

FACULTAD DE INGENIERÍA

Escuela Académico Profesional de Ingeniería Civil

Tesis

**Virtual Model of a 5-Storey Educational Institution for
the Orientation of the Construction Process Using
Augmented Reality**

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Virtual model Of A 5-Storey Educational Institution For The Orientation Of The Construction Process Using Augmented Reality

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ABSTRACT

The educational infrastructures in Peru are an important sector for the development of the country for which in the year 2022 65 % of the budget was registered in the local and regional sectors, for which its development of elaboration must be reviewed in detail before building it, since different projects in Peru in the execution stage present incompatibilities in the plans of architecture, structure, sanitary facilities. This research work develops the computational model of a 5-storey educational institution using augmented reality. For the work, the area of structure and dimensioning of the geometry of the institution was modelled using ETABS and then the architecture, structure and sanitary model was made compatible in Revit. The researchers of the present work participated as designers and modellers of the project, to then project the work in an area of Arequipa through the use of augmented reality, the Augin application being a component compatible with Revit. Finally, the computational model of the 5-storey educational institution is shown using the ETABS and Revit programs, presenting plans in 2D and 3D, which for people without a degree of knowledge of plans cannot get an adequate idea of the construction process, But through augmented reality it was appreciated that the level of detail as the elements can be reviewed in the field using the mobile phone that acts as a lens to view each component on a real scale as if the project was built detecting interference of pipes with the specialty of structures that is an essential element, ie allows interaction with the project to 100% with each modeled element being a light and easy to use application that can guide operators who have no experience in the construction sector.

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CCS CONCEPTS

• Computer Graphics; • Mobile Augmented Reality; • Augmented Reality;

KEYWORDS

Augin, Revit, ETABS, Computer Modelling, Educational Institution, Reinforced Concrete Elements, Incompatibility of plans, Augmented Reality

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1 INTRODUCTION

Educational infrastructure in Peru is an important and necessary sector for society, as education is a universal human right, which is why 65% of budgets in the local and regional government sectors will be executed by 2022 [1] [2]. Therefore, they need adequate monitoring in the construction process to verify quality standards, because of the 54800 existing schools in Peru, 76% must be structurally reinforced, water services, electricity, furniture [3], for which in the process of implementation often present incompatibilities in the specialties of structures, sanitary installations, in many situations there are 4-inch pipes passing through the elements, beams, columns, which takes away the resistance of these structural elements, which should be avoided in the process of elaboration of CAD engineering drawings [4], which have begun to be left aside for the use of tools such as Revit for the generation of 3D plans, engineering services in the construction sector has been incorporating 3D designs, as it has more integrated processes which helps to eliminate the inefficiencies of 2D drawing, so much so that Revit was used in engineering processes for the design of substations [4], [5]. Despite these 3D software there are still small construction