Investigating the space for research and learning within doctoral education in medicine

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Doctoral education in medicine, engineering, technology and science (METS) is in many ways different from doctoral education in the humanities or social sciences. In the METS disciplines, typically, students and supervisors work and publish together within the supervisors' research projects. The projects are usually financed by the supervisors' research grants and their success, in terms of high quality research publications, is of great importance not only for the students' dissertations but also for the supervisors' academic careers. In METS contexts, supervisors and students could therefore be said to have double roles: the supervisor being also a project leader and the student also a project worker. Research on this double relationship is scarce, particularly considering the large number of students within the METS disciplines.

Doctoral education and research have increasingly attracted interest among politicians and policymakers world-wide, often resulting in new legislation and policy. In many countries, doctoral education has gradually become more formalised in order to improve students' rights and study conditions. Research, on the other hand, has seen the introduction of productivity audits and increased competition for funding. Such changes converge at the level of doctoral education and could be expected to create tensions, particularly within the METS disciplines due to the close integration of doctoral education and research. Sweden provides an especially interesting case as changes to educational legislation and research policy, respectively, have been comparatively large.

Swedish doctoral students today are guaranteed four years of fully financed studies and a monthly salary (normally between 2100 and 3000 €). At the same time, more than 50 per cent of funds for research and doctoral education today come from funding bodies (governmental and private) external to the universities and are mainly awarded in competition. In the METS disciplines the dependence on external funding can approach 100 per cent, since government base-funding to a large extent is used for infrastructure and administration in order to attract more external funds and researchers with large grants. Consequently, researchers increasingly have had to compete with research proposals, CVs and bibliometric scores, and institutions are now often described as "research hotels" were you can stay as long as you pay.

We have interviewed doctoral supervisors within medicine, a discipline that in Sweden almost exclusively is financed through external funding. For our analysis, we have used cultural-historical activity theory (CHAT) and constructed two co-occurring and overlapping activity systems: one for doctoral education and one for research. We find synergies as well as tensions and contradictions between the two systems but also adaptations. Supervisors describe how increasing pressure from the (research) funding system has reduced the available space for students to influence the design of their projects, to exercise creativity

and to fail. Accommodating doctoral students within large and prestigious research projects also means that students often begin their studies at very different stages in the process, and rarely at the design stage. Supervising involves putting projects, funding and future opportunities at high risk, which is reflected in a student recruitment process characterised by risk-management. At the same time supervisors remark that students to a higher degree today view their studies as work rather than a calling. Furthermore, the requirements of educational policy for full funding and formal qualifications necessitates that supervisors form alliances with more senior researchers. Such alliances typically extend also to research and provide senior and well-funded researchers opportunities to exercise power over junior and less funded researchers.

We conclude that Swedish research policy, contrary to its intentions and in combination with educational policy, could have negative and far-reaching consequences for doctoral student research and learning but also for the STEM disciplines themselves.