

POLYHEDRA CONCEPTUAL KNOWLEDGE WITH NEOTRIE VIRTUAL REALITY GEOMETRY SOFTWARE

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The educational research is increasing focus on the use of augmented and immersive virtual reality in the classroom. The possibilities of visualization and interaction with these technologies, as that offered by the immersive virtual dynamic geometry systems 3D "NeoTrie VR", are enabling new approaches to the teaching and learning of 3D geometry, although there is still a lack of empirical studies (Rodríguez et al., 2021).

We present a quasi-experimental investigation to detect if the use of NeoTrie in practical activities improves the conceptual understanding of polyhedra. We analyze seven specific items incorporated into the final assessment test of the subject "Geometry and Measure in Primary Education", of Primary Education Teacher degree at a Spanish university. The control group (71 students) received a traditional teaching with practical activities using pencil and paper and structured material. The experimental group (132 students) used NeoTrie and Wooclap activities in their practical activities.

The t-student contrast performed on the final test scores shows that there weren't significant differences between the two groups of students at the specified $p < .05$ level, $t(201) = -1.021$, $p = .309$, $d = -.30$, 95% CI $[-.90, .28]$. On the contrary, t-student contrast of set of seven items about polyhedra in the exam revealed significant differences ($t(201) = -3.91$, $p < .001$, $d = -.49$, 95% CI $[-.74, -.24]$). Students working with NeoTrie were more able to identify relevant properties of polyhedral (non-planar faces are not allowed) and irrelevant properties (prism bases can appear in any position and be any type of polygon, polyhedral angles can be concave or convex).

Accordingly, it seems that NeoTrie has improved the students' polyhedral conceptual knowledge. Nonetheless, the role of NeoTrie software for the development of spatial abilities needs further research, since spatial conceptual abilities are an important factor for geometry learning.

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References

Rodríguez, J. L., Romero, I. M., & Codina, A. (2001). The influence of NeoTrie VR's immersive virtual reality on the teaching and learning of geometry. *Mathematics*, 9, 2411. <https://doi.org/10.3390/math9192411>