

Intensive Use of Software in Teaching and Learning Calculus

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Abstract : Despite serious difficulties in the assimilation of the conceptual system of Calculus, software in the educational process is used only occasionally, and even then, mainly for illustration purposes. The following are a few reasons: The non-trivial nature of the studied material, Lack of skills in working with software, Fear of losing time working with software, The variety of the software itself, the corresponding interface, syntax, and the methods of working with the software, The need to find suitable models, and familiarize yourself with working with them, Incomplete compatibility of the found models with the content and teaching methods of the studied material. This paper proposes an active use of the developed non-commercial software VusuMatica, which allows removing these restrictions through Broad support for the studied mathematical material (and not only Calculus). As a result - no need to select the right software, Emphasizing the unity of mathematics, its intrasubject and interdisciplinary relations, User-friendly interface, Absence of special syntax in defining mathematical objects, Ease of building models of the studied material and manipulating them, Unlimited flexibility of models thanks to the ability to redefine objects, which allows exploring objects characteristics, and considering examples and counterexamples of the concepts under study. The construction of models is based on an original approach to the analysis of the structure of the studied concepts. Thanks to the ease of construction, students are able not only to use ready-made models but also to create them on their own and explore the material studied with their help. The presentation includes examples of using VusuMatica in studying the concepts of limit and continuity of a function, its derivative, and integral.

Keywords : counterexamples, limitations and requirements, software, teaching and learning calculus, user-friendly interface and syntax

Conference Title : ICIME 2023 : International Conference on Innovations in Mathematical Education

Conference Location : Tokyo, Japan

Conference Dates : November 13-14, 2023