MATHEMATICAL MODELLING INSTRUCTION BY PRE-SERVICE TEACHERS

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Mathematical modelling (MM) has become increasingly prevalent in mathematics education. Yet, studies highlight challenges in instructing MM in class (Kaiser, 2020), thus raising the need to support teachers in their training for such instruction (Blum, 2015). Therefore, identifying best-instructional practices (BIP) that encourage MM implementation is crucial. MM involves a cyclical process in which a real-world situation is translated into a real-world model which is then solved using mathematical principles and interpreted back in the real-world situation (Kaiser, 2020). MM tasks have the potential to invoke BIP as defined by the NCTM (2014), as these practices reflect abilities that are aligned with the MM competencies (Kaiser, 2020). Accordingly, this study aims to explore the degree to which pre-service teachers use and manifest BIP during MM instruction comparing to standard math lessons.

Participants are nineteen pre-service teachers in their final year of professional training. First, their BIP were assessed at the beginning of the training in a school setting, in order to monitor their ability to implement BIP based on the theoretical knowledge they acquired during their studies. Further their BIP were assessed towards the end of the training in a simulation lab while instructing MM tasks and in a school setting. A rubric designed for this study was used to capture observable events for each BIP.

One-Way ANOVA with Repeated Measures revealed that pre-service teachers' implementation of BIP differed significantly between all three measurements, $F(2, 6) = 24.59$, $p < .001$, $\eta2 = .89$. A follow-up Bonferroni test indicated significantly higher BIP implementation in the laboratory ($M=25$, $SD=2.5$) and on the second measurement in class setting ($M=18.5$, $SD=5.1$) than the first measurement in classroom ($M=6.8$, $SD=1.0$). The effect size between the first and second measurements was high ($d=0.9$), but low between the first and third measurements ($d=0.3$). Difference between laboratory and second classroom measurement did not reach significance. Findings indicate that pre-service teachers' levels of BIP implementation were positively impacted by experimenting in the simulation lab while instructing MM tasks.

References

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