

Review of: "Effects of Teachers' Professional Development on Students' Academic Achievement"

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Potential competing interests: No potential competing interests to declare.

This Review was done with colleague Claudia Figureido from University of Aveiro (Portugal).

The study addresses a relevant topic, namely the complex relationship between the teacher professional development and its' impact (or not) on students learning outputs. It is focused on a specific domain – mathematics education – and context (Nigeria). It has potential, but in our opinion some central aspects need improvements: (i) Title, abstract and keywords: These elements of the manuscript constitute the 'showroom' of your study to the world, it would be important to signal already in these elements the focus – education in mathematics and the specific context – Nigeria, to the potential readers. Regarding the results referred it is more important to be clear about what it means than to add the statistical notion. The author will have space in the method and result part of the article to detail the analytical part. In the abstract it is critical to focus on the main aspects of the study, the results and discussion. Have in mind that keywords and elements of the title should be complementary and not the same to maximize the probability of other colleagues with the same research interest to find your study; (ii) 'Introduction' ('first section – no specific title): references, either scientific or official, for several statements/argumentation are missing. If not available it is important to be explicit that the statement is based on the personal experience or inference of the author. It is critical to signal this to the reader mainly for 2 reasons: to exclude the reasoning that the author have not done an adequate/complete literature review; 2 – to highlight (if there is the case) the lack of evidence or scientific studies regarding mathematics education (in low income countries contexts). We would suggest the following article as an example: Guthrie, G. Classroom Change in Sub-Saharan Africa in Foundations Classroom Change in Developing Countries, Volume 1: Evidence; Gerard Guthrie. Available online: <https://www.researchgate.net/publication/349094827> (accessed on 30 April 2021); (iii) Hypothesis, research design, sample and sampling technique: information about the workshop per se would be important as it would frame the results, the discussion and improve the possibility of more sustained recommendations (yes, teacher training is important, but how? How many hours, which methodology? Etc.). It would be critical to frame the problem considering what are the variables of interest and use the variables of interest when writing the hypotheses. Pretest or post-test scores are related to specific study variables, and it is more clear to the reader to have it plainly addressed in the hypothesis. The research design must be written in a more detailed format. The control group had a treatment (what it is defined as X2?). The observations have been different (O1, O2, O3, O4)? If not we do not use different numbers to represent it. Is it really a post-fact design? The treatment was implemented and assessed, so why is it a post-fact design? Sample and sampling technique: What is it meant by cluster meeting? It is important to have a representation of the sample procedure. The sample and the analysis are focused on students so it would be important to have some data on the students grouped by

teachers' characteristics. One variable to be controlled in the study is the effect of the teachers. In this case, the characterization of the teachers is very important. Regarding the selection of the control sample, how was the pairing of teachers and students assured? A descriptive characterization (ex., age, gender, school year or in the case of teachers, age, gender, number of teaching years, academic training) is relevant for the reader to have a more comprehensive understanding of the participants and the extrapolation of the results. How were the students divided since the teachers were teaching the same classes? (iv) Instrumentation and methods of data collection: In this section, it would be important to be more clear about the type of achievements was measured, if it was an assessment different from the regular assessment if this assessment had impacted the final score of the students; (v) Data analysis: The results would be more understandable if they were focused on the variables of interest than on the statistical procedures. The author can add an analytical procedure section in the method, depict the procedures and explain the assumptions and decisions for statistical analysis. In the result section the results may be presented focusing on the rewriting of the hypothesis and the variables that are to be explored in the discussion. The scale of the test should be explain in order for the reader to have a better understanding of what the means represent. The comparison between the two groups and the two observations should be relay on an ANCOVA or at least an explanation about not choosing the usual procedure. The rational for some of the analysis needs to be better explained, for example, what it means to compare results from experimental students' pre-achievement scores with control students' post-achievement scores; (vi) Discussion and findings: It is critical to explain the results focusing on the variables of interest, and explain better what type of achievement the study is approaching.