

Supporting inquiry-based physics labs. A training co-design for teacher assistants at the University of Groningen

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Abstract:

Introduction

Physics teacher assistants (TAs) facilitating lab-based courses play a major role in physics students' learning process. Their role is especially critical when supporting key disciplinary practices in collaborative inquiry activities (Wheeler et al., 2017). However, physics TAs generally lack extensive educational experience and disciplinary-specific training (Luft et al., 2004).

Educational Innovation - development

At the Faculty of Science and Engineering, University of Groningen, most of the physics TAs are BSc or MSc students of physics, applied physics or astronomy. To support these TAs in their influential role in accompanying physics students (or applied physics or astronomy), a new inquiry-based lab training module was co-designed and implemented by following a design-based model. The redesign process involved key stakeholders (TA coordinators, physics lab lecturers, former TAs and science educationalists) that allowed for the identification of key challenges and unsupported skills the TAs required. By mapping these necessities, two major content blocks were addressed targeting at: a) how to support inquiry practices that fosters physics students' engagement in disciplinary norms, values and ways of thinking in physics settings, and b) how to support equitable participation in physics lab activities. This 2-hour lab-based module was embedded as an elective into a larger TA training addressing other key training requirements in Science, Technology, Engineering and Mathematics (STEM), hence, bringing a comprehensive TA training for prospective TAs in the Faculty.

Educational Innovation - implementation

The complete TA training redesign, including the lab-based elective module, was launched in 2024-2025, training up to about 200 prospective TAs per year. During the elective module, TAs reflected on their roles through previous lab experiences and the pros and cons of adopting inquiry approaches (Windschitl, Thompson & Braaten, 2008) with physics students

in the lab. By comparing real lab manuals with inquiry featured question manuals, participants reflected on how to actively engage students to show understanding, rethink their misconceptions, realise their learning or identify opportunities for creative methodological alternatives.

Prospective physics TAs also showed a broad understanding of their role balancing instructor-based (e.g. probing students with similar situations to transfer knowledge) and affective based responsibilities (e.g. actively building a trust atmosphere.).

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