LESSAM: Lesson Study as a vehicle for improving achievement in mathematics (Erasmus+)

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The project aims to investigate the impact of the model of Lesson Study on teacher learning and, consequently, on student learning outcomes. Lesson Study (LS) is a teacher professional development model that originated in Japan in the 1870s, but has recently been adapted worldwide. The basic model involves teams of teachers within a school investigating collaboratively the effectiveness of teaching practices for their students. The core model involves: a) plan lessons during planning meetings, b) teach/observe those lessons; c) reflect on lessons during reflection meetings. Variations of the model include the presence of a LS facilitator during teachers' planning and reflection meetings, guiding teachers as they construct new knowlegde. Despite the promising nature of LS, more evidence is needed in order to establish how teacher learning occurs during LS meetings. Even less evidence exists on the impact of this learning on teaching practices and, as a result, on students' achievement.

We examine this impact in the context of secondary mathematics and specifically mathematical reasoning; a central mathematical competence in curricula worldwide involving exploring, conjecturing and justifying. The results of the 2018 Programme for International Student Assessment (PISA) suggest that the average student performance in mathematics in the EU countries has remained stable over 2009-2018 (European Commission, 2019). The four participating countries in the project employ different approaches for teacher professional development. The centralised education systems in Cyprus and Greece offer optional seminars to teachers. In Belgium and the Netherlands, schools have the autonomy to make decisions about the professional development of their teachers. The stability of student performance in mathematics, however, suggests that none of the two approaches to professional development contributes to the improvement of student performance.

The objectives of the project, therefore, are the following:

1. To examine the effects of teachers' participation in Lesson Study on their own learning and on students' mathematical reasoning;

2. To examine the potential impact of the role of an LS Advisor and LS Facilitators on dialogues and teacher learning; and

3. To examine the relationship between teacher intentions and teaching practices.

To examine the above, an experimental design will be employed in the four participating countries. Forty-five mathematics teachers who teach in the first three years of secondary education will be recruited in each country. These teachers will be randomly allocated to one of three groups:
1) LS+Advisor group, 2) LS+Facilitator group, and 3) Control group. Teachers in the experimental groups (i.e. groups 1 and 2) will form LS teams and conduct three-cycles LSs (i.e. total of 9 lessons during the school year). Teachers in group 1 will be supported by an LS Advisor, who will provide consultation in noticing and enhancing mathematical reasoning. Teachers in group 2 will be supported by an LS Facilitator, who will support teachers' dialogues and help them through the LS process. Teachers of the control group will not conduct LS this school year.

Data
on the achievement in mathematical reasoning of the students of all 45 teachers will be collected at the beginning and end of the school year, using a battery of tests developed as part of the project.

In addition, LS planning and reflection meetings will be video/audio-recorded. From a selection of four case study teachers per country, lessons planned during the LS process will be video/audio-recorded. Finally, teacher qualitative interviews will be conducted after the end of the intervention for teachers' reflections and the evaluation of the intervention. The data will be analysed both quantitatively and qualitatively. Multilevel techniques will be used in order to examine the effect of teachers' participation in LS on the improvement of students' mathematical reasoning. LS dialogues will be examined qualitatively for evidence of teacher learning and emerging factors from this analysis will be entered into the quantitative analysis. The relationship between teachers' reported teaching intentions and teaching practices will be examine d qualitatively.

Findings from this project will contribute important evidence in relation to the effects of LS. In addition, findings will shed light on the role, value and cost-effectiveness of the roles of an LS Advisor and LS Facilitator. Based on these findings, policy recommendations will be made regarding the implementation of LS as a teacher professional development model and the promotion of mathematical reasoning in teaching practices.

References:

European Commission (2019). "PISA 2019 and the EU: Striving for social fairness through education" https://ec.europa.eu/education/sites/education/files/document-library-docs/pisa2018-eu_1.pdf