

Explaining the effects of team teaching on student achievement through motivational outcomes

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Rationale

The last decade, increasing evidence is getting available that support the positive effect of team teaching – an instructional strategy wherein two or more educational professionals collaboratively teach a class – on student achievement (De Weerd et al., 2024; Vembye et al., 2024). However, it is not only of interest to explore whether team teaching works, but also how it works. This poster presentation elaborates on a causal mediation analysis, which aimed to explore whether the effects of team teaching on student achievement can be explained by students' basic psychological needs satisfaction and lesson engagement.

Theoretical framework

Although studying direct effects of team teaching on student achievement is an important endeavor for educational research, it is critical to learn not only whether a treatment works but also how it works (VanderWeele, 2015). To gain further insight into the underlying mechanisms of team teaching's effect, causal mediation analyses can be applied (VanderWeele, 2015). Such analyses quantify the effect of the treatment on mediator and outcome variables, as well as the effect of the treatment on the outcome through one or more mediators. Any such "mediator" variable may help to clarify the nature of the relationship between team teaching exposure and student achievement. So far, there is no insight available into mediating effects that may explain how team teaching affects student achievement.

The self-systems model of motivational development (SSMMD) was used as a causal framework to unravel how team teaching differs from solo teaching in optimizing student achievement through students' motivational outcomes. The SSMMD is a well-established framework within educational psychology that illustrates how the learning environment is associated with three main student outcomes: students' basic psychological needs satisfaction, lesson engagement, and student achievement.

Research design

A cross-over experiment with two-treatments (i.e., solo teaching and team teaching) and two periods (i.e., two lessons) was used (Shadish et al., 2002). In this regard, 267 purposively sampled students (10-12 years old) received different treatments over time in alternating sequences. One part of the participants was assigned to the sequence where the first lesson was taught by an individual teacher (i.e., solo teaching), followed by a second lesson that was taught in team teaching. The other part of the participants followed the opposite sequence.

Data were analyzed by combining psychometric and explanatory models within a framework of explanatory item response modeling (EIRM; De Boeck & Wilson, 2004). Next, mediation analysis was applied, by specifying an outcome model and mediator models, which allowed to compute the total, direct, and indirect effects (VanderWeele, 2015). In the outcome model, student achievement (outcome variable) was regressed on team teaching (exposure variable), the three basic psychological needs (autonomy, relatedness, and competence) and lesson engagement (our mediator variables), and design and person-related measures (covariates). In the mediator models, autonomy, relatedness, competence, and lesson engagement were regressed on team teaching exposure and the covariates. Finally, the robustness of the parameter estimates to the potential violation of the assumption of no-unmeasured confounders were tested through sensitivity analysis (VanderWeele, 2015).

Results

The findings of the outcome model confirm the small positive effect of team teaching on student achievement ($OR = 1.31, p < .05$). This means that students in the team teaching context have higher chances of scoring test items correctly, compared to students in the solo teaching context. The findings of the mediator models revealed a statistically significant positive effect of team teaching on students' feelings of competence ($OR = 1.38, p < .05$), meaning that the odds of students indicating higher levels of competence satisfaction were expected to be higher in the team teaching context compared to the solo teaching context. Contrarily, no statistically significant effects, nor large parameter estimates were found between the differences of getting taught in team teaching or solo teaching on students' autonomy satisfaction, feelings of relatedness, and lesson engagement.

Inspecting the indirect effects, the only statistically significant mediating effect could be found for students' feelings of competence, with an estimate of .09 ($p < .05$). This means that a part of the effect of team teaching exposure on student achievement can be explained by students feeling more competent (or effective) during team-taught lessons. The proportion mediated was .33, meaning that 33% of the effect of team teaching on student achievement was mediated by students' feelings of competence. This suggests that there could be other mediators that contribute more to explaining the differences between team teaching and solo teaching with regard to student achievement.

Conclusions

We state that stakeholders willing to implement team teaching can be confident that team teaching has some added value for students. Based on the pathways of the SSMD, we were able to partly explain the effect of team teaching on student achievement through its positive effect on students' feelings of competence. This confirms that teachers in team teaching better exploit certain aspects of an effective learning environment through, for example, better monitoring students and providing faster and more focused support when needed, which causes enhanced student achievement. On the other hand, it is clear there are other mechanisms to explain the effects of team teaching on student achievement that remain undiscovered. The topic on (causal) explanation should be of main interest for future research that aim to study the effectiveness of team teaching.