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

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Effects of Teachers' Professional Development on Students' Academic Achievement evaluates the effects of teacher cluster meeting workshops organized by the Nigerian government on students' mathematical achievement. The authors clearly state their research purpose, use appropriate methods to identify experimental and control subjects, conduct a quantitative statistical analysis of student pre- and post-test scores, and report the findings from these scores. The data, analysis, and findings align well with the purpose of the research. Generally, the conclusions are consistent with prior research. There are omissions about the theory supporting the research, the professional development program the teachers participated in, and the assessment tool that constitutes the data that need to be addressed in order for the methods and conclusion of this research to be valid.

Regarding the theory supporting the research, the paper reviews many research findings about the impact of professional development on student achievement. The authors correctly note that the results of professional development are mixed: some results show improvement, some show no change, and some show a decrease in student achievement. Two items are not addressed in the background and theory. First, because this research focuses on professional development for teachers in mathematics, the background and theory should be more direct in describing research findings and theory on professional development in mathematics. For example, the research statement in the abstract reads, "This study, therefore, evaluate the effects of teacher cluster meeting workshops organized by the Nigerian government on students' achievement." This research statement does not indicate any focus on mathematics. Second, the reason that research findings on professional development in mathematics vary is because there are numerous factors that impact the outcomes of professional development including taking a systemic approach; articulating goals; involving participants in decision making; using a well-defined theory of learning; accounting for the contexts of teaching; building support with educational leaders; type of participation, duration, and support; identifying research-based strategies to be used in the professional development; and using formative and summative assessment of the professional development for ongoing improvement and outcomes (Little, 1993; Loucks-Horsley et al., 2010; NCTM, 2000; Walker, 2016; Walker, 2019). The paper should include information about the standards for reporting mathematics professional development in research studies (Sztajn, 2011) in the theory and in the description of the professional development (see next paragraph). Much of the variation in outcomes of research on professional development in mathematics can be accounted for by the standards for reporting.

The professional development program that teachers participated in is not described in this research. Be sure to note that

this was specific to teachers for mathematics. In addition, a description of the professional development should be provided such that the standards for reporting are addressed (Sztajn, 2011) and the alignment of the professional development activities with research on effective practices (Loucks-Horsley et al., 2010; Walker, 2016) can be judged by the readers. For example, what were the goals and learning objectives for the professional development? How long was the professional development? What types of activities did the teachers do? Did the professional development align with the curriculum used by the teachers? What pedagogical approaches were taught? How was ethics addressed during the professional development?

With regard to the theory of continuous improvement used in the research, more information about how this theory relates to the research question and how it was used to organize the research would improve a reader's understanding of the methods and conclusions. Also, APA formatting is not followed and some references are difficult to find.

Finally, more information about the instrument used for the students' achievement scores is needed. Better information is needed about when the pre- and post-tests were administered. Can the authors describe how many days there were between the pre- and post-tests? Also, how many days were between the end of the professional development and the post-test? In addition to the timing of the tests, there is a lack of information about what was measured. For example, was the instrument only a mathematics test or did it test other content areas? How did the professional development align with the assessment instrument? Why is this instrument a valid measure of the outcomes of the professional development? Is the test aligned to any academic standards or content? What is the appropriate age for a student to take the test? What is a typical score on the test? What is a typical change in the test score over time or after instruction? What is measured when there is a five-point difference in scores (e.g., what is the meaning of a score of 25 compared to a score of 30?

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