Flow Experience in Learning: When Gamification Meets Artificial Intelligence in Education

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Abstract. It is still very common that students become disengaged or bored during the learning process by using intelligent educational systems. On the other hand, there is a growing interest in gamification as well as its applications and implications in the field of Artificial Intelligence in Education since it provides an alternative to engage and motivate students, and thereby help students to reach flow state during the learning process. The term Gamification originated in the digital media industry, however, such a term only gained widespread acceptance after late 2010. Since then most of the research on gamification in educational systems was about conceptualization, modelling and impact of use. The goal of this workshop is to provide participants the opportunity to: (i) present and discuss the empirical studies of gamification in Intelligent Educational Systems; (ii) discuss and promote innovative initiatives in educational settings with the use of gamification; and iii) motivate and solidify the research on gamification of intelligent educational systems in order to leverage the development of such systems.

Keywords: Personalization, Intelligent tutoring systems, Game design

1 Introduction

Artificial Intelligence in Education (AIED) is an interdisciplinary field that integrates researchers with different backgrounds (Computer Science, Engineering, Education, Psychology, instructional design and others) but with a common goal: to use AI techniques to support personalized learning experiences where students can work mediated by technology and learn more effectively. The support of robust learning is a complex issue due to many factors (e.g., psychological, technological, personal, instructional, etc.) that affect learning processes and hence, the learning outcome. To tackle this problem, researchers in the field have always been innovative. Through the analysis of different learning settings, researchers have found ways to integrate major advances in Artificial Intelligence, Learning Sciences, Experimental Psychology, Human-Computer Interaction and other areas to leverage the development of Intelligent Educational Systems. For teachers, an intelligent educational system offers better ways to create/reuse/share content, new methodologies and instruments to deploy effective learning activities and accurate tools (e.g. dashboards) to analyze students' progress throughout the learning process. For students, it allows for presenting the content in an intelligent and adaptive fashion, which enables the restructuring of learning content according to students' needs and stimulates the occurrence of deep and long-term understanding.

Nevertheless, it is still very common that students become disengaged or bored during the learning process when using intelligent educational systems [1]. To deal with that it would be interesting to investigate how to design environments that lead students to flow state, i.e. environments where students are fully immersed and engaged in the educational activity. In this direction, there is a growing interest in gamification as well as its applications and implications in the field of AIED since it provides an alternative to engage and motivate students during the process of learning [3, 5].

The term Gamification originated in the digital media industry, gained widespread acceptance after late 2010, and it refers to the use of game design elements such as mechanics, aesthetics, and game thinking in non-game contexts aimed at engaging people, motivating action, enhancing learning, and solving problems [2]. Indeed, gamification research has increase in significance in the past six years and shows no sign of slowing growth. The first wave of gamification research has predominantly consisted of (1) definitions, frameworks and taxonomies for gamification and game design elements; (2) technical papers describing systems, designs, and architectures; and (3) effect and user studies of gamified systems [4]. Such phenomenon also occurred in the context of education. Few studies presented empirical solutions and even fewer in the context of artificial intelligence in education [2].

If the first wave was held together by fundamental questions of "what?" and "why?", the current wave is asking differentiated questions around "how?", "when?", and "how and when not?" Thus, the goal of this workshop is to provide participants the opportunity of: (i) present and discuss the empirical studies of gamification in Intelligent Educational Systems; (ii) discuss and promote innovative initiatives in educational settings with the use of gamification; and (iii) motivate and solidify the research on gamification of intelligent educational systems in order to leverage the development of such systems.

We are particularly interested in scientific and technological advances in the combination of gamification and intelligent educational systems that can help learners to achieve flow state. It is also on the scope of this workshop studies about gamifying intelligent educational systems and equipping gamified educational systems with AI techniques to improve learning experiences. The topics of interest include, but are not limited to: Quantitative studies on psychological and behavioral consequences of gamification design of intelligent educational systems; Qualitative studies that explore how gamification affects education; Novel approaches of designing gamified intelligent educational systems; Real-world Innovative solutions about gamification of intelligent educational systems; Theoretical contributions regarding societal impacts and ethical issues of gamification of intelligent educational systems; and so on.

During the workshop we intend to provide thought-provoking discussions about the quality of research on gamification and intelligent educational systems and we expect (i) to build a community of researchers and practitioners around the best practices for the implementation of gamification in intelligent systems in education; (ii) to understand game elements and/or game design thinking behind gamified strategies in the context of intelligent educational systems; (iii) to inform about the future of gamification and intelligent systems; and (iv) think about new propositions about how to integrate scientific impact into social and economic development through the research on gamification of intelligent educational systems.

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