

Chapter 4

Influence of Game-Based Methods in Developing Engineering Competences

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ABSTRACT

This research aims to understand the influence of game-based learning methods on engineer competences. Competencies expected from an engineer, which competencies are commonly explored by game-based learning methods, and perceptions from a sample composed of 92 respondents about the question that drives the research are explored. All competencies analyzed had more positive influence responses than negative ones, or non-impact responses. The competence analyzed most positively is “problem solving”; the one with the most negative impact responses is “second language learning,” and the one with the most non-impact responses is “continuous search for career improvement.” This study fills the following gaps: compiles and analyzes articles on game-based learning methods and carries out unprecedented research regarding the influence of game-based learning methods on the professional competences of graduates of engineering courses.

INTRODUCTION

One of the main goals of undergraduate institutions is to improve the quality and efficiency of education and to improve the professionals who will graduate. So moreover than developing just technical and

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theoretical knowledge required of graduating professionals, it is necessary the activation of cognitive and learning competences (Liuta et al., 2019) - according to (De Jesus & Costa, 2013), it is also a need in forming engineers. In the other hand, according to (Hamari et al., 2016), it can also be noted that student disinterest is an international problem because, once 20-25% of them classified themselves as having low participation and a low sense of belonging, as discovered in a research in 28 countries members of the Organization for Economic Co-operation and Development (OECD). Taking in mind that more than 2.5 billion people in the world spent time playing video games (SuperData Research, 2019), many have wondered why not change this problem to this solution.

So, there is an expectative about the game-based teaching and learning contribution to improve student engagement, increase teamwork and improve student motivation in the disciplines. According to (Liuta et al., 2019). the introduction of game-based learning methods, increases the interest and understanding of engineering students and even improves their capacity of self-learning. Based on all these statements, the main objective of this paper is to answer the question: **In what degree are engineers' professional competences influenced by game-based learning methods?** This core question, and its related central objective were deployed in secondary ones. Table 1 shows the connection among them and the research steps addressed in the research, while Figure 1 summarizes the flow of the research steps mentioned in Table 1.

Table 1. Questions, objectives and research steps

Questions addressed	Objectives	Research steps
What are the professional competences developed by game-based methods?	Identify the competences developed by game-based methods within the literature.	Analysis of competences that are developed by game-based methods in the literature.
What are the competences expected of an engineering professional?	Identify what competences are expected of an engineering professional, in Brazil and worldwide.	Analysis of the competences expected of an engineering professional.
Based on the results of the literature, is there an expectation of an association between the competences worked by the game-based learning methods with those expected from an engineering professional?	Analyze what competences required of engineers are being developed by game-based methods.	Association of the results of the two previous questions.
What is the degree of influence perceived by users of game-based learning methods (teachers, students, and coordinators) on the expected competences?	Map users' and appliers perceptions in the degree of influence of game-based learning methods on the competences they develop.	Analyze from the perspective of users, both game developers and participants, to what degree these competences were developed within the scenario they participated in.

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