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Understanding Learning, Assessment, & Evaluative Judgement in Science Education Through a Practice Theory

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One of the purposes of education is to prepare students for future learning. It has been argued that one concept that helps teachers to target this future learning is developing students' evaluative judgement, understood as the capability of making decisions about the quality of one's own or someone else's work (Tai et al. 2017). This is not foreign to science education with its emphasis on learning how to read the world in which we live and its critical approach to evidence.

Pedagogical research, mostly within constructivist and socio-constructivist paradigms, has contributed to understanding how formative assessment and feedback strategies can be implemented to support students' understandings of quality and their capability to make judgements. However, recent research has used practice theories to study assessment and learning, moving from understanding learning as an individual's acquisition of knowledge to learning as "participation in social practices", which are intrinsically bounded by their social and material contexts.

This paper reports on findings of a case study with undergraduate physics students, and uses the theory of practice architectures to explore how these students learn and develop their evaluative judgement through everyday practices of solving problems and doing laboratory work. The findings address how students develop notions of quality of their work through participation in interconnected study practices (ecologies of practices), which are enabled and constrained by their discursive, material, and socio-political context (practice architectures). However, student practices do not always unfold in the ways educators may desire due to the interaction between students' agency and their sociomaterial context. Tensions were identified in the learning that resulted from participating in educational practices, in particular, the tension between learning the substantive practices of a discipline (e.g., what scientists or science teachers do) and the practices of being a student (e.g., sitting exams, attending classes, prioritising tasks, etc). Summative and formative assessment were both identified as crucial frames for student practices and their learning, questioning the usual dichotomy between these two.

Potential ways forward for how to support learning and evaluative judgement in science education include considering the value of slow pedagogy, and authentic and programmatic assessment. However, implementation of these and other pedagogical approaches need to be sensitive to the local practice architectures that constrain teaching and study practices in specific contexts.