DIFFICULTIES IN THE RESOLUTION OF TASKS ON THE BASICS CALCULUS CONCEPTS

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The importance of Calculus and the difficulties in understanding its basic concepts have motivated the development of numerous investigations that address different aspects of this problem from various theoretical approaches. These studies indicate that the construction of the understanding of the concepts of Calculus is limited to the routine application of the algebraic rules in situations of artificial contexts or purely symbolic (Kouropatov & Dreyfus, 2014). Orton (1983) mentions that this practice causes a set of errors and difficulties observed when comparing students' performance when they solve routine problems versus those requiring a conceptual understanding.

In this study, we focus on the visible, namely, in analyzing the errors that students make to identify possible difficulties. For this, we consider the framework proposed by the APOS theory (Arnon et al., 2014), which has been operationalized through the use of mathematical elements and the logical connections that students establish when they solve tasks on the concepts of derivative and integral. The participants of this study were 40 first-year engineering students. The data were collected during the second semester of 2019 and correspond to the students' productions obtained from the application of a questionnaire, which was made up of 6 tasks that address different aspects related to the derivative and integral. We analyzed the answers regarding the mathematical elements and logical relationships connected by the students in their resolution process. From this, we established and interpreted the errors categories using the theory. The results show that there are difficulties associated with the construction of reversal processes that is manifested in a large number of errors associated with the use of logical equivalences between mathematical elements

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