

Gamification in Education

Subjects: Others

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Gamification, or gameful design, refers to the strategic application of game design principles, mechanics, and elements into non-game environments. It is often facilitated using digital platforms, aiming to solve problems, increase engagement, and motivate individuals towards their goals. The technique fosters a gameful and interactive experience, enhancing perceived autonomy, competence, and relatedness among users. With roots in fields like education, business, marketing, and services, gamification is a versatile tool that serves to enrich user experience and create value in a multitude of settings. The widespread impact of gamification across various sectors has transformed traditional methods of engagement, notably in education.

Keywords: gamification ; education ; mixed reality ; metaverse ; serious games ; engagement ; motivation

1. Introduction

Play is a fundamental human practice that can spark curiosity and facilitate skills acquisition and behavioral change. Fundamental research in the field of affective neuroscience has revealed seven basic emotions that humans share with other mammals ^[1]. Several of these emotions are quite expected and part of everyday life and activity, such as fear, anger, and care. Two of these emotions are quite surprising and of special interest to education: exploration (seeking) and play ^[1], with each one of these being essential elements of games. Games can be defined as rule-based systems of meaningful choices towards desirable goals. Games such as sports and board games have been the staple of ancient human civilizations ^[2].

Gamification was first coined in 2008 by Shirky and Terrill ^[3]. Gamification stems grammatically from the verb gamify, which was presumably first used by Richard Bartle in his work on the first Multi-User Dungeon (MUD), one of the first computer-generated gameful and social virtual worlds ^[3]. Gamification (or gameful design) is one popular motivation enhancement method ^[4]. Other methods include playful design (or playification), toys, and serious games. Playful design is a quick and simple method to integrate elementary game attributes or aesthetics in a non-gaming educational context for attention and interest enhancement ^[5]. It relies upon simple qualitative elements, such as themes, narratives, characters, and metaphors ^[6]. Toys are self-contained objects that can be utilized for playful purposes. One toy-based method is Lego serious play ^[7]. Serious games are games with a purpose beyond entertainment. Serious games in education constitute complex systems with goals, rules, and game mechanics that merge gameplay with learning ^[8]. One example of serious game type is the serious escape room or educational escape game ^{[9][10]}.

Importance and Impact

The integration of gamification techniques into various sectors of the economy and society has been a notable trend. A systematic review has revealed that the domain of education and training emerges as a primary area where gamification is both implemented and researched extensively ^[10].

Within the educational landscape, gamification's potential for transformative impact extends beyond merely making learning 'fun'. Research suggests that well-designed gamified environments can foster a range of cognitive and emotional benefits, such as enhanced problem-solving abilities, collaborative skills, and resilience in the face of challenges ^[11]. Further, gamification can be particularly potent in nurturing intrinsic motivation, thereby contributing to long-term engagement and learning gains ^{[12][13]}.

As an instructional approach, it extends to various disciplines (science, technology, engineering, mathematics, arts), with each employing unique mechanics and reward systems tailored to the learning outcomes of the discipline ^[14]. Indicative examples include point-based grading systems ^[15]; leaderboards for academic achievements ^[16]; and even more intricate constructs, such as game-based learning platforms that simulate real-world scenarios ^[17]. Beyond K-12 education,

gamification has also infiltrated higher education and professional training environments, where interactive online courses often employ game elements to enhance learner commitment ^{[18][19]}.

Given the multidimensional benefits and versatile applicability of gamification in various educational contexts, the present work delves into the critical elements that contribute to the effective integration of gamification in education educational settings.

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