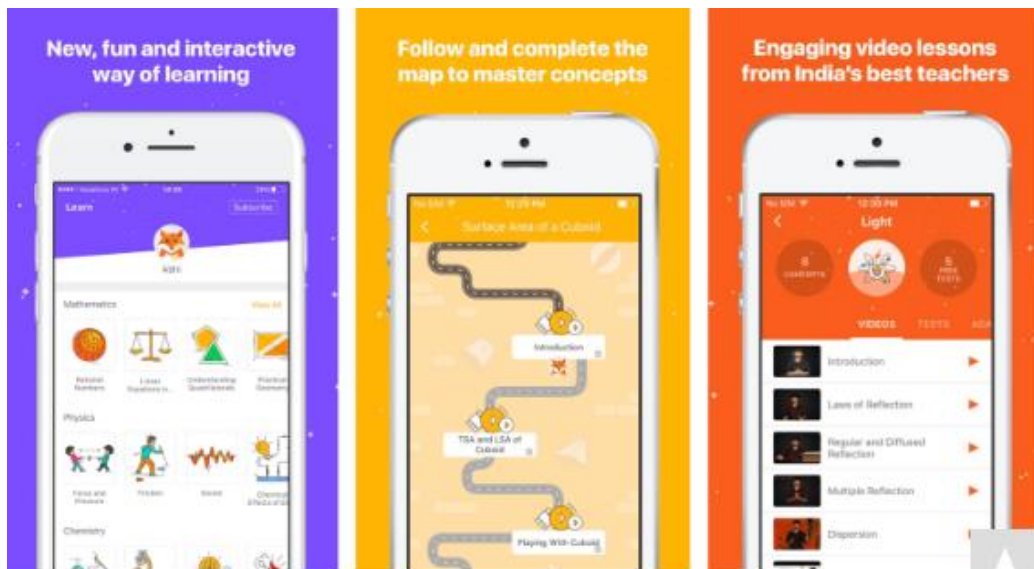


Figure 5.1.3

## **6. Conclusion:**

In conclusion I will be using Android Studio Kit as it is IDE has very good visual layout editor and the emulator will be very useful when testing the application on my laptop or connecting my android device via USB. I am very familiar with Java and I have been learning Kotlin alongside my research for this application. The process for uploading my application onto the Play Store is way more applicable and less taxing on my end, if I had decided to create an iOS application the review process would have been up to two weeks and the restrictions that accompany iOS like being closed source would limit the flexibility of the application. I also intend to use GDPR and some basic cybersecurity fundamentals as the core subjects for the users to study as I feel a lot of people online will need this knowledge going forward with their ventures on the internet. The content for the topics will be taken from my second- and third-year syllabus in Cybercrime and IT Security specifically 'Secure Systems' and 'Cyber Legislation'.

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