



# INTERNATIONAL CONFERENCE ON MATH EDUCATION AND TECHNOLOGY

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## A GEOMETRIC EXPLORATION OF MONUMENTS IN THE CITY OF AVEIRO

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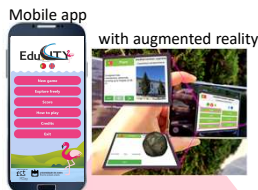
### I – the EduCITY project

“EduCITY - Smart and sustainable cities with Augmented Reality mobile educational games made by and for the Citizens”

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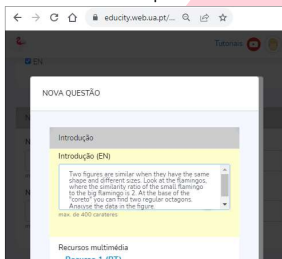


EduCITY creates a smart learning city environment, for the exploration of the urban territory as an experimental living laboratory towards Education for Sustainability [1]. It comprises:

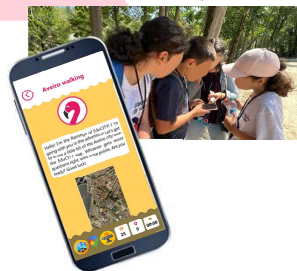


EduCITY's Smart Learning City Environment

Web-based platform



Location-based games

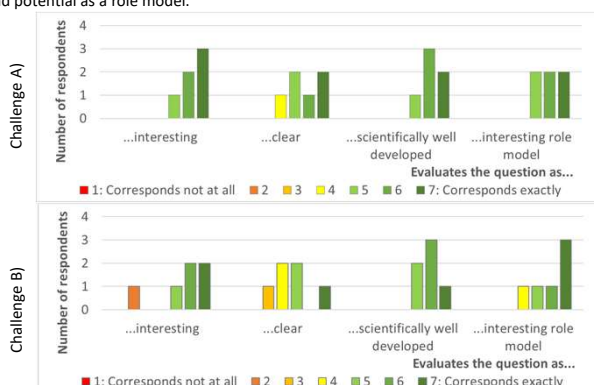


Geometry allows the development of several skills, namely, geometric thinking, problem solving and argumentation. Additionally, the development of student special visualization capabilities is essential for their learning of space. Furthermore, research involving digital technologies has been shown to contribute to a favourable view of geometry [2, 3]. For example, the inclusion of mobile technologies in the so-called Math Trails facilitate the teaching and learning process, creating collaborative and meaningful outdoor mathematical experiences as well as enhancing the support of modelling activities [4, 5]. Digital tools allow teachers to design and implement geolocated routes that contains contextualized problems where students must visualize and manipulate geometric models of real-world objects to solve them, connecting mathematics and everyday life.

In this poster we intend to present geometric challenges and analyze their evaluation by a group of PhD students in Education, without specific training in Mathematics.

### III – PhD students perceptions

A group of 6 PhD students experimented indoors a demo game with two distinct geometric challenges and answered a small questionnaire to evaluate them in what concerns their interest, clearness, scientific soundness, and potential as role model for others to develop new challenges, regarding its interest, clearness, scientific soundness and potential as a role model.



### II – the geometric challenges

A location game was created integrating geometric challenges in tourist sites in Aveiro, to be played by PhD students in Education.



### VI – Final remarks

The results present international PhD students positive perceptions regarding the geometric challenges. Challenge A) was better evaluated comparing to challenge B), particularly in what respects the interest and clearness of the question. Challenge B) required more mathematical calculations, so, considering the respondents' non-mathematical background, that may be an explaining factor. This hypothesis needs further research.

This work supports the evaluation of the geometric challenges and the reflection on possible revisions to increase their suitability to different target-players.

- Pombo, L., & Marques, M. M. (2023). EduCITY as a smart learning city environment towards education for sustainability - work in progress. In T. Bastiaens (Ed.), *EdMedia + Innovate Learning*, Jul 10, 2023 (p. 133-139). AACE. <https://www.learn-techlib.org/primary/p/222493/>
- Arzarello, F., Ferrara, F., & Robutti, O. (2012). Mathematical modelling with technology: The role of dynamic representations. *Teaching Mathematics and Its Applications*, 31(1), 20-30. <https://doi.org/10.1093/teamat/hr027>
- Clark-Wilson, A., Robutti, O. & Thomas, M. (2020). Teaching with digital technology. *ZDM Mathematics Education*, 52, 1223-1242. <https://doi.org/10.1007/s11858-020-01196-0>
- Cahyono, A. N., & Ludwig, M. (2018). Teaching and learning mathematics around the City Supported by the Use of Digital Technology. *EURASIA Journal of Mathematics, Science and Technology Education*, 15(1), em1654. <https://doi.org/10.29333/eimste/99514>
- Jablonski, S., Barlović, S., & Ludwig, M. (2023). How digital tools support the validation of outdoor modelling results. *Frontiers in Education*, 8, 1145588. <https://doi.org/10.3389/educ.2023.1145588>

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