

## A study of preservice science teachers' pedagogical use of multiple representations during lesson presentations

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The science teacher must be able to explain any concept to optimise learning and to develop learners' ability to transfer knowledge. Verbal communication, tables and graphs, text, diagrams, symbols, models, and simulations are used to communicate the body of scientific knowledge.

This study focuses on how preservice science teachers (PSSTs) use these multiple representations as teaching devices during lessons. The main research question of the study was: 'How do pre-service science teachers use multiple representations as a pedagogical tool to explain science concepts during their lessons?'

By analysing recordings of 167 practice teaching lessons I found that the predominant modes used in physics were *nonspecialist words*, *graphical representations* and *expert words*. In chemistry it was predominantly *nonspecialist words*, *experimental representations*, and *expert words* – with *nonspecialist words* and *expert words* being the most prominent modes overall.

Overall, PSSTs showed similar levels of competence and fluency across all representational modes combined when presenting physics and chemistry lessons. None of the most frequently observed 'fluency code combinations' for physics and chemistry included *experimental representations*. Less than five per cent of PSSTs showed high levels of representational fluency in all five representational modes in physics, and only about six per cent PSSTs showed representational fluency in all five representational modes in chemistry.

The findings showed that significantly more PSSTs used *nonspecialist words* at a high level of competence and fluency compared with those who use *expert words*. The overall findings of the study indicate that the PSSTs did not show adequate levels of competence and fluency when teaching science with the help of MRs.

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