Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 75 (2015) 250 – 256

Procedia Computer Science

2015 International Conference on Virtual and Augmented Reality in Education

How to Include Augmented Reality in Descriptive Geometry Teaching

Nora Argelia Aguilera González*

[a] *Tecnológico de Monterrey, Campus Monterrey. Monterrey, Nuevo León, México.*

Abstract

The geometric representation has always existed, from the antiquity when the man was using it to plan his areas to the present day. For the construction of any object or building the use of geometry is needed since the finish work has to be very precise. Teaching geometry is not easy at all and the new generations every time has more problems for the spatial understanding. With the new digital technologies the young persons are losing increasingly the sense between the royal space and the two-dimensional one, due to the fact that they are immersed on a screen. Therefore, the system of learning as for the spatial representation must change to manage to answer the interest for the use of these technologies. The matter of Descriptive Geometry is directed students of the first and second semester of the careers of Architecture and Industrial Design. Their aim is to develop skills of perception and spatial analysis, under systems of parallel and conical projection in the construction of volumes. The work that is realized in the semester is with instruments to hand, but we see the need to penetrate with the technology on having explaining basic aspects since they are the units, scales and coordinates (length, width and thickness). For what we know that the AR will help to make more understandable the process of modeling of a figure. Later the pupil will be able to be working with hand to learn to project the exposed figure, later it will be possible to work with the software SketchUp. The key point of this process of education is that the pupil learns to project, not to copy, from the work to hand up to the culmination with the software. For it I have to conclude of that the work of the AR does not remove importance to the work that the teacher does since this one is the one that programmes that makes learning understandable.

Peer-review under responsibility of organizing committee of the 2015 International Conference on Virtual and Augmented Reality in Education (VARE 2015)

Keywords: Spatial visualizatiom, SketchUp representation, visualization.

* Corresponding author.
E-mail address: naguiler@itesm.mx

Peer-review under responsibility of organizing committee of the 2015 International Conference on Virtual and Augmented Reality in Education (VARE 2015)
doi:10.1016/j.procs.2015.12.245

1. Introduction

To teach geometry is not easy at all and the new generations every time have more problems to achieve a spatial understanding. With the recent digital technologies the young persons are losing increasingly the sense of the royal space, due to the fact that always they are immersed on a screen where from there they observe all his surrounding world. Therefore, one seeks to design a system of spatial representation that it helps to the conception of the forms to design using the Augmented Reality with SketchUp's software.

This study is applied in the matter to which this project is applied is that of Descriptive Geometry for students of Architecture and Industrial Design of the Instituto Tecnológico de Monterrey, Campus Monterrey of firstly and the second semester, which their aim is to learn to represent the space on the basis of exact methods of projection for the construction of spatial models.

This article exposes the teaching of spatial representation across the Descriptive Geometry with constructive methods of projection applied both in the traditional form and in the foxglove to manage to present the final results with the Augmented Reality.

This offer is based on months of investigation on how the pupil can learn to project with precise methods. For the designer it is very significant to have the aptitude to be able to project any idea that has in mind since his offers must be focused towards the needs of the human being.

Always there has been listened that it is very important that the student learns to project first with instruments by hand, and there are motives for justifying it since across this system of work the student has more direct contact with the royal space, so much the scales and as the managing unit they are important points that make possible that it approaches the royal dimensions of any offer.

The key point of this process of education is that the pupil must not copy but be able to project, because they are accustomed to expressing in agreement to since see it on the screen without any alteration. It is necessary to to understand what shows itself, is what implies a constructive representation.

The structure of this work is organized in the following way: First one will speak on how it appreciates the visual perception before the virtual reality. In the second point a comparison will be done between the Descriptive Geometry by the digital vectorial representation, it is important to know what points they have jointly in order that the learning in the pupil is more effective. In the third point a comparison is done between the Descriptive Geometry by the Augmented Reality. In the fourth point it treats on since the Descriptive Geometry works as a whole with the SketchUp to do the final presentation with Augmented Reality.

The fourth point involves the topics the Montea and the Axonometrías as methods to project three-dimensional models in a two-dimensional space. And since last the final conclusions are on the use that Augmented Reality can give in the education of the Descriptive Geometry.

2. Virtual reality vs. Perception reality

In the latter years we have observed that the new generations already do not conform to be informed across static images but they seek to get in a three-dimensional world with movement in the one that one could interact, being named a virtual reality. Let's remember that this reality is an IT system that generates a simulation computarizada of environments and virtual situations in a certain place. In many occasions this reality reproduces in three-dimensional form with a contained graphical, acoustic and tactile high place, understanding this way a perceptive condition without any physical support and that only gives itself inside the computers in order that they could describe scenes of places or objects that exist in the reality. The virtual reality supports a three-dimensional relation between the space and the time, the royal thing of the unreal thing is not distinguished due to the fact that the computer is thinking an environment in which the spectator could take part about acting, as it appreciates in the figure 1.