Review of: "On the Impact of Technology on University Analysis"

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Potential competing interests: No potential competing interests to declare.

A very interesting paper. Relevant topic, yet requiring sound contributions dealing with specific issues, such as the one addressed in this article: quantitative evaluation (by performing some experiments with students) of the benefits of using dynamic mathematics software in first-year university math analysis courses.

The paper is very well structured (precedents, goals, methodology, experience description, analysis of results, conclusions). It deserves a detailed reading by interested readers.

Some comments. The title of the paper refers to “the impact of technology,” but then it is clear that it focuses only on the use of dynamic mathematics software, more precisely, on GeoGebra. It is evident that there are other technological tools (e.g., ChatGPT, Maple,…) that could be (maybe) used for teaching Calculus and are not even mentioned in this paper…I think the title should be more precise in this respect.

Moreover, actually, the paper seems to focus on the use of GeoGebra for plotting equations and inequalities and visualizing functions. That is, as an instrument for demonstrating graphically certain tasks. It is not clear in the paper if this is all the technology that has been used. I mean, GeoGebra is --as described by the author-- a dynamic mathematics software, including computer algebra, symbolic computation, dynamic geometry tools…and it seems none of these features have been considered in the experience as technological resources for the teaching of the Analysis course. This limitation (intentional or not) should be considered and discussed in the paper…

Another surprising issue that needs, in my opinion, further explanation is the content of the First Study (dealing with Logic through the plotting of polynomial inequalities). In general, the teaching of simple boolean operators, de Morgan laws, etc., is not considered as part of Analysis, but of Logic or (in some sense) of Algebra…Bearing in mind that the paper only considers two studies, why half of the studies, the first one, has so little to do with Analysis, so little to do with “dynamic” mathematics technology?

Finally, regarding the conclusion, “using GeoGebra can improve students’ understanding of the mathematics of the Analysis I course”…it is not clear to me. Perhaps the students who decided to use GeoGebra in the experience were students who, in general, perform better in mathematics (with or without GeoGebra)…I do not see clearly in the paper how this factor has been analyzed.

References are a little bit old (twenty references in total, the most recent is 2018, then one from 2017, three from 2016,

two from 2015….and older).

Some typos:

> First paragraph of the Introduction: the reference “Hohenwarter, 2019” does not exist in the References; may you refer to “Hohenwarter, 2018.”

> First paragraph of the Literature Review: please review “Selden <& Selden.”

> References:

>>“d’Azevedo Breda, A. M., & dos Santos, J. (2015).” should be

“ Breda, A. M., & dos Santos, J. (2015).”

(please confirm by looking at https://orcid.org/0000-0001-7076-707X)

>>"Hohenwarter, M. (2018). GeoGebra. https://www.geogebra.org/"

Why 2018? GeoGebra creation took place much before, and, on the other hand, the web page is not made by Hohenwarter. I think if you want to refer to the origins of GeoGebra, you could mention

M. Hohenwarter. GeoGebra. Ein Softwaresystem für dynamische Geometrie und Algebra der Ebene. Diplomarbeit zur Erlangung des Magistergrades an der Naturwissenschaftlichen Fakultät
der Paris-Lodron-Universität Salzburg. Salzburg, Februar 2002.

Accessible at: https://archive.geogebra.org/static/publications/diplomarbeit_geogebra.pdf

>>"In: G. Hana & M. de Villiers (Eds.)," should be

“In: G. Hanna & M. de Villiers (Eds.),”

(please confirm by looking at https://link.springer.com/book/10.1007/978-94-007-2129-6)

>> In general, concerning the references, I miss some more detailed information. For example, “*Proceedings of PME 20*, Valencia” could be “*Proceedings of the 20th Conference of the International Group for the Psychology of Mathematics Education (PME),* Valencia, Spain”.

Same for references including CERME…