Evaluation of the fulfillment of the national goals for doctoral studies

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SHORT SUMMARY

Fulfillment of the national goals for doctoral studies was assessed by PhD students and their supervisors (111 people in total) in order to map the current status. Results show remarkable differences between both respondent categories and specific goals, and that most of the progress in doctoral studies is perceived to occur during the second and third years. This work is relevant for PhD examiners, students and supervisors.

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Aim and Background

The Swedish Higher Education Act (*Högskolelagen*) issued in 1993 and amended in 2013 by the Ministry of Education and Research contains the Higher Education Ordinance (*Högskoleförordningen*), whose Annex 2.3 [1] specifies the list of qualifications required at a national for a Degree of Doctor (see Table 1). These qualifications are divided by the Swedish Council for Higher Education (*Universitets och Högskolerådet*) into three main categories: Knowledge and understanding (KU), Competence and skills (CS) and Judgement and approach (JA). This list represents the examination goals for doctoral studies but can be completed with further requirements at a local level, e.g. at Chalmers courses within Generic Transferable Skills and one popular science presentation are also required [1].

This work aims at evaluating the fulfillment of the national goals for doctoral studies at the graduate schools hosted by the Department of Space, Earth and Environment. The present work complements with other activities at the department: mapping of which activities within the doctoral studies contribute to which goals, identification of key activities and most vulnerable goals, and formulation of specific indicators for each of the goals. As a whole, the aim is to provide solid ground for the design of an action plan ensuring fulfillment of the national examination goals and quality of the doctoral studies at SEE. Due to the limited space, the scope here is limited to the assessment of progress in goal achievement along the doctoral studies as well as on the differences between supervisors and PhD students in perception of goal achievement.

Table 1: List of qualifications for the Degree of Doctor as specified in the Swedish Higher Education Act [1]

General qualifications for the Degree of Doctor

Knowledge and understanding (KU)

KU1 - demonstrate broad knowledge and systematic understanding of the research field as well as advanced and up-to-date specialised knowledge in a limited area of this field

KU2 - demonstrate familiarity with research methodology in general and the methods of the specific field of research in particular

Competence and skills (CS)

CS1 - demonstrate the capacity for scholarly analysis and synthesis as well as to review and assess new and complex phenomena, issues and situations autonomously and critically

CS2 - demonstrate the ability to identify and formulate issues with scholarly precision critically, autonomously and creatively, and to plan and use appropriate methods to undertake research and other qualified tasks within predetermined time frames and to review and evaluate such work

CS3 - demonstrate through a dissertation the ability to make a significant contribution to the formation of knowledge through his or her own research

CS4 - demonstrate the ability in both national and international contexts to present and discuss research and research findings authoritatively in speech and writing and in dialogue with the academic community and society in general

CS5 - demonstrate the ability to identify the need for further knowledge

CS6 - demonstrate the capacity to contribute to social development and support the learning of others both through research and education and in some other qualified professional capacity

Judgement and approach (JA)

JA1 - demonstrate intellectual autonomy and disciplinary rectitude as well as the ability to make assessments of research ethics

JA2 - demonstrate specialised insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used

It must be noted that examination of a doctoral student is currently approved after the positive verdict of a grading committee (consisting of three to five members) on the basis of the successful public defense of a PhD thesis in front of an external opponent. As the grading committee cannot properly assess the qualifications in Table 1 through a dissertation, the examiner at Chalmers wears the responsibility of ensuring that doctoral students defending their PhD theses fulfill the qualifications specified despite the national goals have not been pro-actively used by examiners in their examination task. Literature reports similar issues in other countries, claiming that the assessment procedures for the doctorate remain relatively unexamined despite the degree's major gatekeeping function [2].

Method

A total of 111 doctoral students and faculty members at the graduate schools hosted by the Department of Space, Earth and Environment were gathered for a half-day workshop focusing on the national goals for doctoral studies. The distribution of the participants was according to the data in Table 2:

Table 2: Distribution of respondents in the workshop

PhD students	75
Year 1	20
Year 2	17
Year 3	12
Year 4	14
Year 5 or more	12
Faculty	36

To start with, the participants got acquainted with the goals through a group exercise (about 6 persons per group, with mixed composition in terms of doctoral students and faculty) in which three fake goals that had been added to the original list had to be identified through individual reflection and group discussion. After this, each group chose 3 goals to analyze in detail in terms of which activities within the doctoral studies represent a contribution to the goal achievement and which indicators could be used in order to assess the fulfillment. After these introductory exercises, for each of the national goals, doctoral students were asked to make a self-assessment of their current goal fulfillment while faculty members were asked to assess the perceived average level of goal fulfillment in doctoral students as they hold their doctoral dissertation. The questions asked were:

To PhD students: "How far have I reached?"
To supervisors: "How far has/have student/s you supervised in average reached by dissertation?"

Respondents were given further 30 minutes to reflect and anonymously place a marker for each national goal in a color scale with gradient traffic light coding, i.e. three regions (red, yellow, green) in gradual transition, as shown in the result figures below. A numerical scale (from 1 to 10) has been coupled to the color scale in order to carry out data analysis and presentation of the results.

Results and discussion

The summary of the results obtained for each of the national goals is shown in Figure 1, with a subplot (a to c) for each of the three categories shown in Table 1.

In first place, both doctoral students and faculty members in average consider that all the ten national goals are achieved by dissertation. The national goal for which supervisors set the lowest achievement level is JA2 (with 6.78, in the lower end of the green region), while doctoral students consider CS2 to attain the lowest achievement level (6.90).

Differences can be observed among the different categories: for goals within *Knowledge and Understanding* and *Competence and Skills* the level of achievement according to supervisors (8.79 and 8.26, respectively) is higher than those of fifth-year students (8.28 and 8.11). An opposite trend can be seen for the two goals related to *Judgement and Approach*, where PhD students evaluate their goal fulfillment remarkably higher (8.12) than their supervisors (7.02). The main factor behind this is the goal JA2 (see Table 1), for which supervisors and doctoral students have in average set 6.78 and 8.55 respectively.

In general, the perception of doctoral students and supervisors on the level of achievement are rather similar: excepting for different perceptions in CS3 and the above-mentioned JA2, the average absolute difference between supervisors and fifth-year students is of only 0.45 points.

Furthermore, in terms of progression, it is interesting to observe the overall progress from start to end level. In these terms, the start point of the goals varies strongly, from 1.23 (CS3) to 5.93 (CS5). The doctoral students consider that they make the greatest progress within goals CS3 and CS4, with increases of around 6.7 points in the 1-10 scale used. The smallest progress is found for goals CS1 and CS5, with increases around 3.4 points. No significant differences in terms of absolute progress are observed between the three goal categories defined.
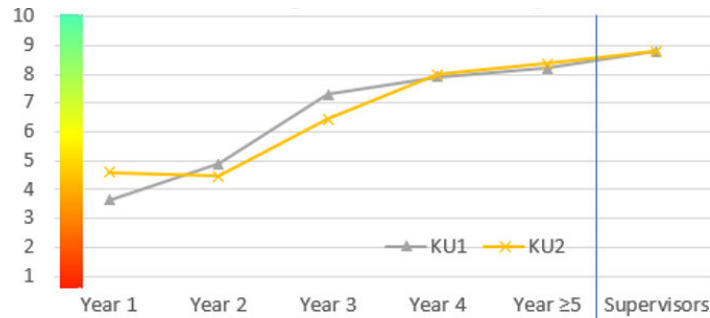
1.a) National goals within the category *Knowledge and Understanding*
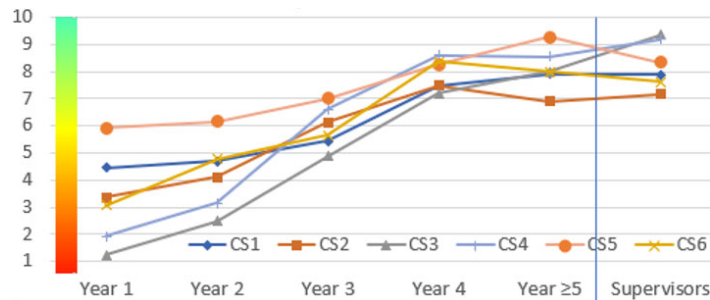
1.b) National goals within the category *Competence and Skills*
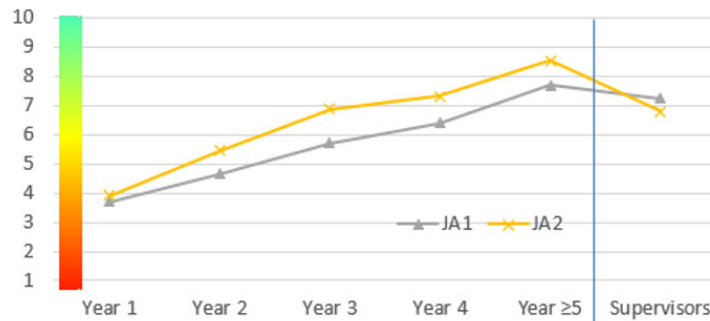
1.c) National goals within the category *Judgement and Approach*

Figure 1: Level of goal achievement of the national goals

The contribution of each year of doctoral studies towards goal achievement is summarized in Table 3 for each goal category.

Table 2: Progression towards goal achievement with time

	Progress from year x to year y				
	1 to 2	2 to 3	3 to 4	4 to 5	Total
KU	0.55	2.19	1.10	0.33	4.16
CS	0.90	1.72	1.95	0.20	4.77
JA	1.24	1.73	1.54	0.47	4.97
mean	**0.90**	**1.72**	**1.50**	**0.44**	**4.56**

From the given data it can be seen that doctoral students consider that, generically for all goal categories, the main progress is made between the second and the fourth years of their studies. It is remarkable to see that the perceived progress towards examination goals in the middle years hits an average of 3.22 points, while the same time period on the initial and final ends of the doctoral studies only provide 1.34 in perceived progress. This concentration of

the perceived progress to the central time period in the doctoral studies (in average 70% against 30% in the initial and final ends) finds the most accentuated numbers in the KU category, with a concentration of 79% of the progress in the middle time-half. The lack of similar studies as this one for shorter doctoral studies makes it impossible to study whether longer doctoral studies are coupled to higher output quality as hypothesized in [3]. On a more detailed basis, the progress experienced during the final year has the lowest features even though the writing of the doctoral thesis was after the initial workshop exercises identified as a central activity in post-graduate studies and one contributing the most to the achievement of almost all national goals listed. This indicates that the sample group of doctoral students belong to the profile identified by [4] that perceive the thesis as a product rather than a process of developing expertise. It should be noted that [4] found students belonging to the thesis-as-a-product profile type tend to score low in terms of experienced well-being and study engagement.

Processing of the outcome

The results shown above have been presented to different forums for analysis and discussion in order to validate different possible interpretations and thereby design actions. Such discussions have been carried out at the departmental group for doctoral studies (consisting of the directors of studies and representatives of the PhD students and the faculty), faculty assembly (faculty) and management group (heads of department and division, HR, communicator). Actions taken and supported by the analysis of the above results are shortly listed below.

In view of the relatively low fulfillment of the goals within Judgement and Approach, a course in *Theory of Science in Space, Earth and Environment* has been designed and included as compulsory in the study plans of the research schools hosted by the department.

The identified remarkable gap in perception of the goal fulfillment will be tackled through the inclusion in the yearly follow-up meetings of a discussion and common assessment (PhD student and examiner) of the national goals.

Given the strong contribution associated to the writing of the licentiate thesis, the alternative option of holding a seminar (*mittseminarium*) will not be recommended as standard procedure.

Conclusions

In summary, the national qualifications for doctoral degree are achieved in the doctoral studies at Chalmers, where students and supervisors have relatively similar perceptions of the level of achievement. The goal where this perception gap is largest is that related to the societal role and individual responsibility on research, which is also the goal for which supervisors set the lowest level of achievement.

The middle years in the doctoral studies are considered to provide most of the progress towards the achievement of the national goals, with in average 70% of the progress taking place along them rather than in the initial and final years of the doctoral studies.

References

 [1] Swedish Council for Higher Education
https://www.uhr.se/en/start/laws-and-regulations/Laws-and-regulations/The-Higher-Education-Ordinance/Annex-2

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[4] Stubb, J., Pyhältö, K., Lonka, K. 2012. “The Experienced Meaning of Working with a PhD Thesis”. *Scandinavian Journal of Educational Research*, 56(4), pp.439-456.