How Prospective Mathematics Teachers Elicit, Explore, & Apply Classification Models in Unplugged Image Classification Tasks

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The advent of big data and AI has heightened the necessity of developing instructional approaches and professional learning to integrate core topics of data science (DS) and AI within mathematics learning at the primary and secondary levels (Leavy et al., 2026). Both practising and teaching DS are required as part of initial teacher education (ibid.). In this context, unplugged DS tasks and activities that do not rely on computational tools and programmes are effective for teachers who are not familiar with data science to experience fundamental DS practices (e.g., Biehler et al., 2025; Hilger & Büscher, 2025; Lindner et al., 2019). This study explores how prospective mathematics teachers (aged 20–21 years) elicit, explore, and apply classification models in two unplugged image classification tasks based on *Models and Modelling Perspectives* (MMP; Lesh & Doerr, 2003). MMP focuses on real-world problem-solving and conceptual development through the modelling process (Doerr et al., 2017). Consequently, MMP aligns with DS practices centred on modelling, involving the development of their own models and key ideas related to DS. Based on the MMP, this study developed two DS units (total nine 90-min lessons). In the first unit (six lessons), the prospective teachers collaboratively elicit classification models in an unplugged image classification task, explore and revise them using new data, and apply the models they developed in the first unit to another image classification task in the second unit (three lessons). This study analysed the group's model development through the units. Preliminary results indicate that they constructed decision tree models, and one group of them developed informal random forest models to ensure the simplicity, shareability, and generalisability of the models. In addition, they creatively developed informal classification models, including point system models that incorporate weights for each attribute and classification success rates. These results highlight the potential of a modelling approach to achieve open-ended and creative DS learning in initial teacher education.

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