


## Chapter 8

# The Benefits of Wolfram Alpha Tool Applied to Interactive Learning Environments in STEM Education

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### ABSTRACT

*The present chapter propose aims to show the benefits of using an interactive learning environment as a way of promoting greater engagement and consequently improving student performance. In this chapter, the benefits of using the Wolfram Alpha tool applied to interactive learning environments in STEM education will be shown. The quantitative and qualitative results obtained during the research showed the students' preference for classes in which the Wolfram Alpha tool was used allied to traditional teaching. Regarding performance, research has shown that these classes can increase students' academic performance by up to 35%. A tutorial about how to teach the students using the Wolfram Alpha tool will be shown.*

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## **INTRODUCTION**

The object of this chapter aims to show the benefits of using an interactive learning environment as a way of promoting greater engagement and consequently improving student performance. In this chapter, the benefits of using the Wolfram Alpha tool applied to interactive learning environments in STEM education will be shown. The quantitative and qualitative results obtained during the research showed the students' preference for classes in which the Wolfram Alpha tool was used allied to traditional teaching. Regarding performance, research has shown that these classes can increase students' academic performance by up to 35%. A tutorial about how to teach the students to use the Wolfram Alpha tool will be also shown.

The study of the tools and methods focused on the improvement of the academic performance and the engagement of the students can bring relevant information to the development of new technologies and research. According to PISA 2018 (Programme for International Student Assessment - 2018) BRASIL (2020), Brazilian students have shown low levels of learning since 2003 and still haven't presented relevant improvements. The PISA report evaluates the abilities of 15 years old students in solving problems related to daily life. The difference in the score of the students who took the test in 2003 (356 points) and 2018 (384 points) was 28 points. Despite the enhancement in the indicators, there was no significant growth in the average score which was 7.87%, in 15 years. Considering the history of test application, occurred in the years of 2003, 2006, 2009, 2012, 2015 and 2018, the highest historical average was registered in 2012, with 389 points. In a 15-year period, the average score of Brazilian students has not left the first level of learning. The second level has a minimum score of 420 points. According to PISA 2018 BRASIL (2020) 10% of Brazilians with the highest scores in Mathematics have reached an average of 501 points, equivalent to level three of a scale that goes up to 6 and the lowest 10% have reached an average of 277 points, staying below level 1 of learning (minimum 358). The table 1 shows the results reached by Brazilian students in the 2018 evaluation. On the scenery presented by PISA 2018 BRASIL (2020) the results of Brazilian students can be divided according to the administrative dependencies of the school's shown in table 2, where Municipal schools are highlighted for having the lowest averages.

This chapter analyzed the efficiency and effectiveness of three methods by evaluating the engagement, measuring the academic performance during this process and the preferred method for each student involved, it is important to highlight that using the preferred method by the students, during class, can work as one of the factors responsible for increasing the engagement and allowing improvements in their academic performance. This study contributes to STEM education by comparing different teaching methods and the academic performance obtained with each one of them. This research was carried out in three classrooms with 90 students with

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