

Didactical suitability of a proposal for 3D printing and augmented reality with preservice teachers

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Introduction

The Learning and Knowledge Technologies make up an instrument for the transformation of the interactions that arise among teachers, students and knowledge. Particularly in mathematics, and more specifically in geometry, some proposals have been implemented in which 3D printing and Augmented Reality transform those interactions. (Novak & Wisdom, 2018; Schacht & Swidan, 2019).

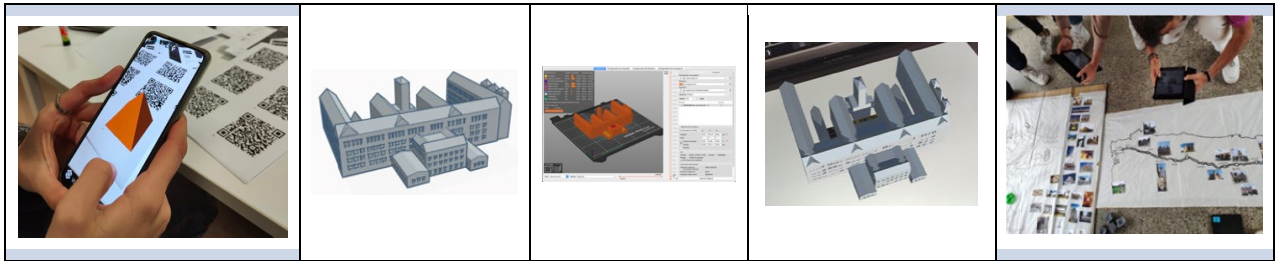
This poster presents the analysis of the didactical suitability of a project carried out with preservice teachers in which the teaching-learning processes of three-dimensional bodies are combined with 3D printing and Augmented Reality (AR).

Methodology

The sample is made up of 101 students, 82 women and 19 men, in the third year of Primary Education Teacher Degree. The project revolves around the pilgrimage way to Santiago de Compostela in commemoration of the Jacobean Year 2022-2023. It is structured in four phases: (I) Introduction to geometric bodies with Augmented Reality, (II) Creation of 3D designs, (III) Generation of Augmented Reality designs and (IV) Location of models and markers on the mock-up. Table 1 shows an example for each of the phases. The data collection instruments used were: notebook, recordings of the sessions and students creations. The components and indicators of Didactical Suitability, for each of its six facets, were used as an analysis instrument: epistemic, cognitive, ecological, mediational, interactional and affective (Godino et al., 2016). In addition, an evaluation rubric for phase II was constructed and an emotional questionnaire adapted to the context was applied based on Gómez-Chacón (2000) Mood Map.

Table 1: Results obtained for each of the phases of the project

(I) Introduction to geometric bodies with Augmented Reality	(II) Creation of 3D designs	(III) Generation of Augmented Reality designs	(III) Location of models and markers on the mock-up
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Discussion and results

The results show a positive assessment of the ecological and affective suitability. The analysis of epistemic suitability shows the use of different mathematical languages contemplating verbal, graphic (both analog and digital) and manipulative representations, although it would be convenient to consider the introduction of symbolic representations. As for epistemic suitability, the interactional suitability shows a great concordance with the established indicators, especially for phase I and II. Despite this, due to the fact that the methodology followed granted little decision-making capacity and autonomy to the students in phases III and IV, problem solving and argumentation received negligible attention. Regarding cognitive suitability, significant deficiencies are observed in the previous mathematical and technological knowledge that students have. This fact did not allow deepening the content on geometric bodies. Lastly, mediational suitability, supported by affective suitability, make up one of the strongest points of the project. Nevertheless, increasing the instruction time in some of the phases would enrich the didactical suitability of the proposal.

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