

Exploring the Educational Transformations: A Systematic Literature Review on the Influence of the Internet of Things in Higher Education

Vasileios Paliktzoglou^{1,*} and Olympia Vlachopoulou²

¹Bahrain Polytechnic, Bahrain

²Chandigarh University, India

Abstract

The rapid growth of the Internet of Things innovations stimulates higher educational institutions to invest in and adopt these technologies to support and enhance their learning and teaching strategies. This study aims to investigate the influence of the Internet of Things on teaching and learning in higher education, performing a systematic literature review. Therefore, this research focuses on the following research questions: R-Q1: What are the benefits of the Internet of Things for teaching and learning in higher education? R-Q2: What are the limitations of the Internet of Things for teaching and learning in higher education? The systematic literature review, including the search strategy, the inclusion and exclusion criteria, and the review of the titles, keywords, and abstracts, identified a total of 31 results, mainly journal and conference articles. The findings from the extracted articles in this review were grouped into eleven themes: adoption, personalized learning, learning efficiency, intelligent teaching, collaboration and connectivity, creativity, health and safety monitoring, latency time, security and privacy, quality and ethics, and financing issues. The findings suggest that the Internet of Things can enhance the learning quality, improve the gained knowledge, and reduce costs in higher education. Therefore, adopting a consistent Internet of Things implementation strategy is essential to address identified limitations in higher education.

Keywords: internet of things, systematic literature review, teaching and learning, collaboration and connectivity, higher education

Received on 01 02 2024, accepted on 30 10 2024, published on 11 11 2024

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doi: 10.4108/eetiot.4999

1. Introduction

According to current predictions, the Internet of Things (IoT) devices will almost triple from 9.7 billion in 2020 to more than 29 billion in 2030 (1). The rapid growth of IoT innovation also stimulates higher educational institutions to invest in and adopt these technologies to support and enhance their learning and teaching strategies (2).

The term Internet of Things (IoT) is coined as "uniquely identifiable objects/things and their virtual representations in an internet-like structure" (3, p. 6125). The primary goal of IoT adoption varies in the field and is to transform every organization's operations (4). Additionally, this aspect motivated educational institutions to develop strategies to

help students and their development while utilizing current teaching methodologies (2). Teaching and learning aim to facilitate physical space interaction, information transmission, or education, and thus IoT innovation should support learners in areas such as personalized learning, interaction, mobility, and accessibility (5–10).

Utilizing the benefits of user-friendliness and connectivity of social networks, the IoT aims to incorporate devices into users' daily lives (11). Thus, integrating IoT innovation in education supports a forthcoming enhanced education that is more connected and collaborative. IoT innovation allows educators to track student's learning progress in real time and improve students' access to learning resources and communication channels (12–14). Incorporating IoT in education enables the use of cutting-edge technologies, the personalization of the teaching and

*Corresponding author. Email: paliktzoglou@gmail.com

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