

Contents lists available at [ScienceDirect](#)

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Participatory methodologies to promote student engagement in the development of educational digital games



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ARTICLE INFO

Article history:

Received 11 April 2017

Received in revised form 12 September 2017

Accepted 13 September 2017

Available online 14 September 2017

Keywords:

Interdisciplinary projects

Learning communities

Media in education

Secondary education

Teaching/learning strategies

ABSTRACT

Engagement is a fundamental condition for learning, which the outdated educational system is failing to sustain for the current generation of students, born in a world permeated with digital technologies. This article presents an analysis of high school students' engagement while playing the roles of programmers and designers of educational digital games in the Community of Practice of the DEMULTS project, which aims to provide an alternative within the traditional educational system. Data collection was performed within an ethnographic approach with participant observation, questionnaires and social network interaction, and analysis was based on the constructs of Activity Theory. Four groups of students were identified with similar needs and motivations, each engaged at different levels according to the nature of the tasks, interaction with peers and educators, and personal expectations. Results reveal that, even in a supposedly fun and innovative context, the relationship between the object of the activity and the students' needs is crucial to promote engagement and learning. Identifying and taking into account students' needs and expectations is reinforced as an indispensable step in educational interventions.

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1. Introduction

Despite the boom of information and communication technologies (ICT) designed for and/or used in education in the last years, the dominant paradigm of the educational system worldwide has not changed: it remains fundamentally based on transferring knowledge to passive learners, consisting of a structure lacking democratic principles, where contents and methods are imposed by teachers on students. Technologies have been simply aggregated to this outdated structure, regardless of the radical changes they have provoked in people's lives. The discrepancy between the classroom and the world 'out there' has been aggravated as the first generations of learners born in the ICT era entered school, many of them bringing along new ways of processing, searching and dealing with information (Prensky, 2006). The need for approaches that are more appropriate for the current generation of learners has become too evident to be denied.

Several authors (Prensky, 2006, 2008; Lim, 2008; Vos, Meijden, & Denessen, 2011; Yang & Chang, 2013) highlight the potential of digital games as one of the most promising innovative approaches for children and adolescents' education

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nowadays, as the games 'speak their language' and are part of their lives, besides being associated with fun, immersion, sense of belonging to a community (of gamers), motivation and engagement. Reinforcing the potential of games, the concept of engagement has attracted growing interest as a way to improve academic achievement and reduce boredom in the classroom (Fredricks, Blumenfeld, & Paris, 2004). Currently, many initiatives - such as the democratisation of the school environment to encourage participation - explicitly or implicitly focus on engagement, seeking to increase learning and decrease evasion in schools. School engagement can be promoted by interpersonal relationships, intellectual endeavours and opportunities to share knowledge. Engaged students seek information, are willing to participate and actively collaborate (Fredricks et al., 2004) - and these are aspects easily identified in teenagers playing digital games for fun. However, the integration of educational games to 'real', everyday classes hardly ever goes beyond the instructionist paradigm (Valente, 1997) of conveying information and verifying students' answers, once more conforming to the system in vogue (Lim, 2008).

DEMULTS is a longitudinal, school-based research project (Educational Development of Sustainable Multimedia) envisioned as an attempt to encourage schools to move away from traditional paradigms. It integrates learners as active agents in the development - not only the use - of educational digital games in the school context, through participatory design and end-user programming, placing learners in the position of decision-makers and autonomous creators of the games. According to Lim (2008, p.1002), "If educators design learning experiences based solely on their own vision, goals and circumstances, they may be merely imposing their set of values upon their students; engaged learning is unlikely to happen in such an environment. (...) It is only when students are empowered to take charge of their own learning by co-designing their learning experiences with teachers and other students that they are more likely to engage in their learning process".

Previous findings from projects involving game development by students show evidence of enhanced academic achievement (Yang & Chang, 2013), development of logical thinking and problem-solving competencies (Vos et al., 2011); critical thinking (Yang & Chang, 2013); student empowerment (Triantafyllakos, Palaigeorgiou, & Tsoukalas, 2011); and engagement (Robertson & Howells, 2008; Vos et al., 2011). However, particularly regarding the scope of this article, analysis of engagement is mostly superficial and short-term, making it subject to the novelty effect bias. We present a longitudinal analysis of engagement in the DEMULTS project, framed by the constructs of Activity Theory.

Activity Theory (Leontiev, 1972, 1978) guides the construction and understanding of the DEMULTS process of development of digital games overall, aiming to reveal aspects of knowledge construction and mediation that cannot be observed through abstract and behaviourist models. The social practice experienced in a community and organised in a school context is a concrete phenomenon, an intersubjective and dynamic system, whose daily processes are interconnected with the environments and particular operations of the process. In this theory, there is a disruption of the dichotomy involving individuals and society, for Leontiev extends the psychological relationships within the activity to a more aggregated model, that considers human needs, their motives and conditions, as being part of the activity structure.

Aligned with this argument, the approach taken in this research project treats cognition as a cultural-historical process. The cultural-historical perspective, based on the ideas of Vygotsky, Luria and Leontiev early in the twentieth century, was reinforced from the 1980s by studies of situated and distributed cognition (Hutchins, 1991; Lave & Wenger, 1991; Lave, 1988; Suchman, 1987). Strengthened by these approaches, this work understands human learning in close relationship with others and with the use of artifacts. Therefore, although the methodology is anchored in Activity Theory, it has in the concepts of Communities of Practice (CoP) (Lave & Wenger, 1991) its cornerstone, according to which learning is an aspect of social practice, directly related to the actions of individuals in a context, and based on co-participation. The main idea on this approach is the relationship between beginners and veteran participants (here called novices and experts), but it also considers aspects of the activity itself, of the identity processes and of the artifacts in the CoP. Thus, there is a structure of participation in which individuals acquire skills through their concrete engagement in the process.

This article presents an investigation of the aspects that increase or decrease engagement of learners throughout the development of educational digital games, analysing them as novice members of the DEMULTS CoP taking place at their own school. Engagement is analysed in terms of the object of the activity and the needs of the novices, as Activity Theory constructs. The article is organised as follows: initially, the theoretical underpinnings of DEMULTS are presented, as well as the methods that are used to structure the practical activities (Section 2). Then, the discussion on engagement in educational contexts is deepened in Section 3, drawing from central considerations of the cultural-historical perspective. The phases of a DEMULTS cycle are described in details in Section 4. Section 5 presents the method for data collection and analysis, followed by the derived findings on engagement (Section 6). The article ends with closing remarks and potential routes for future research in Section 7.

2. Theoretical frameworks of the DEMULTS project

DEMULTS is a transdisciplinary research project which takes place in a public secondary school since 2011, and investigates the relationships between learning and technology within a process of development of educational digital games by a CoP. Aiming at making students develop games that include curricular contents, but are more motivating for them than the average games known as 'educational', DEMULTS adopts participatory design (Bodker, Ehn, Sjögren, & Sundblad, 2000; Ehn, 1988) and end-user programming (Barbosa, 1999; Morch, 1997). From an educational point of view, DEMULTS aims at promoting learning of curricular contents included in the games, but also abilities of game development, i.e. graphical design and programming (the latter of which enables the development of computational thinking (Wing, 2006), considered an essential ability in the contemporary society). The theoretical basis on which the methodology of DEMULTS was conceived and is

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