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Open inquiry in science classrooms: exploring and developing teachers' practices in upper secondary school

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Abstract

This thesis investigates the teachers' role in developing and supporting open inquiry in science classrooms. The point of departure for the study is educational research suggesting open inquiry as an approach to learn about Nature of Science (NOS) and scientific inquiry as a major part of science curricula. The thesis is based on a case study using an action research approach at an upper secondary school for three years. This in-depth and longitudinal study can be of importance in providing context-dependent knowledge, increasing our understanding of scientific inquiry in school and the conditions necessary for change of practice.

The *first article* offers an understanding why a positivist epistemology and related myths concerning NOS are robust in school versions of scientific inquiry even though they go against the "appropriate" views of NOS. The case study reveals that what seemed to be a teacher's positivist position towards NOS and scientific inquiry was embedded in a broader concern about pedagogical considerations and personal engagement with low-achieving students. The implications are that teachers (students) should be given the opportunity for guided reflections on personal experiences and commitment to scientific inquiry in order to become more conscious of how they affect their beliefs and practice. The *second article* identifies emerging issues concerning how the teacher support the students providing them with a balance of *structure and space* – and how it constitutes the students inquiry process in the different phases of the inquiry. The study indicate that there exist a necessary tension and interplay between structure and space, creating what can be seen as a driving force providing both exploration and direction for the open inquiry. The notion of "structure and space" is suggested as a thinking tool for teachers' (students) to increase competence on how to scaffold more authentic versions of scientific inquiry in school. The *third article* explores possibilities and constraints with collaborative action research between teachers and researchers to improve science inquiry in school. It draws on two action research projects experiencing many similar challenges. In both practices we found that the *transition* between planning change and what happened in the actual classroom practice was difficult. We suggests that the collaborative effort developing concrete *tools* for classroom practice of science inquiry can act as an impetus for change when it is supported by both educational literature and the situated practice. Thus, the *distinguished voices* of the teachers and researchers will complement each other and might act to bridge the gap between research and practice of science inquiry.

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