



Cyprus  
University of  
Technology

Faculty of Fine and  
Applied Arts

**Doctoral Dissertation**

**ARTIFICIAL INTELLIGENCE IN SMART LEARNING  
ENVIRONMENTS: AN OVERVIEW AND CASE STUDIES**

**Eleni A. Dimitriadou**

**Limassol, March 2024**



CYPRUS UNIVERSITY OF TECHNOLOGY  
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DEPARTMENT OF MULTIMEDIA AND GRAPHIC ARTS

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Supervisor : Andreas Lanitis

Department of Multimedia and Graphic Arts

Professor

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# **Approval Form**

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## **ARTIFICIAL INTELLIGENCE IN SMART LEARNING ENVIRONMENTS: AN OVERVIEW AND CASE STUDIES**

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*«.. And if you find her poor, Ithaka won't have fooled you.  
Wise as you will have become, so full of experience,  
you will have understood by then what these Ithakas mean.»*

Constantine P. Cavafy (1863 – 1933)

This doctoral dissertation is not just the fruit of my personal effort, but it is also the result of the constant support of some very important people. Thus, I would like to thank these people from the bottom of my heart and say how fortunate I feel to have had them by my side to help me during this process. I would like to thank my supervisor Dr. Andreas Lanitis from the Department of Multimedia and Graphic Arts at Cyprus University of Technology who supervised me throughout my work. With his guidance, his useful advice and his emotional support I was able to conclude this dissertation. I would like to thank him, in particular, for his support at difficult times as well as for his immediate response when I needed his help.

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## **ABSTRACT**

This thesis provides a review of research work on smart classroom technologies, with a focus on emerging and Artificial Intelligence (AI)-related technologies. Smart classroom technologies related to the effective class management that enhance the convenience of classroom environments, the use of teaching aids during the educational process and the use of performance assessment technologies are presented. Apart from discussing the range of technological achievements in each of the aforementioned areas, the role of AI in smart learning environments is thoroughly discussed. Furthermore, the development of two automated artificial intelligence systems that aim to address modern education issues and enhance the professional skills of educators are presented.

The first system aims to maximise the interaction between educators and students during tele-education, by monitoring the actions of the students in online courses while protecting as much as possible students' privacy. In addition, as an attempt to assist educators to improve their teaching style, a second system that assesses the body language of educators was developed. Furthermore, the operation, role and impact of these two proposed systems was assessed with comprehensive quantitative and qualitative evaluations. Conclusions derived from this thesis indicate the acceptance of stakeholders for AI-based systems that can facilitate the educational process through the provision of tools that enhance the educator-student interaction, and tools that help educators improve their teaching style.

**Keywords:** *Artificial Intelligence, Emerging Technologies, Smart Classroom, Student Action Recognition, Teaching Style Assessment.*