

Learning Teaching Virtual Reality Experience

This project is about an assistant application for education. Teacher and students can explore lessons in virtual reality. The main focus of this work is about the teaching part. The user can place different objects in a predefined scene. A notice, a question and answers can be created for these objects and assigned to them. In a “Live-Session” can the teacher and the students be together in the defined scene. The teacher can show the question and the students can answer these. This application should help including new technologies into the education. It should be possible for the teacher to create the lesson how every he wants.

The project is basically for Smartphones with an Android operating system with at least version 5.0 (Lollipop) and is made with the Unreal Engine version 4.18. For developing are used the Samsung Galaxy S7 Edge and the ASUS Zenfone AR. The menu is in a two dimensional view with a schoolboard a chalky script. In the settings menu are options to change the sound volume and the graphic settings. Freed lessons can be practiced alone. In the menus the teacher can create questions and one to four answers to that. It's possible to create object groups and add single objects to them in the object group editor. The questions can be assigned to a single object in this menu as well. After creating the objects groups, the lessons can be edited and the groups can be placed in predefined locations. The questions and the lessons are saved in an external xml formatted file. They can be used later in external programs and easily to read. Starting the lesson switches the view of the application to the VR view and there is a virtual reality head mount needed. Every student only sees the teacher and the teacher sees every student. All objects are visible for the teacher and if he looks long enough at it a panel pop's up over it. With this panel the teacher can show or hide the object, the notice and the question to the students. If the question is visible the students can answer it. This answer (if correct or not) is shown to the teacher from every student. The answers are also saved to the teacher. This result is saved to an external xml formatted file after the lesson. In this file is an overview over all lessons and how the students answered them. The percentage (how every student answered the questions) is also in this file and helps to review the lesson. An important aspect of this work is to share the lesson to the students after the

lesson ended. The teacher sets up how the lesson can be reached for practicing by not visible, visible and answerable.

In the first week of the practical part was the creation of the project and the basic settings. Simple functionalities like the basic menus and the switch between the two dimensional menu view and the scene VR view were also implemented in this time. I tried to use the Vulkan render pipeline, but with the unreal engine is currently a problem by rendering on mobile and in VR. The lighting was not as I expected, so I had to research in the beginning of the second week how lighting is made on mobile devices. After fixing this issue I did some considerations about the main classes of the lessons and how I would use them later. After doing this I started creating the menus by the settings menu. But before doing that I designed the orientation of the menus. With this it was easy to create the menus. In the third week I worked mainly on the functions to create single objects, questions and object groups. I also implemented the function to save the lessons to the xml formatted file. In the fourth week of the practical part I worked on the creation and saving of the questions. I also worked on the basic functionalities of all menus. In the week five I finished the menu part and fixed the problems with them. After the menus I focused the work on the practicing part of the VR Scene. Everything worked fine, but the widgets in VR doesn't work with multiplayer in the unreal engine. In the beginning of the sixth week I created a separated project to create the implementation of the multiplayer widgets. After testing this I implemented this feature in the main project. The name and the meshes of the students and the teacher are at this point shown as planned. In week eight I reworked nearly the whole networking part to a better system. I also implemented the saving of the result in the xml formatted file. In the ninth week I finished the basic functionality of the project and showed this to a product manager of a, with virtual reality working, company. The feedback was good but the design and the usability of the application should be better. In the second half of this week I worked on improving the performance. This would take way longer than expected. In the tenth and last week I cleaned up everything and optimized what I could. I also made the packages and the final version of the project.

All in All, it was a very interesting project with new problems and challenges. I never tried mobile and VR development together before. There are a lot of difficulties. But in the end everything that I wanted on features in this project worked fine. Including the new technologies in the education area is an interesting idea, but takes a long time and patience.

With this idea the whole classic classroom could change into an interactive experience where teachers and students could learn and teach new exiting knowledge.