This project explores mathematics in an educational environment and aims to bridge the gap between teaching mathematics and playing games. The software created in this project explores techniques that can be used in games to teach users as well as putting mathematics in a more accessible and engaging environment to traditional learning. The idea behind this project is to take the Natural Deduction logic in mathematics and try to make it easier for older secondary school and university students to understand. In my opinion, an effective way of doing this is through gamification and the literature will explore this. The overarching aim is to engage students in a new and different way.

Games are popular in the everyday life of young people. Mobile phones, tablets and computers all have multiple sources of games which people play on a daily basis. Gamification is taking a task that is not usually associated with gaming and turning it into a game. Gamification is already used in a variety of situations and that is laid out in Section **??**. The topic of gaming can be explored to see whether it has the capability to educate people in a mathematical context and whether people are capable of using games to learn new mathematics.

Education is now compulsory for every child in the UK up until the age of 18. Using unconventional methods such as games to help people learn may be effective for some pupils because not everyone learns in the same way. Educational principles need to be harnessed and captured to be put in a gaming environment. This project aims to create software that users feel has educationally benefited them, whilst still enjoying themselves. Some other games already do this successfully and building on their success will deliver a successful project. Gamification for Education is built on the premise that the teaching within the game is of a high standard. Researching key educational principles that need to be included in such a game is an important step to achieve this. Many learning techniques and how Gamification can be used for education is explained in Section **??**.

What makes this project unique is its approach to teaching Natural Deduction. Natural Deduction is a Mathematical logic proof system that represents logic in an instinctive way. Common rules that exist are “and”, “or” and “implies” and they work in a way which you would naturally expect. Using these rules and helping teaching them in a mathematical context is central to this project. There is many reasons that Natural Deduction should be picked as a mathematical topic to teach and these are set out in detail in Section **??**. One of the key reasons is that it is popular and is a common logic system to be taught in undergraduate degrees.

Once literature has been examined, the system development life cycle needs to be implemented to create a successful piece of software. This starts with the analysis gathering and the requirements setting. Whilst this project

doesn't have a customer, a target audience is specified in Section **??** for where the author believes this project lies in the wider scope of educational games. Picking the correct target audience is important to make sure that the game has the biggest impact.

The goal setting process also needs to carefully contemplated. Frequently in software products, the end user can give you detailed requirements from what they want from the software. This project is more of an investigative process in whether the software created can be useful in the future. Targets and requirements need to be formulated from the literature, drawing on the experience of similar educational games (Section **??**) and from key features examined in Section **??**.

Goals

Design

Implementation

Results