



# MIDI-AM Videogame Usability in Virtual Learning as a Digital Pedagogical Tool in Emerging Economies

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## ABSTRACT

This article analyzes educational video game usability as a pedagogical support tool in primary early childhood education, particularly in virtual environments of emerging or developing economies. The MIDI-AM series of educational digital games is used as a case study that focuses on learning by playing using technology. The study examines the degree of usability, applicability, and relevance of these serious games as pedagogical tools in educational virtuality, identifying opportunities for improvements and designing a practical methodology to evaluate them as part of the teaching-learning process. A triangulated analysis is carried out with mixed methods, evaluating data generated in a control panel of MIDI-AM applications, focus groups with teachers and parents of local schools, and user satisfaction questionnaires. The results regarding usability and relevance of the applications were primarily positive. However, certain shortcomings in these application structure and possible opportunities for improvement within the educational context applicability were also identified.

## KEYWORDS

Developing Countries, Educational Technology, Primary Education, Serious Game, Teaching Innovation, Triangulation Analysis, Virtual Learning

## INTRODUCTION

Nowadays, technological development has allowed new tools to promote education globally and satisfy needs that traditional methods have not met (Balmaceda, Almeida, & Galeano, 2021). The use of technology has created an implicit need for innovation for the scientific and academic community to develop projects that improve society's general situation. Therefore, research in the educational field tends to offer contributions that allow us to investigate different topics. For example, studies on child-centered education stressed the need to be concerned about children's autonomy or create their own learning spaces and resources. In this sense, it is essential to personalize resources, differentiated

according to the children's needs in instructions, resources used, and content adaptations (Kucirkova, 2019). For example, serious game developers should consider the importance of children finding the content attractive and having fun with it, reviewing the age of the children closely. They should know these types of video games as mobile applications, being products for tablet use, so they must consider tactile gestures during use. Children aged 4 to 5 needed more hints and help from adults to interact successfully with the touch screens, while children aged 5 to 7 quickly learn typical gestures, which ensures that they solve the game levels more quickly (Samarakoon, Usoof, & Halloluwa, 2019). These types of studies allow a better understanding of a particular phenomenon from the knowledge generated in previous studies about educational digital game satisfaction and usefulness to seek improvements and social transformations in favor of children (Pérez, 2011).

In this sense, there are currently investigations about video games presented as mobile applications that have been developed specifically for use in the educational area. These video games are also known as serious games or educational digital games. For these games to reach a context of educational support, their use must start from the relationship between the message they emit, the universe they recreate, and the player and the ability to interpret the contents for which they are created (Marín, 2011).

According to Marín and Martín (2014), there are several advantages to granting this entertainment tool an educational value; if the negative aspects are left aside, this can be another resource in developing teaching-learning processes. In this way, it is possible to design didactic and innovative methodologies in line with today's students' reality. Recent studies that align with this thinking seek to provide game-based learning tools and materials for students to achieve more meaningful knowledge with hands-on activities (Hsu, Abelson, Lao, Tseng, & Lin, 2021).

Therefore, there is a direct relationship between using digital games as a game itself and as a pedagogical resource in the classroom and formal education. The game has become a training of skills through which it is possible to understand and assume the values of the society in which one lives (Gallardo & Gallardo, 2018). That is, although there are several learning tools, the use of a game-based methodology allows the development of desirable skills in the curriculum of the ministry of education, also as a motivation to carry out school activities, reflecting an evident correlation between usability and usefulness of the game in the classroom.

Likewise, it should be noted that the integration of ICT in the stage of primary education is conducive to students; especially in this period of compulsory virtuality to which many countries have had to adapt due to the pandemic effects of COVID-19 influencing the rapid development and implementation of virtual curricula (Gelineau-Morel & Dilts, 2021). Moreover, with the use of ICTs and the management of educational games, it is possible to obtain a more active and autonomous role in which they learn to collaborate with a more significant initiative than those not exposed to this type of tool (López, 2012). Also, current digital tools respond to the concept of multitasking, so visual and auditory notifications that can be used as applications on the smartphone help to capture the student's attention during the time of the study activities planned by the teacher (Amez & Baert, 2020).

Therefore, it is remarkable the usability and usefulness of the game. In particular digital games, based on the resources available, are addressed in different learning scenarios, inside and outside the classroom, with the help of the teacher or the parent correspondingly. Then, considering these scenarios, it is necessary to analyze their applicability in a natural context within the educational process. Many of these countries suffer mainly considering the differences between academic institutions and individuals in emerging or developing countries such as Ecuador, given the possible lack of quality, accessibility, and openness to technology. Although there are several initiatives in the development and improvement of technology transfer in institutions, it is recognized that the lack of public policies does not always give the expected results due to the slowness in the adaptation of technology (Alalwan et al., 2020).

This research focuses on examining usability aspects of MIDI-AM series video games as a case study on the effectiveness of using complementary pedagogical digital tools. Tools identified as

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