



Tutorial 3D 2.0 on Graphing and Visualization

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Abstract

In recent years, the continuous incorporation of new technologies in the learning process has been an important factor in the educational process [1]. The Technical University of Madrid (UPM) promotes educational innovation processes and develops projects related to the improvement of the education quality. The experience that we present fits into the Educational Innovation Project (EIP) of the E.U. of Agricultural Engineering of Madrid. One of the main objectives of the EIP is to "*Take advantage of the new opportunities offered by the Learning and Knowledge Technologies in order to enrich the educational processes and teaching management*" [2].

Our research group Geovisualization, Special Areas and Heritage (GESyP) works to progress in the introduction of the knowledge and skills specific to the Technical Drawing and Display with accessible electronic formats, in order to facilitate the acquisition of general and specific skills [3].

The subject of Graphic 3D Representation and Visualization (G3DRV) has a workload of 4 ECTS (European Credit Transfer and Accumulation System).

The 2.0 Tutorial objectives are as follows:

- To encourage the student to study and apply the G3DRV in the area of agricultural engineering.
- To integrate the student's G3DRV training and evaluation in cross-disciplinary skills, by introducing active learning techniques in order to develop and evaluate generic and specific competences.

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- To guide the student in the area of Cartographic Engineering, Geodesy and Photogrammetry, as well as its close relationship with Science and Related Techniques for its potential development and application in this engineering area.
- To design an interactive graphic material that can support teaching G3DRV subject, as well as self-learning in the virtual platform Moodle and other educational virtual environments 2.0 [4].

There has been a prior analysis of the acquisition of similar skills in other subjects offered by UPM and other universities. Further to the selection of the content for the tutorial, new resources and teaching materials have been developed.

Different examples in animated 3D formats, accessible and can be manipulated have represented. Processes as "reverse engineering" is to obtain information or a design from a product accessible to the public, in order to determine of what is made, what makes it work and how was it manufactured.



Fig.1. Virtual model 3D and image



Fig.2 Virtual mode used in augmented reality

The environment of augmented reality (AR) has been used to incorporate virtual information into the existing physical information. The student interacts with physical objects; the computer projects additional information about them and also captures the relative to the environment. As markers has been used open source QR (Quick Response code).

It has been generated content in the area of the Aurasma software. This software uses an advanced technology of image recognition on which is superimposed multimedia elements: animations, video, 3D models, etc.

Ultimately, this tutorial 3RGV helps learning outcomes described in the teacher guide for this subject to be acquired through collaborative learning procedures that evolve continuously in environment 2.0. Therefore, to be added to the Personal Learning Environment (PLE) of each participant they endure over time.

References

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