

# Greek Science Teachers' Views about the Use of Educational Simulations in their Practice

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**Abstract.** Simulations are one of the most powerful digital tools for science education. This paper investigates the views of Greek secondary school teachers regarding the use of simulations in the teaching and learning of science, aiming to probe the individual factors, positive or negative, that may influence their decisions regarding integrating simulations into their practice. Our preliminary results show that despite the poor technical infrastructure reported by most respondents, teachers display a positive view concerning the use of simulations in science education due to their perceived value in learning. A few teachers display negative views when comparing simulations with traditional laboratories.

## Introduction

In recent years, the Ministry of Education in Greece has invested in training teachers to integrate ICT into the educational process (B-Level ICT Teacher Training). The integration and use of simulations in science classrooms are part of this strategy. Additionally, the educational policy seems to be promoting the use of simulations, as the Ministry's instructions for teaching science suggest their use as supporting material to enhance students' understanding of concepts and phenomena [1]. Moreover, during the pandemic and emergency remote teaching, even more teachers were involved in using simulations [2].

The global educational community recognises the potential of simulation-based education and its benefits for teachers and students [3]. The use of simulations in teaching and learning can improve students' conceptual understanding by visualising abstract scientific concepts [4,5], develop their experimental skills [6], and contribute to increasing students' interest in the course and their positive attitudes towards science [7].

However, despite the positive results of research on the benefits of integrating simulations into teaching at a practical level, their use in the science classroom is more complex. Some of the obstacles frequently reported are the lack of school equipment, teachers' unfamiliarity with the technology and their lack of education and training in specific tools, the limited teaching material/resources, and the time needed to organise a lesson [8,9].

Hence, there seems to be a gap between research data and educational policy on the one hand and educational practice on the other. Moreover, the situation does not seem settled, as new factors may be introduced. It is, therefore, interesting to investigate the current reality.

In this paper, the views of science teachers towards the use of simulations in teaching and learning are investigated. In particular, we are trying to identify key factors that might influence the use of simulations in their educational practice. This is a work in progress.

## Research Methodology

A mixed-methods approach was attempted to investigate the most prominent factors contributing to the formation of secondary school science teachers' views on using simulations. A questionnaire was used for data collection based on similar earlier work of other researchers after being modified accordingly. The questionnaire consisted mainly of closed-ended questions for recording the demographics of the respondents, e.g. age, teaching experience, subjects taught,

school infrastructure, in-service training, etc. It also included some open-ended questions for collecting qualitative data, e.g. "The reason(s) for using / not using simulations in my practice is that ...". The sample consisted of 133 Greek teachers, teaching science to students from 12-18 years old, and is characterised as "convenient", as the questionnaire was shared on social media in several Greek teachers' groups.

## Findings & Conclusions

The results reported here are preliminary, as the analysis of the data is ongoing. The quantitative data and, in particular, the demographic data collected show that the majority of the respondents have participated in in-service training (B-Level ICT Teacher Training). From the qualitative data collected, it appears that the vast majority of teachers express positive views about using simulations, while a few teachers do not wish to use simulations or have never used them.

Teachers who had positive views stated that simulations are an essential tool as they make learning more enjoyable, activate their students' interest, help them understand concepts, and provide many ways of presenting information. This is a very interesting finding since, in addition, significant infrastructure problems were reported in the participants' schools.

In contrast, teachers who said they would not use simulations mostly argue about the "superiority" of conventional laboratory experiments and their contribution to the learning process. Other reasons claimed are that specific preparation is required for engaging students with simulations and the time restrictions of the school program.

In our view, the above-mentioned findings demonstrate the positive effect of teacher training so that all teachers are familiarised with simulations. The training should also focus on presenting the dynamic of simulations as a learning tool that co-exists with the traditional laboratory.

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