

DESIGN PROJECT

By Eric Torres Velasco and Estefanía Medina Duarte

UNIVERSUM

Project description

Universum is an AR application planned to function as a support in the teaching of topics related to the solar system and its various complements through more visual and interactive supports than those offered in traditional methods.

The application will use a plane of the solar system in A4 size to show the operation of the entire system and its appearance in 3D models, it will also work in conjunction with A6 size cards to show the different elements of the solar system such as stars or planets in a more specific way.

Targeted age

- 8-11 years old
 - 3rd grade-6th grade

Activity Analysis

The application will serve as support to traditional teaching methods, representing an addition of new techniques that include the use of mobile devices, like tablets or cell phones, which are already part of the technological objects commonly used by people, including children.

Beside, it will incorporate ludic and didactic tactics in order to attract most of the attention from kids, creating some sort of recreational and playful environment, making the learning process more fun and interactive.

Therefore, for its main characteristics the application can be described as a ludic AR atmosphere for kids among 8-11 years old. These characteristics were chosen based on what was said for different authors over the years. In first instance, it is set that from childhood to maturity, play has a central place at each stage of development in its different forms, styles and meanings (Erikson, 1950; Piaget, 1962; Vygotsky, 1978; Wolf, 1984), and in Mainemelis et al (2010), is established that:

...play exemplifies one of the highest forms of experiential learning in three fundamental ways: first, it encourages learners to take charge of their own learning based on their own standards of excellence. In play, learners achieve authentic and higher order learning by creating their own game rules and conduct. Second, an equal value is placed on the process and the outcome of learning. Play does not happen staring at the scoring board. Outcome acquires meaning only if equal attention is paid to the experience and the process of play. As Dewey (1997, p. 167) says, a truly educative experience sees no difference between utility and fun, the process and outcome. Third, in play, the experiential learning cycle is fully engaged by allowing players to come back to the familiar experience with a fresh perspective. The recursive nature of the play activity gives continuity for the individual's experience to mature and deepen, moment-to-moment, and stage-by-stage. Taken together, these three factors are the key principles of a learning space conducive to deep learning.

In addition, James and Swain (cited in Johnson-Glenberg, 2017: 196) point out that «when 5- to 6-year-old children actively manipulated an object while hearing a new label and then heard the label again, motor areas of their brains were more likely to be activated upon subsequent viewing

compared with when they were only allowed to passively watch an experimenter manipulate the named object» (James & Swain, 2011).

Design specification:

Objectives

General objectives

- The AR application will be designed to work for different scholar grades (from 3rd to 6h). That's why it should be adaptable in order to offer the required information according to each grade.
- It is not planned to be used as a substitute for traditional methods, but as an aiding resource focused on interactive and collaborative methods for children.

Learning objectives

The learning objectives respond to expected learning established on the study programs from the Public Education Secretary (SEP, Secretaría de Educación Pública) in Mexico. According to them, children in elementary school, among 3rd and 6th grade take the Natural Science course where it is taught about the solar system through different readings and practices outdoors.

Specific objectives

- Describe the characteristics of the components of the solar system
- Represent the regular motion of the planets and some of their characteristics.
- Describe the Sun's movement.
- Explain the Moon's eclipses and phases in a Sun-Earth-Moon system.

Resources

- Adobe Photoshop & Illustrator - Design of the A4 map and A6 cardboards
- Sketch-Up - 3D Modeling, Application of textures and materials
- V-Ray - Rendering
- Sketchfab, clara, archive3d, 3dwarehouse.sketchup, turbosquid, cgtrader, quixel, mixamo, free3D, poly - 3D models in .fbx, .obj, etc.
- Unity with 2019.4.9f1 version - Exporting of 3D models, addition of text and other features, and creation of mobile application (.APK file)
- AR FlashCards (planets and star)
- We will look up flashcard images online first
- Otherwise, we will need to design our own flashcards.

Key design decisions

The main decisions were taken in face of making an AR application for kids, since in many of the course's readings was mentioned that engagement and immersion highly increases when these technologies are implemented (Dunlevy, 2009; Radu, 2014)

Opportunities for data collection

Interviews with both type of users: teachers and students

Ways to assess learning outcomes

Beside the visualization of the components of the solar system, the application can include some after questionnaires whose results can be send to the teachers.

Aside, the functionality of the application can be evaluated through more traditional methods like tests or reports.

Ways to evaluate the design

The results of the questionnaires included after the visualization of the components can be also saved in a server to evaluate which aspects are left behind for the users, apart from it, the feedback from the interviews with teachers and students can also work to see deficiencies on the application.