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PREFACE

This report has been translated from Swedish and adapted for an international audience. The original report, *Leadership for quality in doctoral education*[1], was commissioned by the Association of Swedish Higher Education.

Here we describe and discuss doctoral education as *policy*, *practice* and as *an object of knowledge*, and highlight a number of questions that are important for the management and leadership of doctoral education, today as well as in the future. The policy trends, changing circumstances, and challenges we discuss here are to a large extent international. Sweden specifically, with its long history of government regulation of doctoral education and swiftness to adapt to the ideas of the knowledge economy, provides an interesting case.

We represent two different Swedish universities, three disciplines and four contexts. Together, we have held positions as heads of department, directors of doctoral studies, faculty board members, quality coordinators and educational developers. We have developed and given courses for doctoral supervisors, doctoral students, and leaders of doctoral education in most subject fields. Our research includes assessment practices in doctoral education, the practices of peer review, leadership and management of doctoral education, and the European higher education curriculum reform. Furthermore, we have personal experiences of supervision, supervisor collegia, and the practices of peer review within different subject fields. As a result, we have gained a broad insight into the diverse practices of doctoral education and supervision, and into the different ways in which policies may affect fields of research and doctoral education

By describing, contextualizing, contrasting and problematizing doctoral education we aim to provide support for the continued development of this level of education

We are very grateful to The Association of Swedish Higher Education's *Expert panel for quality assurance queries* and to the participants at the conference

[1] Ledning for kvalitet i forskarutbildningen

Leadership and quality in education, research and doctoral education[2] for constructive comments on various drafts of this report.

Maja Elmgren, Eva Forsberg, Åsa Lindberg-Sand & Anders Sonesson

[2] *Att leda för kvalitet i utbildning, forskning och forskarutbildning*

TABLE OF CONTENTS

DOCTORAL EDUCATION IN CONTEXT: THE SWEDISH CASE

In recent decades, education on the doctoral level has increased in size and strategic importance for universities worldwide. We can observe a growing interest in doctoral education as *policy*, *practice* and as *an object of knowledge*.

From having been considered primarily a concern for universities and research communities, doctoral education has now become much more debated and politicised. The number of stakeholders expressing expectations on the content and organisation of doctoral education has grown. In Sweden, doctoral education has seen an increasing number of rules, regulations and recommendations as well as new forms of quality assurance procedures and the results of supranational coordination and joint policies. While these developments have a homogenising effect on doctoral education we can discern differences related to disciplinary fields as well as aspirations for autonomy and an increasing diversity within the student group.

When the conditions for a university are changed, doctoral education is affected both directly and indirectly as it is integrated into the university's entire mission: research, education and public outreach. Decisions and strategic priorities made on university level impact doctoral education and, in turn, the organisation, size and orientation of doctoral education affect the university's capacity to fulfil its mission in both short-term and long-term perspectives.

Doctoral education is essential for the education and training of future generations of academics and, thereby, also for higher education and for the production of new knowledge. Not only after but also during their education, doctoral students contribute significantly to research and teaching. Doctoral education is thus conjoined with the practices, qualifications, esteem, and future prospects of universities, departments, teams and individual supervisors. At the same time there is an increasing demand in the knowledge society for doctoral education to contribute to sustainability and national capacity in an increasingly competitive world.

There has been considerable development of our knowledge of doctoral education. Practices, traditions and experiences have come to be compared, described and problematized through networks, conferences and courses for supervisors and doctoral education coordinators. Additionally, claims for

increased governance and transparency have made practices visible and exposed to trial and reflection. At the same time, research-based knowledge has increased in scope although it is still limited.

This report describes and problematizes doctoral education as a strategically important instrument for universities' production and reproduction of knowledge. We identify changing circumstances, trends, and increased expectations, and discuss quality and leadership in relation to policy, practice and knowledge of doctoral education. We have strived to capture the diversity of doctoral education and to stress its many and important functions for the academy and for society in general, and thus to provide a useful foundation for reflection and development.

Aims and purposes of doctoral education

Doctoral education serves many purposes. Different stakeholders have legitimate expectations, and doctoral education is of fundamental importance not only for research and for the regeneration of academia but also for providing competence and knowledge for authorities, industry, commerce and politics.

The significance of doctoral education for those working close to it is partly different from the significance it has for society in general. For individual doctoral students, doctoral education can be of crucial importance to their lives and careers. Students are given opportunity, for an extended period of time, to grow as individuals, to develop competences, to make important decisions and to join networks and establish important relationships.

Moreover, doctoral education is a complex activity at the heart of academia. It shapes those future generations that will carry academic ideals and practices onwards at the same time as it produces new knowledge. Depending on how academia, research and doctoral education are perceived, different ideals and practices are formed. For example, doctoral education can be viewed as bildung, education, research, work, apprenticeship or as a calling – or as a combination of two or more of these perspectives. With these different perspectives follow different and sometimes conflicting ideas about what a doctoral student can be and how doctoral education could or should be designed.

Figure 1 shows how various aspects of the outcome of doctoral education emerge whether focusing on the doctoral student as an individual, or on the academic community to which the student belongs.

	Academic and disciplinary: knowing	being	doing
Individual perspective	Competence	Identity	Dissertation
Collective perspective	Capacity	Culture	Production

Figure 1. *Different perspectives on the purposes of doctoral education*.

Within the academy, focus is often geared towards *academic and disciplinary doing* and doctoral research is then primarily regarded as research. Doctoral students progress from learning the known to exploring the unknown. A doctoral student's success is essentially measured by way of his or her research results. Courses mainly serve to provide the necessary skills and knowledge to perform research. Research can be produced either individually or collectively, depending on the academic environment and subject field. If research is predominantly an individual endeavour, the doctoral student's contribution and importance to the collective may be small. If, on the other hand, research is a highly collective activity, the individual doctoral student's learning and development may be neglected in favour of the research production of the collective.

When doctoral education instead is regarded as work[3], doctoral students may be viewed as part of a workforce with work assignments, deadlines and working hours. In other contexts, where doctoral education rather is viewed as a calling, students may instead be expected to prioritise the research project above their own needs for an appropriate workload.

The contributions from doctoral students to the *doing* of research groups or departments are of great significance to their assimilation into academia.

[3] In accordance with The Higher Education Ordinance, the majority of Sweden's doctoral students are employed to study

Doctoral students are young researchers among other researchers and can be viewed as peripheral members of communities of practice (Lave & Wenger 1991). Departmental duties within the framework of doctoral education, e.g. teaching, also contribute to the collective and can provide possibilities for learning and insight into the various tasks of academia as well as to a feeling of fellowship with other academics.

If focus instead is on *academic and disciplinary knowing*, the competent PhD, who can contribute to societal development both within and outside of academia, appears and as a result, doctoral research is primarily seen as education. Doctoral students should conduct research, but principally as a means for developing competence rather than as an immediate contribution to research. Successful doctoral education should lead to doctoral students' development of profound knowledge and skills and, formally speaking, to the fulfilment of the learning outcomes in the Swedish Degree Ordinance[4]. Research activities and courses should be designed in such a way as to best cater to doctoral students' development and preparations for life after their doctoral studies. This perspective is often present when politicians want to increase the number of doctoral students and in relation to specific initiatives for graduate schools.

On a collective level, doctoral education can contribute to the growth of capacity for the entire organisation. Possibilities arise for all participants through new perspectives, through ventures in new areas that need development and through the formation of environments that can increase the capacity for research and education as well as outreach and engagement.

Finally, if attention is geared towards *academic and disciplinary being,* doctoral education can be perceived as a journey of *bildung* by which the student is shaped, and which shapes, the community and culture he or she is part of. Here, time and room for exchange of experiences and reflection becomes important so that both the doctoral student and the collective can develop. Research assignments, courses and departmental duties can be designed to broaden perspectives and provide academic training at the same time as doctoral students' contributions are made available to others. The student is expected to develop an academic identity and adopt academic

[4] Annex 2 of the Swedish HE ordinance. Lists requirements for degrees awarded at first, second and third (research) level. Level descriptors are stated as intended learning outcomes

ideals. Furthermore, the student is seen as a vehicle for knowledge with an ability to deepen our understanding of ourselves and of the world around us, abilities that may benefit society in various ways. In countries where the degree of doctor is viewed as an important credential, for example, for politicians and other people in power, the educational purpose of doctoral education is often stressed.

Doctoral education is often regarded as an apprenticeship where the less experienced work side by side with the more experienced. The concept of apprenticeship includes elements of training and supervision, and by contributing to the collective practices the student naturally becomes assimilated. For doctoral education however, the apprenticeship metaphor would need to be extended. To develop the appropriate knowledge and skills, the student needs more than a supervisor and a project. The intellectual environment surrounding doctoral students is crucial and a sense of collective responsibility for doctoral students' development is essential for doctoral education to be successful (Walker et al. 2008).

Depending on which aspects are emphasised – the *knowing*, *being*, or *doing,* either on an *individual* or *collective* level – the purpose of doctoral education, for the academy or for society as a whole, can be seen in very different ways. Doctoral education can be perceived differently depending on research traditions, on the conditions for a particular research field, and on the future labour market for graduates.

Swedish doctoral education in numbers

The *Higher education in Sweden status report* (2013) shows that the number of enrolled doctoral students in Sweden has been increasing for several years and in 2012 there were about 3 700 entrants in the third cycle[5]. The number of international entrants is steadily increasing and in 2012 they represented 39 per cent of the entrants as compared to 16 per cent in 1997. The total numbers of entrants at these two points in time were largely the same which means that the transfer of Swedish students from undergraduate and graduate levels to doctoral level has gradually decreased. There is no longer an

[5] Doctoral education belongs to the third level in the framework of the European Higher Education Area. In Sweden, third level education includes both the doctoral degree (4 years) and the shorter licentiate degree (2 years)

imbalanced distribution of doctoral students in terms of gender as there was in the 1990s. The gender balance has been more or less even since 2000. However, the number of women is slightly lower among international entrants (40 %).

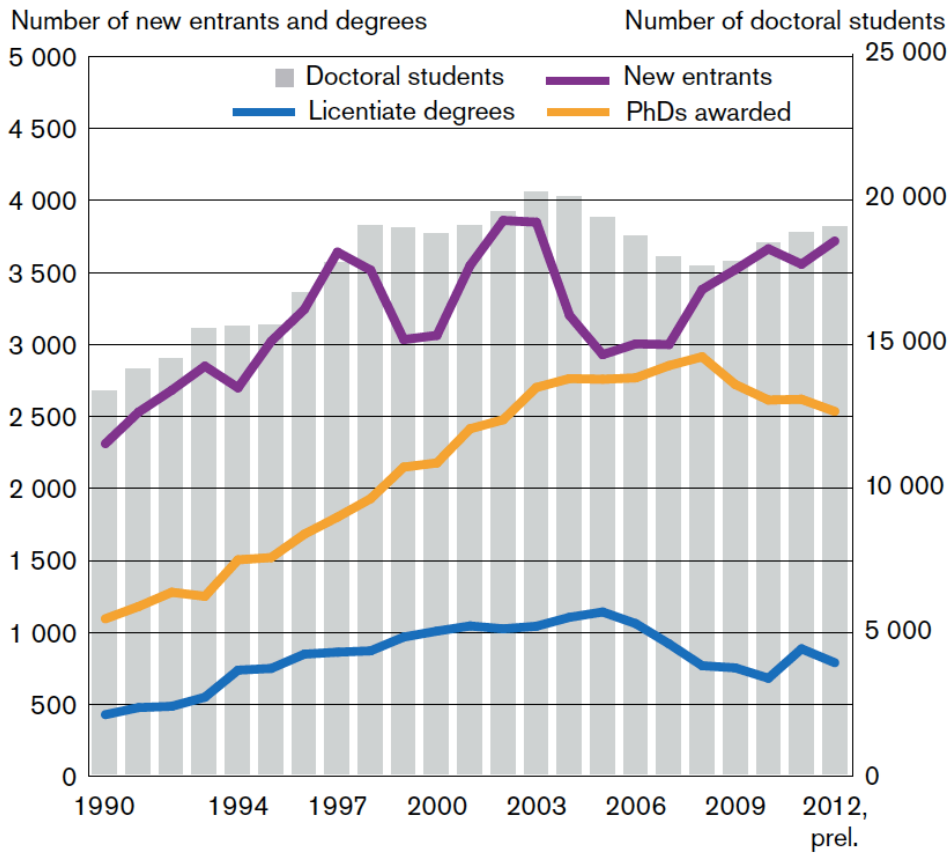

Figure 2. *Entrants, students and awarded degrees in third-cycle programmes, 1990-2012. Source: Higher education in Sweden, 2013 status report, p. 35.*

An increasing number of doctoral students come from abroad and this is particularly common in the natural sciences and in engineering. Most international doctoral students originate from Asia (approx. 50 %) and from the EU (almost 30 %). Even among the 61 per cent of doctoral entrants that are domestic to Sweden, 20 per cent have some type of international background. The total number of students on doctoral level has increased somewhat and amounted to almost 19 000 in the autumn of 2012. Apart from these there were 2 900 students who were not active. In 2012 the number of doctoral

degrees awarded amounted to 2 500 and the number of licentiate degrees awarded were 800.

There are relatively large differences between the six research domains accounted for in the report. The majority number of degrees are awarded within the field of medicine and health sciences (1/3), followed by the natural sciences (1/4), technology (1/5), the social sciences (1/7), the humanities (1/15) and the agricultural sciences (1/50). Licentiate degrees are most common within the field of technology followed by the natural sciences (1/4).

Figure 3 shows the number of entrants within different research domains. In 2010 doctoral and licentiate degrees were introduced for the fine, applied and performing arts. These make up a small number of the total sum and are part of the report for the humanities.

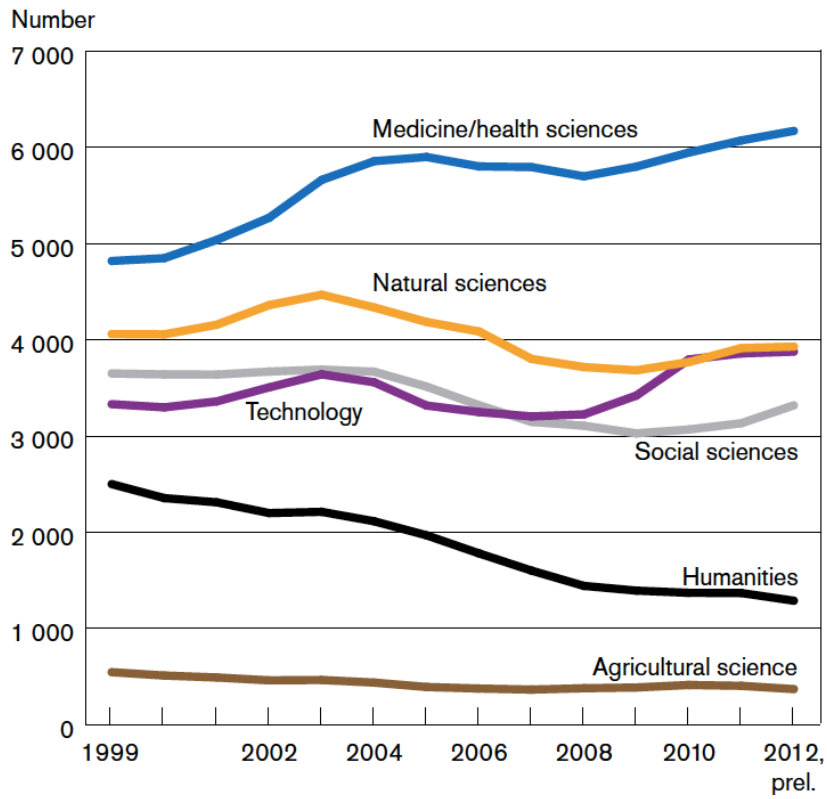

Figure 3. *Number of entrants distributed according to research domains 1999-2012. Source: Annual report for higher education, 2013, p. 37.*

Women are generally slightly older when they begin their doctoral education and older entrants are more common within the social sciences, the humanities and in medicine and the health sciences than in other fields.

Eighty per cent of doctoral students carry out their studies at nine of the largest universities in the country. Traditionally, only universities have had the right to award doctoral degrees but since 2010, university colleges can apply for permission within particular research fields. So far 12 university colleges have had such applications approved in 23 fields. Subsequently, the number of doctoral students who study at a university college where they have not been enrolled has decreased, leaving these types of arrangements only at three per cent of the total number of active doctoral students in 2012.

Almost two-thirds of doctoral students (slightly more common for men) carry out their studies full-time (80-100 % activity). Doctoral studentships, i.e. where the student is employed to study and perform up to 20 % departmental duties) are the most common means of support within all subject areas, but are less common in the medical and health sciences.

For those who received their doctoral degree in 2012, the average net completion time was 8.4 terms[6] and the gross completion time was 11.0 terms. The equivalent figures for a licentiate degree were 5.3 and 7.0 terms respectively. Net completion times are the highest within the humanities and the lowest within medical and health sciences.

Drop-outs

Reasons for student drop-outs were examined in a questionnaire issued by the Swedish National Agency for Higher Education in 2012 (Högskoleverket 2012c). Two-thirds of doctoral students who had discontinued their studies claimed to have done so for social reasons (35 %) or for problems related to their education (31 %). The remaining percentages involved 17 per cent of students who had interrupted their studies due to labour market considerations and 12 per cent who had financial reasons for dropping out. The least common reason for discontinuation had to do with departmental duties (5 %). 36 per cent of doctoral students starting their doctoral education in 1980 finished their degree within 8 years. Since then the frequency of

[6] The Swedish study year is 40 weeks dived over two terms

completion has increased. 49 per cent of entrants in 1990 had completed their studies in the same amount of time and 69 per cent of those beginning their studies in 2000 had received their degrees within 8 years.

Social reasons for termination were more common among women than men and more common within the humanities and in medicine than in technology and the natural sciences and, furthermore, more common among younger doctoral students. The reverse is true for reasons relating to doctoral education. However, it is more common that women discontinue their studies for social reasons in all age groups. Men claim to discontinue their studies due to financial reasons more often than women within all fields and age groups.

When doctoral students were encouraged to state more specific reasons for dropping out, reasons relating directly to doctoral education were the most common. The three most frequent causes involved insufficient support from supervisors (40 %), loss of motivation (37 %) and inadequate psychosocial working environments (28 %). Reasons pertaining to social factors were only the fourth most common factor, and these specifically concerned doctoral students who did not enjoy doctoral studies (25 %).

Family reasons regularly featured as cause for discontinuation: 16 per cent of doctoral students maintained that they had difficulties finding a balance between doctoral studies and family life and 5 per cent pinpointed parental leave as a reason for dropping out. Discontinuation on grounds of discrimination or harassment[7] was rare but, nevertheless, present (3 %).

The majority of doctoral students who discontinued their studies did so before they had come midway in their studies (72 %). However, one in ten doctoral students had completed 80 per cent or more of their education when they terminated their studies. The number of students who discontinued their studies late in their education has probably been underestimated due to the fact that students who finished their doctoral studies with a (lesser) licentiate degree instead of a doctoral degree were not included in the population.

[7] The Swedish Discrimination Act prohibits direct and indirect discrimination, harassment and reprisals related to sex, transgender identity or expression, ethnicity, religion or other belief, disability, sexual orientation, and age

Approximately the same amount of men and women discontinued their doctoral studies at a late stage. However, older doctoral students and students within the humanities and natural sciences are over-represented.

PhDs on the labour market

Information on third cycle graduates in Sweden has been retrieved primarily from studies conducted in 2007. There were approximately 51 000 doctoral graduates in 2007, 60 per cent of which were men and 77 per cent with Swedish backgrounds. The number of people from non-Swedish backgrounds was, thus, higher among PhDs (23 %) than in the Swedish population generally (17 %, source Statistics Sweden). Almost half of these PhDs had completed their degrees within the fields of medicine, natural sciences and mathematics.

Among PhDs aged 30-64, at least 90 per cent were employed. This number was higher among men and among PhDs from Swedish backgrounds as well as among PhDs as compared to licentiates and PhDs graduated in other countries. The variation of employment based on research subject oscillated between 84 and 91 per cent for most. In a study that included everyone who completed a doctoral degree at Lund University in 2008 (Holmström 2013) 97 per cent were employed and only 1 per cent reported to be unemployed in December of 2011 (60 % response rate).

A little less than a third of research graduates worked in the higher education sector closely followed by health care as the second largest occupational sector. Many were also involved in research and educational employment outside the academy. The distribution of graduates within different occupations varied greatly with degree subject. In Holmström's study of alumni from Lund University, (2013) 49 per cent of the alumni worked within universities and university colleges three years after completing their degrees.

In general, male PhDs received higher salaries than female PhDs and salaries increased with age. PhDs native to Sweden received higher salaries than graduates from non-Swedish backgrounds.

Summary

In this introduction we have discussed doctoral education's many purposes and functions and how it may have different significance for individuals and collectives within academia. The statistical data presented shows that the number of doctoral students has increased in the last two decades, particular-

ly just before the turn of the century. The balance between men and women in the entire doctoral group has improved. The number of non-Swedish entrants has increased and the number of Swedes has decreased. Total completion times have decreased and throughput has increased. Also, discontinuation has decreased but when it occurs the most common cause is social factors or problems in the doctoral programmes themselves. The labour market both within and outside of academia appears favourable for PhDs. Possible reasons for the decreasing number of Swedish students entering doctoral education are yet unknown.

DOCTORAL EDUCATION AS POLICY

Doctoral education is enveloped by several layers of policy which, in turn, comprise an array of regulations, guidelines and recommendations stipulated by authorities, institutions, cooperating bodies and interest groups on national as well as international arenas. These policy texts gain meaning through processes by which various actors interpret, translate, reinterpret and transform them to proposals, directions or frameworks for the activities they are part of (Ball *et al.* 2012). As doctoral education is highly integrated into most institutions' missions and activities, policies from different levels and aimed at different activities will often converge within doctoral education where they may have both unintended and undesirable effects.

Jennie Haraldsson (2010) highlights how doctoral education has been governed by the state through legislation, appropriation directions, reforms of doctoral education and research bills. Governance at the institutional level involves guidelines and recommendations, often related to questions of admission procedures, employment terms, funding, courses and assessment, supervisor training and students' rights to information and representation when doctoral education is discussed and decisions are made.

Through the participation of Swedish authorities, universities and organisations in various international collaborations, primarily European, doctoral education has become more closely linked to the globalisation of higher education and research. This movement involves, among other things, the development of shared policies within many areas, which reinforces already established practices in doctoral education and impels new ones while leaving others in the background. Below, we will describe themes and tendencies at the national level and then give some examples from the European level that further emphasise these. First, however, we will discuss doctoral education as a "boundary object" and also some, in this context, essential changes to the Swedish higher education landscape that form a background for some more specific regulations relating to doctoral education.

Doctoral education – a boundary object

Doctoral education can be viewed as a practice formed in the intersection between the three major missions of universities: research, education and

outreach (see figure 4). Perhaps it is possible to consider doctoral education as that which Geoffrey C. Bowker and Susan L. Star refer to as a "boundary object".

> *Boundary objects are those objects that both inhabit several communities of practice and satisfy the informational requirements of each of them. Boundary objects are thus plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. (Bowker & Star 1999, p. 297)*

Viewed as a boundary object, doctoral education is both coherent and multifaceted. Disciplinary differences have been made visible, for instance, in Charles Percy Snow's *The Two Cultures* (1961) and in Tony Becher's *Academic Tribes and Territories* (1989). However, doctoral education can be viewed as a boundary object also because it is both part of as well as transcends the universities' different missions. Doctoral students partake in both research and education. As a result of globalisation and the growing impetus for research and doctoral education to more directly contributing to the good of society, more and more doctoral students are carrying out their studies outside of traditional departments and with supervisors from different universities.

The universities' three missions are mirrored in three different emphases on doctoral education. Over time, these emphases have been expressed to varying degrees in policies related to doctoral education.

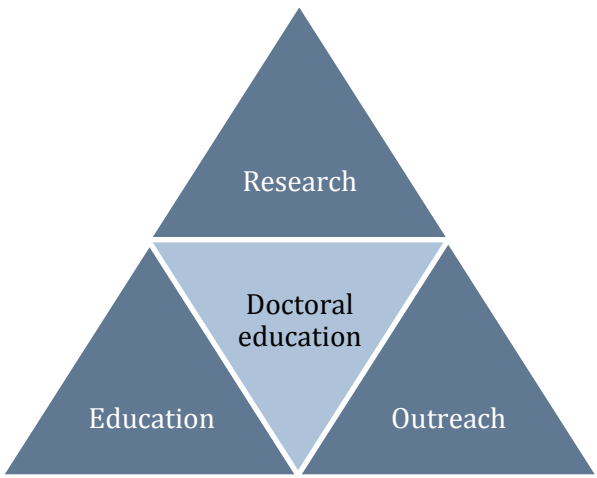

Figure 4. Three emphases in doctoral education.

Doctoral education as research

The first emphasis is doctoral education as research and the doctoral student as a young researcher embarking on his or her research career. The emphasis on research has been salient since the first regulations on doctoral education were stipulated in modern universities in the mid-nineteenth century. From a political perspective, the proximity of doctoral education with research is manifested in the distribution of resources to Swedish universities where research and doctoral education form a unified category.

Using Aant Elzinga (1990) we can speak of a drama where various actors are struggling for power and control of research: the academic oligarchy, state bureaucracy and market forces in the form of business and commerce. The academic oligarchy can be linked to traditional autonomous research emanating from curiosity. The value of the research is determined largely by its contribution to the research field. State bureaucracy can be connected to Sweden's sectoral research and subsequent cross-disciplinary research councils and different extra-disciplinary and political objectives. The market forces can be linked to public outreach and collaboration with industry, and to extra-disciplinary objectives and economical development through innovation. The two latter ways of regarding research can also be connected to shifts in how problems are identified and studied as well as how knowledge is produced and spread. Elzinga (1989) discusses a change in researchers' views on research as an epistemic drift towards what society, industry and commerce regard as relevant research problems.

In contexts where research policies are formulated and political decisions made, doctoral education is commonly treated as an integrated aspect of research. A strong and one-sided emphasis on extra-disciplinary or economical outcomes for research risks diminishing doctoral education to a tool for such objectives. Doctoral education's fundamental role for regenerating and developing the academy, its disciplines and the higher education system may then be over-looked. When funding agencies external to universities fund large international research projects, doctoral education within these areas expands, according to the principle "where research goes, doctoral education follows".

Doctoral education as education

The second emphasis highlights doctoral education as education and the doctoral student as a student. On a formal and general level, according to Swedish legislation, doctoral education is first of all education. This was reinforced by the Bologna process, which in 2005 incorporated doctoral education into the European framework for qualifications *Framework for Qualifications in the European Higher Education Area* (QF-EHEA 2005) and into the EU's qualification framework for lifelong learning *European Qualifications Framework* (EQF 2008). The latter describes the competence achieved through a doctoral degree as the eighth and highest level in the educational system. The role and position of doctoral education in the educational system also gives rise to questions about admission and the length of programmes. In relation to a bill passed in Swedish parliament in 2006, it was primarily the relationship to the master's level and the length of doctoral programmes that were subject to debate. The bill entailed a four-year long doctoral programme that could be started formally after one year of advanced (second) level studies. The competence level upon completion, hence, should be considered to be on a par with a three-year long programme following a two-year master's degree[8]. Even though more and more Swedish doctoral students have a two-year master's degree when admitted to doctoral studies, very few choose a three-year PhD. Swedish doctoral education, in practice, thus, could be said to be positioned on a higher level than the general European framework.

When Sweden adapted its educational legislation to the framework of the European Higher Education Area in 2007, quality descriptors in the form of intended learning outcomes were introduced in the Swedish Higher Education Ordinance for all levels of higher education, including the doctoral level. It is noticeable that several aspects of the requirements on broad and complex competence expressed on the European policy level are not to be found in the learning outcomes formulated for the Swedish doctoral degree. Examples include the capacity for teaching[9], cross-disciplinary collaboration,

[8] The educational structure within the European Higher Education Area Is 3 + 2 + 3 years for the bachelor, master and research level respectively

[9] One of the intended learning outcomes for the doctoral degree does include the phrasing "support the learning of others" but it is common that this outcome is achieved through departmental duties or through short courses on teaching and learning in higher education which in some cases are not included as part of the formal curriculum

innovation, entrepreneurship, project management and leadership. The educational emphasis is also visible through requirements for both general and individual study syllabi[10]. Together, these syllabi describe the individual student's educational path and regulate his or her course work and dissertation as well as other aspects of the students' programme. Other directives regulate the extent of departmental duties allowed parallel to the student's studies. The importance of the student developing pedagogical and administrative competence as well as leadership qualities is demonstrated in the appointment criteria for senior lecturers.

Policies on higher level often express a will to strengthen the educational emphasis in doctoral education. International organisations and arenas for doctoral students, for example the EUA (*European University Association*) or the ESU (*European Students' Union*), have also expressed this will. This tendency can also be observed on the administrative levels for international collaborations on doctoral education such as ERASMUS-programmes or in relation to the development of joint degrees. A need to complement subject-specific knowledge with more generic competencies arises in these contexts (see SOU 2004:27)[11]. The emergence of more structured study curricula in the form of programmes and graduate schools can also be viewed in this light.

The fact that doctoral education formally is education does not disqualify it as a boundary object. A telling sign is that doctoral students are expected to acquire the required competencies first and foremost by conducting research. Also, funding for doctoral education is often directly linked to specific research projects and research environments.

Doctoral education as public outreach and engagement

The third emphasis is doctoral education as public outreach and engagement, and the student as an agent in the interaction between different sectors. This emphasis also designates participation in contexts where knowledge is communicated and spread to the public. From this perspective, doctoral education appears as an inter-sectoral phenomenon with its basis in

[10] All doctoral programmes are obliged to construct general study syllabi. Also, an individual study syllabus should also be designed for every student

[11] Swedish Government Official Reports (SOU) is a series in which a commission of inquiry presents its proposal to the government

academia but located also in different sectors. Doctoral students can be affiliated with several universities and partake in multi-disciplinary and cross-disciplinary projects as well as in sector-transcending collaborations in which research, politics and commercial interests interact in various ways.

In the 1970s, when confidence in social engineering was high, collaboration primarily occurred within the realm of Swedish sectoral research. Doctoral students could be enrolled at universities but employed by a public authority or funded from a sectoral agency to study a particular problem. Eventually, critical voices were raised against sectoral research and gradually it was dismantled in the 1980s and 1990s. Political interest in strengthening relations between research and society in general as well as between research and industry and commerce was not diminished however. This was manifested in 1993 when the Higher Education Act specified the importance of collaborating with society in general, which was an expansion of universities' mission to communicate research to the general public, stipulated in 1977. Various forms of collaboration exist today and below we provide some examples relating to doctoral education.

Since 2010 there are two types of doctoral degrees in Swedish higher education; the degree of doctor and the degree of doctor in the fine, applied and performing arts (SFS 2013:617).[12] Sverker Jullander (2007) links the degree of doctor in the fine, applied and performing arts to practice-based research which can be found in several other areas and which is sometimes labelled praxis research and design research (see Carlgren ed. 2005, Forsberg 2010). In common for these approaches are their attachment to practices outside of academia in which the researchers are, in some sense, professionally competent. One example is clinical research which ever since the publication of *The price and crisis of clinical research* (1998)[13] has been subject to evaluation and investigations. Another example on doctoral education within a context of professional practice is the licentiate[14] graduate schools which were introduced by the government in 2008 within *Lärarlyftet*[15] with the purpose of

[12] SFS is Swedish Code of Statutes, the official publication of laws enacted by the Riksdag and ordinances issued by the Government

[13] *Den kliniska forskningens kris och pris*

[14] The Swedish two-year third cycle research degree

[15] A government continuing professional development initiative for teachers

opening up new career paths for school teachers and to promote school improvement.

Another form is constituted by industrial graduate schools, which were established in 1994 and partly funded by the KK-foundation to, among other things, stimulate collaboration between academia and industry and commerce but primarily to form bases for economic growth and strengthened competitiveness. Students in these graduate schools are expected to act as "brokers" between academia and commerce and they

> *… should share their time between the company and the university within the realm of their employment, have a business-related dissertation project and be supervised by both an academic supervisor and an industrial supervisor (our translation) (Wallgren 2007, p. 21)*

There are variations with regard to funding, the placement of employment, location, completion time, and supervision etcetera. In common for these types of doctoral programmes is a notion of a bidirectional transfer of knowledge that also affects how the aims and purposes of doctoral education are perceived and, ultimately, the learning and working conditions for students.

Parallel to the PhD, many countries, for example the United States, Great Britain and Australia, offer *Professional doctorates*. Here, students typically come from the professional field they choose to study, and their research is conducted in close proximity to their professional practices. Some doctoral programmes in Sweden present similar traits but there is no formal distinction made between these programmes and more traditional PhD programmes – both types lead to the degree of doctor. Although there are several different doctoral titles in Sweden, such as Doctor of Philosophy, Doctor of Medicine, Doctor of Theology and Doctor of Technology, they all sort under the degree of doctor in the Higher Education Ordinance and share the same quality descriptors (intended learning outcomes). The only exception is the aforementioned degree of doctor in the fine, applied and performing arts.[16]

[16] In order to receive the degree of doctor in the fine, applied and performing arts, doctoral students must also demonstrate creative competence within their fields which means that their doctoral training needs to provide them with the right prerequisites for developing their professional competence.

In some cases, Sweden has chosen the two-year licentiate degree for research education linked to professional life. One example is the licentiate graduate schools intended to support the development of the teaching profession. The licentiate degree has a dual role in Swedish higher education, as an intermediate exit point as well as a degree in its own right within certain fields. The relationship between specific professions and doctoral education also involves transition and admission to doctoral studies. Long specialised vocational programmes, which lead to professions such as medical doctors, specialised nurses, psychologists or psychotherapists, are not entirely compatible with the educational structure devised under the Bologna scheme (3 + 2 + 3 years). Hence, doctoral education risks becoming a separate and "streamlined" track without any connection to particular professions.

Another movement that can be related to an emphasis on outreach and engagement is the increased expectation on doctoral students as innovators and entrepreneurs. In contexts – especially within the EU – where reference to *the knowledge triangle* is frequent, it is precisely innovation rather than collaboration that is stressed. The preface to *The knowledge triangle in the Nordic countries* (Melin & Blomkvist 2011) [17] states that

> *The concept of "the knowledge triangle" is relatively new and, traditionally, strategies have focused on education, research and innovation separately or as a combination of two, but rarely on all three in one and the same context (our translation). (p. 7)*

and moreover

> *The knowledge triangle concept could possibly be viewed as a buzzword used primarily within politics and especially in various EU-related* contexts*. Within universities as well as in national politics on education, research and innovation, the concept is far less used (our translation). (p. 49)*

In *Promoting innovation in universities and university colleges, part 1* (SOU 2012:41) [18] special investigator and chief administrative officer, Curt Karlsson, advocates caution.

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[17] *Kunskapstriangeln i Norden*

[18] *Innovationsstödjande verksamheter vid universitet och högskolor, del 1*

> *The government often uses the concept "innovation" to describe activities in the third corner, despite the fact that this appears to be a significant diminishment in relation to the formulations in the Higher Education Act regarding collaboration, information and utilization. However, the labelling of the third corner of the knowledge triangle must be viewed from the perspective of the EU's description of the triangle where precisely innovation is highlighted. But used as a model of explanation or basis for reform, the knowledge triangle is questionable and can easily become misleading (our translation). (p. 23)*

The emphasis on collaboration and innovation is intimately linked to an altered view of research and of what can be perceived as relevant research problems and useful knowledge (see Jörnesten 2008, Elzinga 1990) which, in turn, can determine what doctoral education can and should be.

From an apprenticeship to an education

In summary, doctoral education appears in different ways when considered from the emphases education, research and outreach. Adding disciplinary and cultural differences, the question of what constitutes quality in doctoral education can have several answers and inspire very different educational strategies. Depending on where emphasis is placed, our image of what characterises the ideal doctoral education is altered.

Moreover, doctoral education is closely connected to the evolution of national models for higher education governance and with the cultural history into which doctoral programmes are imbedded. In *The use of doctoral education* (2004)[19], Sam Hägglund and Jan-Eric Degerblad present different university models: the Swedish "entrepreneurial university" is compared to the German "research university". They also describe the British "educational university", the French "elite university" and the American "graduate school university".

The Swedish higher education landscape is changing. If politicians, a few decades prior to the turn of the millennium, attempted to form a uniform higher education sector with widened participation and with the resources for education and research regionally distributed, then politics today are characterised by increased differences between large, research-intensive

[19] *Nyttan av forskarutbildning*

universities and smaller regional university colleges. The Bologna process also entailed a clearer division between different types of education where the development of international master's programmes in close proximity to doctoral research have become important and characterising features for large universities (Lindberg-Sand 2012). Today, when smaller university colleges no longer are expected to harbour doctoral education to an extent required to cater to their own need of teachers, perhaps universities should be prescribed to take responsibility for providing university colleges with teachers in certain subject areas. From this perspective it is also a problem if the transition of Swedish students to doctoral education drops further. There is a remarkable lack of discussion on the national level regarding these matters.

In conclusion, doctoral education is not solely about educating researchers but also about providing universities and university colleges with teachers, as well as providing authorities, public and private sectors with qualified and competent experts within a broad range of fields. Coming from a situation where educating researchers was in no way a given we have now arrived at a situation where doctoral education fills many needs in society and where it is expected to adjust itself to various types of requirements from different sectors and agents.

Swedish doctoral education - An emerging landscape of governance [20]

Although there are examples of government regulations for doctoral education from the late nineteenth century – such as the introduction of seminars and supervision – it is during the second half of the twentieth century that doctoral education becomes politically relevant. The contribution from research was considered crucial for the development of the welfare state and the education of new generations of researchers was considered an important instrument for safeguarding the future (Odén 1991). Ever since then, and especially during the twenty-first century and in relation to policies intended to further develop Sweden as a knowledge society, doctoral education has increasingly become subject to political initiatives.

[20] This section builds partly on SOU 2004:27 attachments 5 and 6 and on Haraldsson (2010)

In 1963, *Forskarutredningen* (a government inquiry on research) was appointed and commissioned to model proposals for how to make doctoral education more effective. Lowering the requirements for the degree of doctor was one proposal that was put forward (SOU 1966:67). Critics stressed that an overly governed and mechanistic doctoral education would pose a threat to originality and creativity. The 1969 reform of doctoral education (Prop. 1969:31) fixed the completion time for a doctoral degree to four years and dissertations were expected to decrease in scope as a result. From the point of view of formal frameworks, Swedish doctoral education today is, broadly speaking, a product of the 1969 reform. As a result of an investigation of doctoral education in 1974, general and specific entry requirements for doctoral students were introduced (SOU 1977:63).

The importance of more structured and coherent doctoral programmes including increased supervision, better access to relevant courses, and collaboration between subject fields, has been the subject of debate since the latter part of the 1960s. In the so-called *Andrénska utredningen* (a comprehensive investigation of the Swedish higher education sector) which was appointed in 1979, several major issues were on the agenda: the funding of doctoral education, educational objectives, entry requirements, recruitment, curricula, supervision and planning as well as assessment and assessment of qualifications. The committee heading the investigation noted that these were pressing issues but, at the same time, areas for which the universities themselves had to make decisions.

In the 1980s, questions of effectiveness and funding of doctoral education was on the agenda again. In 1987, the possibility for doctoral studentships[21] was introduced and in 1988, it was decided that admission to doctoral studies should be restricted to only those who could be offered acceptable terms and conditions. In 1993 the bill *A proposal on graduate schools*[22] was presented and as a result a number of graduate schools were established in the 1990s; a development which has continued since. When 16 new graduate schools were initiated in 2001, their purpose was to improve the quality of doctoral education, boost recruitment, enhance throughput statistics, and establish

[21] A doctoral studentship is an employment to study and grants the student the same social benefits as other employees. The studentships may last no longer than eight years, and the total time of employment may not exceed four years of full-time studies

[22] *Ett förslag om forskarskolor*

collaborations with higher education institutions that had no doctoral programmes.

In the 1990s, the need for more doctoral students and increased collaboration with the public and private sector was especially noted. However, funding and effectiveness were yet again essential questions on the political agenda. Eventually these questions resulted in another reform in 1998 which became the second major reform of doctoral education. This time the minimum number of degrees within each disciplinary research domain was regulated. Other modifications involved requirements for student funding at the time of admission, stricter restrictions on completion times (a maximum study time of 8 years and a maximum of 20 % of departmental duties on top of that), doctoral studentships for the last two years, all doctoral studentships to be advertised, the overriding responsibility of the faculty board, increased requirements on individual study syllabi and the possibility of withdrawing students' rights to supervision. The requirement for a general syllabus for each subject offering doctoral education already existed from before.

At the start of the twenty-first century, each university was required to formulate regulations for admission to their doctoral programmes stating rules for applications, eligibility and selection as well as information on the procedures for decisions. Doctoral students who have been admitted to a doctoral programme after July 1st 2007 should have at least two supervisors. Additional regulations introduced in the twenty-first century involve participation of doctoral students in courses on teaching and learning in order to be able to teach themselves as well as the universities' obligations to arrange training for supervisors and their responsibilities for the career opportunities for doctoral students. When higher education in Sweden was adapted to fit the European framework (QF-EHEA 2005), parliament decided to hold on to the four-year programmes. In order to adhere to the three cycles of the framework (3 + 2 + 3 years) it was decided that admission to doctoral education in Sweden would not require a degree of master but that students could be admitted after only one year of advanced level studies (3 + 1 + 4 years). Entrants holding a two-year master degree should be allowed to transfer one year worth of credits from their advanced level studies and thus be able to complete doctoral studies in three years and, hence, their degree would be similar to the European standard. However, as the credit transfer must be petitioned by the doctoral student himself or herself, which very rarely happens, the total completion time for doctoral students with two-year masters' degrees constitutes an extra year (i.e. 3 + 2 + 4 years). Thus, these

doctoral students' degrees correspond to a higher level than their European counterparts. However, for some subject areas, courses are coordinated between the second and third cycle in such a way that doctoral studies, although officially spanning four years, in reality span three years. The whole situation entails 1) that the validity of a two-year master's degree in relation to Swedish doctoral education remains unclear, 2) that the formal framework for doctoral education does not correspond to actual practice, and 3) that Swedish doctoral education exists in both a three and four year version.

The Swedish autonomy reform, with amendments to both the Higher Education Act and Ordinance in 2011, lead to changes in formal responsibility for doctoral education. The universities were, to a greater degree than before the reform, given responsibilities and mandates regarding their own organisation and structure for decision-making. Directives on compulsory supervisor training were retracted from the Ordinance, which meant that each university could decide on this matter itself.

Following Sweden's entry into the European Union in 1995, Swedish doctoral education is now also affected by decisions made by the EU Council of Ministers, EU directives that are ratified through Swedish legislation and activities coordinated through the Union's open collaboration model. Changes to Swedish doctoral education have resulted from both more general decisions and decisions directly concerned with doctoral education. The European development is dealt with briefly below in relation to our discussion on doctoral education and globalisation.

A number of issues keep recurring in the Swedish government's reform of doctoral education. These issues concern for instance, scope, funding, admission, widening participation, supervision and supervision training, length, throughput and efficiency as well as career opportunities within the various sectors of society. Additionally, a shift from regarding the dissertation as a life's work has come about as well as the possibility of exiting the programme at an intermediate stage but still achieving a "mid-way" degree[23]. Content-wise it is possible to discern a change in policy, related to the three emphases previously discussed (education, research, outreach/engagement), progressing from doctoral education as research to doctoral education as structured education and subsequently as an instrument for collaboration/innovation,

[23] The two-year licentiate degree

societal growth and competitiveness. Furthermore, Sweden's alignment with the European framework has also entailed some ambiguities with regard to programme structures. There is also an increasing interest in the periods before and after doctoral study, for instance career opportunities.

Doctoral education and globalisation

The growing number of stakeholders emerging for doctoral education can be related to increased expectations on doctoral education to answer to more societal needs. Up until the mid-twentieth century, doctoral education was primarily a concern for academia and for the professoriate in particular. Today, however, doctoral education is also a major concern for university administration and management. In the second half of the twentieth century, the construction of the Swedish welfare state and the growth of the commercial an industrial sectors demanded a different and more qualified work force. These changes corresponded to a greater interest for doctoral education from politicians and commercial and professional organisations, manifested through an increased number of regulations but also investigations, publications and policy documents from different actors such as the Swedish Confederation of Professional Associations, the Union of Civil Servants, the Swedish Confederation for Professional Employees, the Swedish National Union of Students and the Association of Swedish Higher Education as well as the Confederation of Swedish Enterprise.

As Swedish research and doctoral education is funded by external parties to an increasing degree, various research funding bodies have also come to exercise more influence over doctoral education. Parallel to several investigations and reports published by the Swedish National Agency for Higher Education, the Swedish Research Council and the Royal Swedish Academy of Engineering Sciences have issued several publications. From a Nordic perspective also, there is expressed interest in doctoral education. Nordforsk (www.nordforsk.org), which is a platform for collaboration with regard to research and research politics under the Nordic Council of Ministers, has funded doctoral students and arranged specialised courses, summer schools and so-called Nordic graduate schools following the establishment of Nordic centres of excellence.

Along with increasing numbers of stakeholders, more diversified demands on doctoral education are expressed, not only in Sweden but also internationally.

Swedish publications on doctoral education are increasingly referring to international developments, particularly European, and attention is given not only to the research community but increasingly also to the intersection between research, politics and the market.

In the United States the Carnegie Foundation initiated a five-year project called the *Carnegie Initiative on the Doctorate* (CID) in the United States. This project was carried out in collaboration with departments that wanted to change their doctoral programmes. The project resulted in conferences and workshops as well as publications. Additionally, there are several supranational organisations such as the OECD, UNESCO, the World Bank and the EU who have drafted policies in relation to doctoral education based on aspirations of improving the contributions from education on economic growth both nationally and regionally (see Nerad 2011). There are numerous cross-references in documents from the various supranational actors and, here, we will focus on the development of policies on the European level.

Doctoral education in a European context

The political background to the development of policies for doctoral education in Europe can be referred back to the Bologna process and in particular to the ministerial meeting in Berlin in 2003 when the doctoral level, the "third cycle", was included in the process. The next step was taken two years later through the Salzburg Basic Principles, which determined that doctoral education should proceed through original research, that it should be embedded into departments, should meet the needs of an employment market wider than academia, prepare students for a professional career, increase mobility and innovation, and be characterised by variation. The principles gained support by the foreign ministers in Europe, which led to similar reforms in many countries. The Bergen Communiqué (2005) stressed that doctoral education should form a link between the *European Higher* Education *Area* (EHEA) and the *European Research Area* (ERA). Furthermore, the ministerial meeting endorsed the Qualification Frameworks QF-EHEA, which meant, among other things, that learning outcomes should be formulated and used as descriptors for the doctoral degree. Additionally, the ministers sanctioned the *ESG - Standards and guidelines for quality assurance in the European Higher Education Area*.

More researchers with better training is an important precondition in order for Europe to become the most competitive knowledge-based economy in the

world. Quality assurance, which has emerged primarily in the context of undergraduate education, is now also being considered in relation to research and doctoral education. Higher education and research, two areas that previously belonged to two different political spheres within the EU, have now been joined through doctoral education. In London in 2007, the importance of avoiding too much regulation was pointed out, but it was also noted that the status of doctoral education needs reinforcement and that funding and career paths should be safeguarded for early stage researchers. The importance of more structure within doctoral programmes and continued collaboration and exchanges of experiences was emphasised as well as the autonomy of universities. Great differences between the countries with regard to the organisation of doctoral programmes were also noted.

The *European University Association* (EUA) is an important actor on the European level and its *EUA Council for Doctoral Education* (EUA-CDE) purports to contribute to the development of doctoral education in Europe. The CDE takes an active part in the political dialogue within the EU as well as on a more global scale and, moreover, drafts recommendations and policies. Additionally, the CDE arranges conferences and workshops and initiates networks. A number of projects have also been initiated, for example the ARDE, CODOC and FRINDOC projects. These projects will be discussed briefly under the heading *Doctoral education as an object of knowledge*.

The Bologna process was officially concluded in 2010. However, the collaborating organisations that were founded in the process persist and coordinate the more than 40 countries within the EHEA, primarily in relation to quality assurance of higher education. The *European Quality Assurance Forum* (EQAF), which arranges annual conferences, is one example. The EQAF joins four major stakeholders: the *European Association for Quality Assurance in Higher Education* (ENQA), the EUA, the European Students' Union (ESU) and the *European Association of Higher Education Institutions* (EURASHE). Collectively, these organisations are the main actors in matters of evaluation and assessment in Europe both on national levels and on university levels (ESG 2005) and adhere to the guidelines for quality assurance of higher education in Europe. The requirements outlined in these guidelines have formed the basis for the criticism levied against the 2011-2014 Swedish national quality assurance system, which has been questioned by the ENQA.

The associations mentioned above form examples of European fora that unite policy makers, administrative bodies and parties responsible for quality

assurance as well as researchers who are either active in doctoral education or who conduct research on higher education. These fora exert a significant influence on policies for doctoral education at national and institutional levels.

Byrne, Jørgensen and Loukkola (2013) discuss the on-going changes in Europe in terms of an altered context characterised by an extensive expansion and a widening of objectives. With reference to the *Salzburg Basic Principles,* doctoral education is described as research, not as a preparation for research, and research is described as the means for doctoral training. Departmental structures and strategies are also emphasised as well as the importance of focusing on both broad and deep knowledge. Both trends and challenges are identified. Examples of the latter are risks related to autonomy, structure and quality assurance. The authors express concern for negative effects of too much regulation and micromanagement. Also, they expect difficulties in developing adequate methods for quality assurance, as these should take into account not only curricular aspects but also aspects related to the research and departmental environment.

In a commission report issued by the EU in 2011 and with the subtitle *Towards a common approach* the incentive for engaging in and developing doctoral education is attributed to the *Europe 2020 Flagship Initiative Innovation Union Policy* which was launched by the EU (Commission of the EU 2010). The report models a common understanding of doctoral education and mechanisms needed for its implementation. The balancing of supply (trained researchers) and demand (recruitment of researchers) is described as a means to strengthened research and development within the EU. Hereby, the question of doctoral education is extended from attracting and recruiting doctoral students to involving also career opportunities after completion. From a European point of view, doctoral education emerges primarily as a means of reinforcing Europe's position as a leading knowledge economy.

DOCTORAL EDUCATION AS PRACTICE

Doctoral education is highly individualised and even within a single subject doctoral paths can take different courses from case to case. Although doctoral education has become increasingly regulated through laws and policies during the last few decades, there is still a great deal of local variations and adaptations. New elements and requirements merge with traditions that are sometimes explicit but more often implicit. Formal and informal influence is exerted by many different actors who sometimes have different interests and agendas. Doctoral education is difficult to demarcate from other practices and activities within academia and, furthermore, its borders to industry and commerce, the public sector and authorities, funding bodies and society in general are both vague and very permeable. The number of actors outside of universities, who affect doctoral education both directly and indirectly, has increased. Overall, doctoral education constitutes a complex and challenging object for universities to grasp and manage.

Doctoral education and academia

Doctoral education is integrated into almost all academic practices. Circumstances, decisions and priorities that affect these various practices therefore also affect doctoral education at the same time as the size, orientation and organisation of doctoral education also greatly affects universities in both long-term and short-term perspectives.

Doctoral education does not only exist parallel to research, first and second cycle education, and public outreach and engagement but rather builds on these practices, their organisation and processes. The greatest and most important element of doctoral education is that the doctoral student conducts his or her own research. Hence, doctoral education requires access to the structural support and creativity and quality promoting processes for research, such as seminars, systems for peer review, conferences, journals and publishers.

Academia, its practices and actors, in turn, are dependent on doctoral education. This reciprocal dependency of academia and doctoral education is rarely discussed. We would like to argue that doctoral education occupies the *solar*

plexus of academia, which must be taken into consideration when discussing quality and quality development in relation to doctoral education.

The highest level of education

In the past, many doctoral graduates used to find employment within the world of academia. However, in a global knowledge society, more and more graduates leave academia after receiving their degree. This development is intended and welcomed by governments in Sweden as well as in other countries and universities today are expected to provide society with highly competent persons for many different roles and functions. Thus, the organisation and design of doctoral education breeds consequences that far extend academia. Additionally, graduates who continue their careers within academia will affect society through their continued research, through the students they teach and through the doctoral students that they supervise. Who is given the chance to conduct doctoral studies, within what subjects and what type of competencies and experiences that doctoral programmes generate are all important questions for academia as well as for society in general. Consequently, doctoral education can be described as a practice through which academia fulfils a number of societal expectations and functions.

The gateway to the academy

Doctoral education is necessary for the regeneration and development of academia as it shapes the new generations, which, in turn, will shape the future universities. The new academics contribute to the development of research-based knowledge both during and after their doctoral training. On recruitment, not only those who will receive access to the highest education level are chosen, but also those who will be given the chance to become part of academia. Although degrees from first and second cycle education or professional qualifications can merit academic positions, the degree of doctor is required for the highest academic or administrative positions and thus for the possibility to exercise influence within the academy. The process of selection of students to doctoral programmes, hence, has far-reaching consequences not just for individual universities but also for academia at large.

Increased demands for efficiency and productivity can be very difficult to combine with original and creative research. This difficulty might also entail

that those who have the greatest potential for becoming the most creative researchers are not attracted to doctoral education or not chosen for it. Neumann (p. 222 in Boud & Lee) argues that there is a clear trend towards risk minimisation. The great researchers of the future are not those that get recruited. Rather, those who require very little supervision and complete their degrees quickly are the ones that are chosen. Also, the design of students' projects can be steered towards efficiency rather than quality. Dissertation subjects and projects are chosen on the basis of how feasible they are. They are often provided by the supervisors and limited time is given for the doctoral students to chisel them out further.

Doctoral students' research production

Nowadays, the research conducted by doctoral students constitutes a considerable part of the research carried out at Swedish universities. Therefore, the design and organisation of doctoral programmes affects not only the students learning, but also significantly the quantity and quality of Swedish research.

The size and orientation of doctoral education affects which research areas that can evolve and which that become extinct. This circumstance can be used strategically to reinforce or initiate new research fields. Cross-disciplinary collaborations are made possible through doctoral students who serve as bridges and mutual concerns for the senior researchers. Few senior researchers have the privilege of devoting four years of full-time work to a new area of research and doctoral students can play pivotal roles in the establishment of such new areas. Sometimes doctoral students are used to scout new and exciting but risky research areas. In the best-case scenario, this could be beneficial for everyone involved but if and when the projects fail, the doctoral student will find him or herself in a very troublesome situation.

Qualified research requires both wide and deep knowledge but not necessarily resided within one and the same person. Hence, research teams can let doctoral students deal with very narrow matters, albeit within extensive projects. It is common to assume different roles in research teams and rationality dictates that the person who is best at one particular task in a project also is the one to carry it out. However, this rationale is reversed when the project and the person is viewed from the perspective of education. Then the person who has not yet mastered an aspect of research, i.e. the student, should be given opportunity to practise. If project rationality takes precedence over educational rationality the student may be bereft of many

opportunities for developing competence. On the other hand, in research fields where doctoral students instead work very independently, there may be very few senior researchers interested in the student's research and hence very few opportunities for formative feedback and new perspectives. These effects may be further augmented through demands for efficiency and research productivity in doctoral programmes.

Consequently, there is a risk that the organisation of doctoral programmes and the short-sightedness sometimes present in research move doctoral education away from conditions that are favourable for student learning or, for that matter, with an optimal regeneration of the research community or of academia as a whole.

At the same time it would be reasonable to assume that not many people would like to revert to the days when doctoral students (often without funding) with high ambitions worked year after year. Already in 1969 the government bill 1969:31 (SOU 2004:27) stipulated that the dissertation should not be a life's work: "The individual's most essential contributions should generally be expected to materialise after a period of training and not as a part of the training." Thus, it is necessary to discuss the balance between efficiency, on the one hand, and scientific learning and creativity on the other.

Regeneration of academia requires more than research competence

Future generations of academics need to be able to do more than conduct research. In *Scholarship reconsidered* (1990) Ernest Boyer described four important and interdependent areas of scholarship in order to broaden the understanding of academic proficiency and to give legitimacy to the whole competence. Apart from the *scholarship of discovery* (research) he underlined the need for: *scholarship of integration* which focuses on the need for scholars to integrate and interpret knowledge and use various perspectives; *scholarship of application* which involves application of research, public outreach and engagement in order to spread ideas and identify new research questions, and *scholarship of teaching* in order to attract and educate new generations of critical and creative thinkers capable of continued learning.

In *The Formation of Scholars,* Walker et al. (2008) discuss how doctoral students are shaped into academics. The authors argue that the doctoral degree should entail more than gaining knowledge; students also need to develop academic identities. Their acquisition of knowledge and competence

(as well as the title itself) endows them with a type of power and authority that also requires integrity and a moral stance. This is particularly important as doctoral education also moulds the future leaders of academia.

Academic practice and culture needs to be both reproduced and developed. As with all communities of practice, (Lave and Wenger 1991) new peripheral participants shape the community at the same time as they are shaped by it. How doctoral students are shaped and shape depends on how they are perceived, what experiences they are allowed, what arenas they gain access to, what tasks they are given as well as what knowledge and norms the community itself harbours about its own practices and context.

On comparison, the organisation and contents of doctoral programmes differ greatly between different subject fields. In some fields, taught elements can constitute as much as half the programme whereas in other fields they may span only 10 weeks. Moreover, the dissertation can be composed of a relatively extensive monograph, which the doctoral student is the sole author of, or it can be a compilation thesis of articles co-authored with the student's supervisors and sometimes other authors too. The subject of the dissertation may be very broad or narrow in relation to the discipline. Possibilities for collaboration and teaching while enrolled as a doctoral student may vary greatly. Research ethics (see e.g. the Swedish Research Council's guidelines for research ethics) can be a manifest part of the curriculum or lacking completely.

Doctoral education follows research – with consequences for academia

Doctoral education is more extensive in subject areas where research is most successful, or considered most important, and, consequently, attracts most research funding. Success breeds success, which, in turn, generates financial possibilities, but also a greater need for doctoral students. Research in Sweden is increasingly dependent on external funding. Hence, funding bodies, together with those researchers who best manage to acquire part of this funding, have great influence over doctoral education. This influence is even greater than it seems at first glance as universities and faculties often have to contribute significant amounts of co-funding, for example in the form of infrastructure, in order to attract external funding.

A university can direct funding to specific strategic areas, either directly or by coordinating and backing major research applications. Substantial ventures

to create specific research facilities or other types of infrastructure could influence research orientations at universities for a long time. University leaders often represent their universities in various international committees and they, thereby, contribute to policies that promote certain research areas or specific forms of research collaborations.

The size and orientation of research affects doctoral education, which in turn affects the universities' capacity to contribute to society through other means than research. This mechanism through which academia evolves could be regarded as quality enhancing. However, it could also be viewed as problematic as education, outreach and collaboration often arise from knowledge and competence developed outside the most successful research fields. A great deal of outreach and collaboration requires academics with a broad and integrated knowledge and competence related to different professional fields. There is a danger that large professional study programmes, various forms of collaboration, entire subject fields, or fundamental research areas, which all need to be regenerated with research competent teachers, and with research, become watered down.

Prestige and future prospects through doctoral education

Doctoral education bestows universities, faculties, departments and research teams with prestige and status. Doctoral students' research, both in terms of quality and quantity, directly affects the way in which the organisation is regarded which, in turn, affects its possibilities for new projects and funding. Doctoral students' teaching and outreach also affects how the university is perceived and the recruitment of new students. The number of doctoral students graduating bears significance on universities' standing and reputation and often entails possibilities for funding new doctoral students. Opportunities of supervising doctoral students can attract successful senior researchers to universities and departments.

The success of doctoral students is intimately linked to the success of their supervisors. Successful doctoral students provide supervisors with status and standing. Co-authoring with their students awards supervisors directly but, in other cases, also doctoral students' future careers and contributions to research have bearing on their supervisors' CVs. Conversely, the failures of doctoral students, even after finishing their programmes, affect their supervisors' standing. Such failures may be the result of poor supervision but may

also be caused by other factors. Regardless, the consequences can be dire for supervisors.

The standing and continuance of universities build on the trust society places in their contributions to the world and its knowledge. Hence, the new knowledge that is generated through doctoral education makes a difference to the legitimacy of universities. Furthermore, doctoral education contributes to society to an even greater extent by graduating what are often very competent agents.

Doctoral education is deeply rooted in the enterprises of universities, departments, groups and individual academics and plays a central role for future opportunities. Its positioning at the *solar plexus* of academia renders scrutiny and intervention painful – interference with doctoral education could have unpredictable and possibly disastrous consequences.

Management and leadership of doctoral education

Management and leadership of doctoral education is challenging as this practice formally is defined as education, but is deeply incorporated with and dependent on other undertakings at the university. Additionally, government and external funding situates doctoral education, both practically and in terms of power distribution, within the confines of research[24].

There are several hierarchies within academia which sometimes pull in the same direction but which also compete. Bureaucratic/organisational hierarchies, including, for instance, heads of department and directors of study, exist beside formal academic hierarchies of deans and professors as well as informal academic hierarchies of successful researchers and prominent public debaters. All these hierarchies are significant to doctoral education – both supervisors and doctoral students move in, and up, in them.

[24] Swedish institutions receive funding from the government for research and doctoral education. How these funds are to be used is usually not specified further and when they reach the faculty level they can be used to finance research and doctoral education or for administration and infrastructure for research and doctoral education. Increasingly, Swedish institutions are relying on additional funding for research and doctoral education from different funding bodies. More than 50 per cent of Swedish funds for research and doctoral education come from such external funding bodies

Decision-making procedures regarding doctoral education are blurred and there is often great variation within one and the same university for planning, realising, assessing and developing doctoral programmes. Not only are general regulations interpreted and implemented on the lower levels of the university, but sometimes decisions from separate parts of the university even conflict with each other. The same types of decisions can be taken on different levels within a faculty or department. Moreover, Swedish doctoral education is regulated by several different regulatory systems. Nationally, doctoral education is subject to educational legislation as well as labour legislation[25]. On a local level, there are, apart from policies on university and faculty levels, general syllabi for each research subject. Additionally, there are often general directives regarding funding, admission, dissertations and public defence within each faculty. Supervisors and doctoral students often have insufficient knowledge of the numerous regulations and guidelines and of how they relate to each other. In the last few years, there has been an increase in regulations, affecting how doctoral education should and could be managed and led.

A large number of decisions that affect doctoral education are taken by boards and committees, such as, university boards, faculty boards and departmental boards. However, decisions that are not compatible with the traditions and practices for doctoral education are not always taken into account. For example, we know that it took several years for the national quality descriptors[26] for the doctoral degree, which were introduced in 2007, to become widely known among supervisors and doctoral students.

The size of a university, its range of subject areas and its traditions are factors that affect where different types of decisions are taken. At large, old universities, decision-making is often more decentralised. However, there is a general tendency in Sweden for more general and principle-orientated decisions on the higher levels of the organisation while individual matters are often dealt with on the lower levels. Controversial decisions, such as, for example, admissions of licentiate students or doctoral students on stipends are often taken on a higher level than the less controversial ones such as the admission of doctoral students with faculty funding. Which matters that should be decided by boards and which that should be decided by individual leaders, such as

[25] Swedish doctoral students are to a large extent employed through studentships

[26] Listed as intended learning outcomes in the Swedish HE ordinance, annex 2

heads of department or deans, also differ between universities and sometimes between faculties within the one university. The Swedish autonomy reform[27] brought more freedom to universities. However, most universities chose to convert previous national directives into internal regulations with few or no major changes.

When supervisors and doctoral students collaborate with external parties, the complexity of leadership increases. Cross-disciplinary or national graduate schools can require courses that might interfere with the general syllabi of local research subjects. For students funded through employment with employers other than a university, county councils, companies or municipalities can have their own ideas about the design of the doctoral programme, the focus of students' research and where and how results should be published. When doctoral students are funded by their supervisors' or research leaders' external funding, the conditions for funding may impose large restrictions on the degree of freedom for the students' projects.

Management and leadership on different levels

The responsibility for doctoral education is distributed between several organisational levels, each with different possibilities for management and leadership. Management and leadership are manifested through various types of decisions but often, to a greater extent, through direct interaction in practice. A complicating factor is that one and the same person often wears more than one hat. A doctoral student could be supervised, for example, by the study director for doctoral education, his or her head of department or the group leader of the project in which the student conducts his or her research.

Supervisors and research leaders

As doctoral education involves not only studies but also research, supervision also involves some form of research management. Supervisors are frequently research leaders for projects and research teams. Commonly, this leadership takes place in complex systems where different supervisors assume different roles in each other's research groups and in relation to each other's doctoral

[27] A 2011 reform to increase the autonomy of Swedish HE institutions by decreasing the number of national regulations, effectively giving more power to the vice chancellors

students. The research team leader has an important part to play even if he or she is not a supervisor. The roles and responsibilities in relation to the doctoral student's training are not always clear-cut; an ambiguity that can lead to problems.

Departmental responsibilities

Departments have a large responsibility for doctoral education and for doctoral students. If doctoral students have studentships, there is an added responsibility for them as employees. Departments are also formally responsible for supervision, which involves providing supervisors with support. The extent to which the departmental leadership for doctoral education is exercised varies. A recurring reason for problems stated in evaluations of doctoral education is a lack of, or inadequate, supervision as well as conflicts between the student and the supervisor. Without active leadership in the form of follow-ups and evaluations, these types of problems might ensue and intensify over time. It might be in the short-term interest of both supervisors and doctoral students to conceal such problems. However, in the long-term they become devastating for both parties.

Departments take on the responsibility of leadership in different ways. One way is to arrange active supervisor collegia[28] in which supervision and issues relating to doctoral education are discussed. Heads of department and/or directors of study for doctoral programmes can exercise leadership through performance reviews with both supervisors and doctoral students. Arranging seminars or training for supervisors is a third way of assuming responsibility. How departments organise and lead doctoral education affects the supervisor's role as well as the challenges he or she will face.

Roles and responsibilities – made explicit or not. Heads of department can lead doctoral education but they can also delegate responsibility to study directors or individual professors. Responsibilities can also be delegated to supervisor collegia whose mandates can be more or less explicit. The distribution of responsibilities between principal supervisors, assistant supervisors, supervisor collegia, research groups, professors, study directors and heads of department vary and are not always explicit. Responsibilities and mandates

[28] Supervisor collegia exist in many Swedish HE departments. They function as advising bodies in matters related to research and doctoral education

can be shared by several leaders and are not always linked. Formal leaders, for instance, sometimes engage more in service functions, introductions, information distribution and problem solving than in leadership and strategy-making processes.

Leadership in relation to recruitment, admission and study planning. In most cases, departments have the responsibility for recruitment, admission, supervision, planning and monitoring. According to the Swedish Higher Education Ordinance, vacancies in doctoral programmes should be advertised and doctoral students can only be admitted if funding and study conditions are sufficient. Universities are ultimately responsible for student funding and other necessary resources for the whole duration of the programme and this responsibility is in most cases placed at the level of department. Hence, recruitment and selection processes are very important. One essential question for the department refers to whether the advertised doctoral position is feasible within the confines of the resources available. Responsibilities for doctoral students and their education are long-lasting and the options for terminating a doctoral student's programme in Sweden are very limited.

Taught elements and departmental duties. Finding or arranging courses that are relevant to doctoral students and their projects is often a shared concern within departments. The ability to provide doctoral students with such courses varies significantly between departments. Although departmental duties formally are outside of the doctoral curriculum, such activities can, nevertheless, be important for student learning and development. The departmental duty of teaching, for example, is useful both for students' understanding of their subject fields and for developing pedagogical skills. The extent to which departmental duties are chosen with the students' learning and development in mind varies.

Assessment and career planning. Assessment of doctoral programmes comprises more than a public defence and a passed dissertation. Many other components within doctoral education are relevant as they not only substantiate the dissertation but also contribute to the acquisition of a more comprehensive competence. Consequently, it is important how these components are assessed and how different components within the programme are weighed. However, finalising the assessment of a doctoral student is habitually a question of ticking the administrative box. The doctoral student's understanding of the public defence and of the grading committee's review, as well as the predictability of these processes, differs. Therefore, it is

important that departments prepare doctoral students, supervisors and grading committees for these processes.

Faculty leadership

Faculties decide on policies and provide frameworks for doctoral education. Faculty policy provides rules, recommendations and visions for doctoral education complementing and interpreting directives at the university level. Decisions on the size and orientation of doctoral programmes are often taken on faculty level. These decisions are important not only for the doctoral programmes but also for future research and education at the faculty.

The general syllabi, which provide the frameworks for doctoral education within different subjects, are also determined on the faculty level. It is possible to note differences here, between different subjects' ways of demarcating potential doctoral projects and between their requirements for eligibility and the scope and contents of taught elements. These factors greatly affect the width and depth of doctoral students' curriculum and assessment. Also, faculty policies for individual study plans have consequences on how these can be used to support and monitor the students' learning. Finally, faculty policies for grading committees and opponents are important for quality assurance of the doctoral students' competence and research.

Faculties create structures, provide support and evaluate. Management on faculty level also involves creating structures and providing lower level management with support. For example, faculties can specify tasks and organise networks for directors of study of doctoral programmes, facilitating their leadership and administrative tasks. Another way of influencing doctoral education is to require in-service training for supervisors. Evaluation of doctoral programmes as well as supervisors' and doctoral students' experiences are often dealt with on this level. Should departments run into various types of problems, faculties can take specific actions. Faculties can also identify and share examples of best practice.

In some cases, the faculty level may intervene more directly in doctoral education, not least when problems involving leaders on the lower levels of management arise.

New windows of opportunity for university administration

The Swedish autonomy reform in 2011 gave vice chancellors and university boards more power within their universities. Their authority increased in two directions. The removal of several chapters and sections in the Higher Education Ordinance gives vice chancellors and university boards more room to manoeuvre. Through the reform, the distribution of responsibilities and mandates within universities also became less regulated which entailed that the formal powers which previously should be bestowed upon faculties, now can be transferred to the central level.

Of course, it is impossible to manage a university's day-to-day activities, let alone doctoral education, from the central levels of administration. Management and governance from this level manifests itself primarily through regulations, policies and guidelines. This includes the distribution of responsibilities and mandates on the lower levels of management as well as investigations and follow-up measures.

University leadership often takes a normative role by stressing certain actions and goals. This can be done directly through participation and through policies and guidelines. It can also be done indirectly by initiating different projects, for example courses for leaders within doctoral education and research programmes.

Courses for leaders and supervisors

Courses for supervisors and academic leaders have become increasingly common in Sweden and these are often mandatory, also after 2011 when the section on compulsory supervisor training was removed from the Higher Education Ordinance[29]. Learning changes learners, who can acquire new knowledge and may take on new approaches and instruments for their leadership. The design and content of such courses, thus, can influence doctoral education and supervision. Consequently, those who teach, lead and coordinate these courses exercise "soft" leadership on doctoral education.

[29] This section was removed as a consequence of the 2011 autonomy reform. However, most universities adopted this rule in their local regulations

As described above, doctoral education largely emanates from those practices and research-related processes that exist within departments and faculties. Educational structures may be developed to a greater or lesser degree, and the formal leaders for doctoral education can be more or less actively involved. Doctoral students and supervisors can jointly shape extensive parts of doctoral programmes themselves or they might do so separately. Input and support from other senior researchers or doctoral students, might be organised or could materialise rather *ad hoc*.

We have chosen to illustrate a number of crossroads where doctoral students' education is shaped in the intersection between practices, traditions, agents, priorities, leadership and regulations. We will provide examples of how important decisions are made at these crossroads and make comparisons between different subject areas. We will use the concepts "faculty" and "faculty board" to denote the level that has the overriding responsibility for doctoral education.

Funding and recruitment

As doctoral education plays such an important and integrated role for universities, the opportunities to recruit doctoral students, as well as the students' departmental affiliation and subject orientation, become urgent questions. With the exception of the law-given power to award degrees, funding is the determining factor for which subject fields will have doctoral programmes. Swedish doctoral educations is primarily financed by: 1) government funding, which universities distribute to their faculties or equivalent (henceforth referred to as faculty or internal funding); 2) research grants, awarded in competition through peer review, from different funding bodies; or 3) funding from industry, county councils, the public/municipal sector etcetera (this funding might be earmarked for specific projects and people). These three forms of funding provide different actors with possibilities for influencing the orientation of doctoral education as well as affecting who gets to embark upon an academic career.

In contexts where doctoral education primarily is financed by faculty funding, faculties, often in consultation with departments and supervisor collegia, exercise influence over recruitment of doctoral students. For faculties with many departments and subjects, the distribution of funding for doctoral

education can be a crucial issue. Important considerations have to do with whether distribution should ensue from the need for maintaining a subject that is under threat or, alternatively, establishing new subjects, which may be important for first and second cycle education, or whether funding should be distributed on the basis of which subjects and departments are the most successful within research and doctoral education and which, therefore, could be expected to offer the best supervision and environment for doctoral programmes. A common procedure is to advertise doctoral studentships with broad subject descriptions and let the applicants' qualifications and project plans be the decisive factors regarding which subject should be awarded the doctoral studentship. Sometimes several doctoral studentships are advertised simultaneously within the same or similar subjects in order to achieve a critical mass of students.

In contexts where doctoral education primarily is financed by external funding, notably medicine, the natural sciences and engineering, the situation is quite different. Although faculties and departments formally decide on matters concerning recruitment of doctoral students, in reality, external funding bodies together with the researchers who have submitted the research proposals decide the size and orientation of doctoral education as well as within which subjects and departments it will take place.

Since 1988, doctoral studentships are to be publically advertised and anyone formally eligible to doctoral education should be given opportunity to apply and be assessed. Recruitment of doctoral students is a critical area of tension within doctoral education.

Admission

Admission – then and now. In 1988, the Swedish Higher Education Ordinance stipulated that admission of doctoral students should be restricted to the number of students that could be offered acceptable terms and conditions. Before, faculties (in reality individual professors) could admit a large number of students without any guarantees for supervision, access to facilities or financial support. Instead, various forms of temporary scholarships and employments were used to fund doctoral students and when these terminated, faculties were not obligated to contribute funds for the remainder of students' studies. Hence, supervision and other resources were not locked up to the same extent that they are today and, therefore, it was possible to admit students without running any great financial risks and

without taking consideration to whether or not students' ran the risk of not completing their education. Often, doctoral students received supervision only after they had proven themselves worthy of it (after having shown research skills through advanced research). In this way, support for students, in the form of supervision and other resources, was granted gradually and selectively. Assessment of the candidates' qualifications and potential to graduate, was thus less important at the time of admission. Many doctoral students dropped out of their studies for a variety of reasons and students' rights were low. The students that managed to stay on long enough and prove their worth would gradually receive more support. Although questionable today, this process of gradual selection allowed departments and supervisors extended time to form their decision of who to support. Today this decision has to be made at the time of admission and cannot, effectively, be legally revoked unless in exceptional cases.

Admission has become more important. The last few decades have seen an increased formalisation of doctoral education that has given doctoral students legislative right to an education and to receive stable funding throughout their studentship. Consequently, doctoral education has become an expensive form of education for those organising it and the number of doctoral students must therefore be adapted to match the resources available. The admission process has therefore become an important question. Other expensive study programmes, such as in the fine, applied and performing arts, have traditionally developed sophisticated and selective admission procedures in order to ensure that the few students chosen for their programmes are particularly well suited for the challenges posed by these programmes. Parallel developments can be observed with regard to admission to doctoral programmes and especially with regard to subjects that are funded primarily through faculty funding such as the humanities and social sciences. For these subjects, the number of admitted students has dramatically decreased as a consequence of the demand for full funding.

Who admits and on what grounds. Although faculty boards have overriding responsibilities, there is still a great deal of variation. In the case of faculty funding and studentships advertised with broad subject descriptions, admission is often based on applicants' project plans. These plans are often comprehensive and well-grounded and can give admissions committees a fair idea of the applicant's competence and the potential and feasibility of the project. Admission procedures are becoming increasingly rigorous affairs with active contributions from the supervisor collegium at the department at

which the doctoral students' programme will take place. On selection, considerations can also be taken to the department's possibilities for offering supervision, research environments and other resources.

Subject areas that are primarily externally funded often handle their admission procedures differently. Usually, there already exists a research project that has been externally funded. The researcher behind that project, or someone from the project team, will, almost without exception, serve as supervisor and be deeply involved in both the recruitment and admission procedures. Although the requirements stipulated by the Higher Education Ordinance are adhered to, there is still a great deal of cherry-picking. As supervisors and doctoral students will be working on the same project and supervisors are depending, for their own careers, on the success of the project, as well as on it yielding the results and publications expected, students, who supervisors have gotten to know during undergraduate and graduate levels, are often picked.

A third form of admission occurs when funding has been reserved for specific individuals or groups. Apart from the assessment of general and specific entry requirements, admission in these cases are often mere formalities.

How common are the different forms of admission? The number of doctoral students in the natural sciences, medicine and engineering, in the spring of 2012, amounted to three quarters of the total number of entrants. In these fields, external funding won in competition is very common. Other forms of external funding are also common in the fields of medicine and engineering. Consequently, students are most commonly admitted to Swedish third-cycle studies through the second and third form of admission.

The project plan

We refer to "project plan" as a description, or outline, of the research that will comprise a large part of the doctoral student's education and which will result in a dissertation. The level of detail and extent of such plans vary. Furthermore, when it is written, by whom, how binding it is, whether or not it is part of a larger project, and if there are other interested parties involved apart from the student and supervisors also varies. Although most research plans have to be revised at one point or another, or be abandoned all together, we contend that the original plan for the student's research plays an important role in shaping the student's experience and learning, and subse-

quently, the student's future academic or professional career. The scientific considerations when outlining and reviewing project plans are therefore of particular importance as well as the assessment of how a particular plan relates to existing research, infrastructure and competence (including supervisor competence) at the department or research group.

A fundamental question reads: does the project plan describe a potentially successful research project which can be realised by the student in his or her current research environment and lead to a dissertation of passable quality. However, other considerations are often made in the process of outlining and assessing project plans for doctoral students. Such considerations could be to strengthen or expand a particular research field at a faculty or department, to meet expectations and requirements from research funding bodies, or the aspirations of supervisors. There hardly exists a doctoral student project which does not involve or affect other parties (senior researchers, other doctoral students, practitioners etc.) and more is at stake than the education of an individual student. Depending on circumstances and those involved this can be beneficial for the doctoral student and his or her studies. The student runs a lesser risk of becoming isolated in his or her project and the opportunities for learning in an intense and complex research environment should not be underestimated. At the same time, the learning and development of the doctoral student can be overshadowed by other concerns and priorities. The research and funding of doctoral students may be tied to projects that are unsuitable both for dissertations and for learning. The list of examples of inadequate doctoral projects could be made long: development projects commissioned by industry which hardly can be described as research nor be written up to form comprehensive dissertations; risky "airdrops" with the purpose of reconnoitring unexplored research areas; needs for analysing accumulated data which has been let lie untouched for the very reason that it cannot be analysed; research funding bodies' requests for specific results etcetera.

Project plans are outlined and assessed in different ways. When doctoral student positions are funded with faculty funds, applicants are usually required to attach a project plan to their application. Such plans are not only used to assess the applicant's competence and capability to undertake doctoral education but also to assess the feasibility, quality and relevance of the proposed research project. When reviewing the plans other considerations can be made, including the research, competence and infrastructure available at the faculty. Sometimes plans are drafted with the support from senior

researchers at the faculty and, hence, could be adapted to the research and specific circumstances at those faculties.

In contexts where doctoral education is funded by external funding bodies, procedures are usually different. Here doctoral studentships are primarily advertised in conjunction with projects that senior researchers have designed and been granted research funds for. Hence, the scientific quality, relevance and feasibility of the projects, which doctoral students' education will revolve around, have usually already been assessed by external reviewers. Also, these projects will, in all likelihood, have been outlined with knowledge of local conditions and existing research and infrastructure at the faculty. Research projects for doctoral studies that are outlined by senior researchers before students are admitted are most common are most common within the natural sciences, engineering and medicine. Here external funding, usually applied for in competition by senior researchers, is the norm. Also, within these fields research often requires teamwork as well as specialised and expensive equipment. It should be observed that although these doctoral students' projects have been outlined and reviewed by senior researchers, they have been done so as *research projects* and not as *projects for doctoral education.* In order to assess the latter, the student's possibilities for learning within the project have to be taken in to account. Will the student get opportunities, or even be allowed, to take an active and driving role within the project and, thereby, develop independence? Will the student manage to attain the required number of publications and first-authorships? Will the student receive sufficient supervision and other types of support? Whether or not the project is assessed in terms of its appropriateness as an educational project varies a great deal.

When the student's education is made part of a larger research project, for example an international collaboration, the student's learning may be down-played or be given lower priority in relation to the overall interests of the larger project and the other project members' needs and interests. In multi-disciplinary and international collaborations, through cultural differences and differences in educational legislation between countries, the student's role and education can be understood in many different ways. Another complication is that the student's supervisors may have only secondary roles and limited ways of exerting influence in these kinds of large projects which also can be led by persons who have no formal responsibilities, or defined roles, for the student's education.

Project plans can also materialise relatively late after admission. There are examples of doctoral students who, parallel to an initial and extensive course package, are expected to outline a so-called *research proposal* which is formatively assessed at a seminar more than a year into the doctoral programme. Only after this seminar is it decided who the supervisors will be. This procedure is similar to the traditions of *graduate schools* in other countries and differs from the practices of doctoral education where research projects are defined *before* admission, either by the applicants themselves or by potential supervisors. The procedure of research proposals claims a great deal of time, which entails less time for the actual execution of projects. On the other hand, these types of projects are designed within a department and are given support by senior researchers and at special seminars, increasing the likelihood of projects of good quality and feasible within the educational environment.

Other actors may also fund doctoral studies. Examples are industry, organisations, municipalities, county councils or the public sector. This type of external funding may be earmarked for particular fields of interest and for specific persons or groups. Unlike the regular funding agencies, projects funded from such sources have usually not been assessed through peer review. There is an imminent risk that the proper assessment of the quality and appropriateness of the student's project is circumvented in these cases. In faculties where doctoral education normally is funded by faculty funds, established routines for assessing quality and feasibility usually exists at the faculty and can be employed also in these cases (although at the risk of having to turn down funds). In faculties with a high degree of external funding, which normally entrust this kind of assessment to the peer review process at the regular funding agencies, such routines may not be present.

Supervision

The point in time when supervisors are appointed varies between subject areas. In many faculty funded subject fields, supervisors are appointed after the student is admitted and, if possible, after requests from the student, even though the choice of supervisor can have been discussed before. For most externally funded subject fields the choice of supervisor, at least the principal supervisor but sometimes also the assistant supervisor, is decided already before student admission and sometimes even before the notification of a doctoral position is made. In some subject fields supervisors are appointed only after students have completed up to a year or a year and a half of the study programme. In economics we have seen examples of doctoral

programmes beginning with course work and the composition of a research proposal and supervisors will be chosen on the basis of how the student defines his or her project. We have also witnessed examples of postponed appointments of supervisors within the fields of engineering and social sciences. In these cases, several students have been admitted on doctoral programmes as part of a cohort and devoted their first year to completing courses, teaching and getting to know various research groups and their projects. Not until then has it been decided to which group and general research project the doctoral student's project will belong. In these two cases of postponed appointments, students have had the possibility of affecting the choice of supervisor.

How are supervisors appointed? Irrespective of subject field and forms of funding, the question of who is going to be supervisor is wider than who is the most suitable supervisor for the particular student and his or her project. Supervision provides opportunities for developing and broadening one's own academic competence and, within most areas, experience of supervision is regarded a necessary qualification for promotion and academic positions. For subjects where research is carried out in teams and where doctoral education is characterised by teamwork and co-authorship between students and supervisors, supervision also serves an immediate function for the supervisors' and the team's research and research output. Consequently, the incentive for supervising doctoral students is high, but so is the competition.

A difference between subject fields where doctoral education is faculty funded and fields where it relies on external funds lies in the appointment of supervisors. In the first case the faculty or department, often supported by a supervisor collegium, actively select who they consider to be suitable supervisors. Requests from the student may also be taken in account. In this case the decision on who will be supervising is likely to be made by a group of highly qualified persons who, in accordance with Swedish law, also have the formal responsibility for the student and his or her education. However, an astutely worded and well grounded project by a promising candidate may dazzle the admission committee, which might become more concerned with what they will be gaining than what they can offer in terms of support and research environment. This is an even greater risk when the question of appointing supervisors is separated in time from the question of admission.

In the second case, although the faculties are responsible for taking the formal decisions, in reality, they exert very little influence on supervision and on

which grounds principal and assistant supervisors are appointed. Here, supervisors in effect appoint themselves. With regard to scientific competence, it is more or less obvious that these supervisors are skilled in the field of the student's research – either the supervisor has defined the project himself or herself or he or she is deemed competent enough to be made part of it by the person who has won the research funds for it. These are important qualities for the supervisors but not the only ones. Faculties or departments have few possibilities of affecting the choice of supervisors on the basis of other qualities, such as experience, pedagogical skills or the ability to complement the other supervisor.

The doctoral student's possibility to exert influence over the choice of supervisors also differs in the second case as compared to the first. Here, the student can approach a particular researcher or type of project by choosing to complete an undergraduate or master's degree project with this researcher or research environment, or in other ways approach a potential supervisor. With regard to externally funded projects, it is not uncommon that principal supervisors and assistant supervisors come from the same team. The purposes for this can be manifold; for instance, the relevant research skills needed for the doctoral student's project may be most securely and easily found within the group or a researcher from the team may have already exhibited the loyalty needed from everyone on the team. One objective may be that the main supervisor (who is often the project owner) wants to provide a junior member of the team with the opportunity to supervise and to partake in joint research, both which are necessary for an academic career. In some cases, the main and assistant supervisors previously have had a relation as supervisor and doctoral student. When an assistant supervisor is appointed in this fashion, there is a risk that the appointment is done on the basis of the researcher's needs rather than the doctoral student's. Moreover, there is also a risk that the assistant supervisor is in a position of dependence to the principal supervisors.

The supervisor's participation in the student's research differs between the humanities and social sciences, on the one hand, and medicine, engineering and the natural sciences, on the other. In the former fields, the student's research and education is normally funded by faculty funding and the supervisor has an educational role, as advisor, mentor or critical reader. Students often publish as single authors and rarely collaborate with their supervisors in joint research projects or co-authorships. In the latter fields the student's research and education contrastingly is funded by external funding (the

supervisor's research funds) and alongside a formal educational relationship, the student and supervisor are also research collaborators and co-authors. In the former areas, supervision may become uninvolved and reactive and the doctoral student might not receive enough support. The latter area risks rather the opposite scenario: in view of the fact that a failed student project not only taints the supervisor's reputation (which it, presumably, would do within any field) but also can entail co-authored articles of poor quality, decreased research output, waste of research funds and loss of credibility for future funding, there is a great chance that supervisors take over the student's research and writing or that supervision becomes project management. Regardless of scenario, the student is bereaved from opportunities to develop skills and independence, and the dissertation becomes more the work of the supervisor than that of the student. However, it should be noted that when supervisors and students in these areas manage to handle their double relationships, as student-supervisors and as research collaborators, with care, this type of arrangement has several benefits. The student gradually takes on a greater responsibility for the research and for joint publications. Besides, the student and the work that he or she contributes to the project is of great concern to both supervisors and other members of the research team; a concern which often provides opportunities for participating in different networks related to the project and the supervisors.

Built-in tensions in supervision. We would argue that the structural circumstances that surround doctoral supervision within subject fields that are externally funded give rise to what Goode (1960) call *role strain*, a built-in tension within a professional role, in this case the role of doctoral supervisor. On the one hand the supervisor needs to supervise the student's learning and on the other to manage the research project. These two activities are often in conflict with each other and they also have different goals and rationalities attached. As roles also are constructed in the interplay between actors, the role the student takes, and the expectations that he or she expresses in interactions with the supervisors should also be taken in to account. As complementary roles tend to reinforce one another, the custom of hand-picking students becomes even more problematic. Supervisors who easily assume managerial roles will, presumably, choose students who readily conform to this type of supervision.

Time for supervision. In subject areas that are characterised by individually defined projects, faculty funding and monographs, supervision time is commonly allocated when planning the supervisor's duties. The time allo-

cated has often been defined by the department or faculty. How much time that is considered reasonable could be determined by what is considered appropriate, but it is more likely that economic considerations dictate the terms and conditions for supervision. In subjects that are characterised by projects defined by supervisors, external funding and co-authorships, it is unusual that time for supervision is earmarked in relation to duties planning. Presumably, this is partly due to the fact that supervision can be regarded as a *win-win* situation for supervisors and students and partly due to the fact that doctoral education and the project that the doctoral student is part of are funded by the supervisor's research funds.

Some researchers are main supervisors to several doctoral students at the same time, and sometimes to more students than they can reasonably have time to supervise. There could be several reasons for this. Most Swedish universities and faculties require main supervisors to be docents[30] or have the equivalent degree of experience and competence. If only a few researchers at a department have this title in relation to the number of doctoral students, local regulations often require that they be made main supervisors. The number of doctoral students in a subject is proportionate to the funding available. In many cases, external funding congregates around particularly successful researchers and, as a result, many doctoral students can be recruited. In their capacity as project leaders these researchers often are made main supervisors to the doctoral students even though it is the more junior members of the group, often with some type of post-doctoral position, that handle the bulk of supervision (with or without the formal title as assistant supervisor). These junior supervisors are often directly dependent, both financially and project-wise, on the main supervisor. Hence, a relationship of power exists parallel to the relationship as supervisors to the same student. Being the main supervisor carries a lot of prestige, even for senior researchers, and entails control over the group's research. It is hard to judge where the limit may be drawn for how many doctoral students one supervisor can supervise without negative consequences for the students. How many hours that are reasonable becomes even more difficult when hours for supervision are not documented in duties plans (if, indeed, there are any duties plans at all). Doctoral students, who believe they have not received enough supervision or feel that the supervision they have received has been inadequate, have the right to

[30] In Sweden, docent is a title earned primarily on research merits. As a qualification it is below the grade of professor

complain. However, the doctoral students' ombudsmen that we have spoken to maintain that many doctoral students desist from complaining unless it is absolutely necessary as they are worried that their complaints might jeopardise their continued studies and future careers.

Changing supervisors. Swedish doctoral students are guaranteed by law the right to change supervisor. There may be many reasons for why students would want to change supervisors; for example, they might have come to a new stage in their studies, the orientation of their project may have changed or they might be unsatisfied with their supervision. However, the real possibility to change supervisors differs with different subject areas. Within faculty funded subjects it is relatively common to change supervisors and these are also fairly undramatic affairs. This could be related to the fact that the student's funding is separated from the supervisor's funding – the student owns his or her own project. Moreover, the student is usually the single author of his or her dissertation. Within externally funded subject fields however, matters are usually different. Changing supervisors is less common here and often fairly dramatic affairs for students, supervisors, departments and faculties alike. The supervisor's project loses a project member and risks losing momentum, which entails fewer publications, poorer quality and problems with living up to the expectations of the funding bodies. It may be difficult for the student to continue the research that he or she has started (both up until and after completing his or her dissertation) and to change research orientation at a late stage, which may result in a meagre and incoherent dissertation. As the doctoral student's education often has been funded by the supervisor's external funds, financial problems may also arise. In some cases, the supervisor's original funds may have to finance the student's continued education. As they have conducted the research together they both have the rights to the research and can place demands on the publication of their joint work or alternatively contest publication altogether. In some cases, joint research may result in large collections of data that both parties may claim after the change of supervisor. These circumstances may prove awkward for both parties for a long time. The supervisor also loses the supervision, which is a particularly important qualification for continued funding, positions and promotion within these subject fields.

Contributions from supervisors to doctoral students' research, learning and experiences. What constitutes good supervision depends on what other structural and organised support there is for doctoral education as well as what research environments and activities that are available to students. In some

contexts, supervision is *one of many* relevant components in doctoral education. In other contexts, *supervision is doctoral education.* Apart from the support students receive from supervisors in a well-organised and managed doctoral programme, another important question concerns the support that supervisors receive in order to develop their skills as supervisors. Most universities offer courses for supervisors and also require such courses in order to supervise. The Swedish system with assistant supervisors is one way of maturing into the role of supervisor. Mentorship is another way. Supervisor collegia are common in the humanities and social sciences but less common in medicine, the natural sciences and in engineering. Collaboration between supervisors occurs in the latter subject areas but in the role as researcher rather than in the role as supervisor. The supervisors that we have met in courses on doctoral supervision tend to argue that meeting other supervisors from other subject areas is the most rewarding part of the course but that these types of meetings are rare outside of these courses.

Planning, monitoring and assessment

The curriculum for Swedish doctoral education is three-fold. The first part is comprised by the intended learning outcomes in the Higher Education Degree Ordinance[31]. The second part is constituted by the general study syllabi, which universities have to construct for each subject in which third-cycle programmes are offered. After the Swedish Higher Education Ordinance was downsized in 2011, as a result of the autonomy reform, general study syllabi are required to indicate the main contents of the doctoral programme, eligibility requirements and any other necessary provisions. Most universities, however, have kept the previous stipulations from the ordinance in local policy, requiring research subjects to specify subject descriptions, any subject-specific degree outcomes, programme outlines, and the distribution of credits for the dissertation, course work (obligatory and elective) and any other programme components. There are various traditions with regard to how doctoral programmes are defined and described in general syllabi for different research fields and disciplines. For example, within the field of medicine general study syllabi are few and broad, accommodating a very large number of research orientations. Within the humanities and social sciences, the general syllabi are often more discipline specific and demarcated.

[31] In 2010, a second doctoral degree; in fine, applied and performing arts, with its own set of learning outcomes, was introduced in Sweden

The power and control over doctoral education exerted through general syllabi thus resides at different university levels and with varying distances to the actual practices of supervision and student learning.

The third part of the curriculum is the individual study plan which, according to the Higher Education Ordinance, should specify the university's and the doctoral student's obligations as well as an outline and time plan for the doctoral student's training. The plan is intended to be a dynamic instrument for planning and follow-up and should be outlined in joint consultation between the student and the supervisors. It should be followed up on and approved by the faculty. Individual study plans also serve important functions should potential conflicts arise. If the university claims that the student is not honouring his or her obligation, then these claims must relate to how the student's education is outlined, that is, they must refer to his or her individual study plan.

Differences are great with regard to how individual study plans come about, whether or not they are of good quality and if they fill any actual function for the student's education. We have observed many differences with regard to how heads of doctoral education approach individual study plans. In several cases, follow-up of individual study plans is restricted to ticking the administrative box that indicates that the plan has been revised or at least has been signed. In other cases, the plan is followed up on at specific meetings between the student and a director of studies for doctoral education or the head of department. Planning and monitoring also take place in a less formalised manner, not least through dialogue between supervisors and students.

The prevalence of formal formative assessment has increased in Swedish doctoral education during the last few decades. This could be a result of increasing formalisation of Swedish doctoral education in the last few decades as well as changing circumstances for research and researchers. Approaches vary and we have observed: mandatory seminars when students have completed 10, 25, 50, 75 and 90 per cent of their studies, reviews of research proposals, midway reviews, final seminars, preliminary review of dissertations by grading committees, and requirements for publications in peer reviewed journals. These formative assessments allow problems to be detected and remedied. In many ways, these instances of assessment also constitute the actual quality control of the student's competence as well as of his or her research.

By tradition, virtually nobody is failed at a public defence in Sweden. Thirty years ago, this was not a problem as the possibilities for the senior academics (i.e. the professors) to halt a doctoral student or to prevent him or her from submitting a dissertation were practically unlimited (whatever the reasons were). As a result of legislation, which guarantees the student's right to education, such use of power is now impossible. Hence, formative check-points have become all the more important. From a legal point of view, it should be possible to replace one of these formative assessment components with a summative one. However, today, the summative assessment of Swedish doctoral students is constituted by 1) a passed dissertation (at the public defence) and 2) passed courses and other credit-yielding components.

Thus, formal assessment within Swedish doctoral education is two-fold. Courses are assessed similarly to first and second cycle courses while the dissertation is assessed by a grading committee, comprised primarily by external experts, and with the help of an external opponent. The external components increase the aspect of legitimacy. However, the vanishingly small number of failed students suggests that the real assessment does not take place in this the very last phase. Rather it happens before. Traditions and circumstances may also complicate the grading committee's assessment of the student's competence.

In many cases, the members of a grading committee are dependent on the opponent's ability to illuminate important perspectives. The scholarly conversation between the student, who can be the foremost expert in his or her research topic, and the opponent, who has deep knowledge in the field and broad perspectives, can clarify the student's competence. But if this conversation fails to materialise, due to the opponent or the student, the grading committee must rely on the dissertation and the supervisor's assurance of the student's independence. The grading committee can pose questions during the public defence, but do not always do this and in some fields the tradition is for no questions at all to be posed.

In many parts of the world, the doctoral defence is characterised by extensive questioning on the research field and its methods (sometimes also on more general aspects of the discipline). In Sweden, however, the focus is usually on the research conducted. This entails that extensive subject knowledge is often not assessed by way of dissertations and public defences. Therefore, this part of the student's competence is assessed through courses and other components on the programme. The scope of such elements varies greatly between

doctoral programmes, which affects the competence that can be developed and assessed.

For theses by publication, in which the included articles have several authors, confusion can sometimes arise as to the contributions from the student. Sometimes his or her contribution is specified in the dissertation, but this is not always a requirement. Even when it comes to monographs, the contributions from supervisors and others can vary significantly without this being apparent to the grading committee.

Failing more Swedish doctoral students in connection with the public defence is not something to strive for. However, the Swedish tradition of passing almost all dissertations at the public defence partly undermines the review process of the grading committee. Different academic ideals, such as integrity and collegiality, are juxtaposed – and humanity prevails. A partial solution to this problem, and one that is practised consistently in some countries and also at some Swedish universities, is to arrange for the grading committee to do a preliminary review of the dissertation before it is finalised and made public. This procedure increases the chances of preventing a flawed dissertation from advancing to the public defence, but it can also be perceived as a silencing of the grading committee – they have already said OK – without giving them possibility to take the defence into consideration.

The formation of Swedish doctoral education

One way of summarising some of the main differences that we have witnessed and described above can be found in condensed form in the table on the next page. We have identified a number of crossroads, critical to the formation of Swedish doctoral education, where differences in traditions and approaches appear as contrasts. We have left out practices for feedback and assessment because we cannot perceive the same type of polarisation in relation to these matters. The table should not be read as defining particular subject fields as either left-column subjects or right-column subjects. Rather, each row should be recognised as its own scale in which positions can vary. Different disciplines display different patterns.

What shapes Swedish doctoral education?		
Faculty funding	**Main source of funding**	Funding agencies Public and private organisations
Faculty board Department/Supervisor collegium	**University institutes doctoral positions mainly through**	Supervisors Research groups
The doctoral student Faculty board Department/Supervisor collegium	**Research orientation/subject is decided by**	Supervisors Funding agencies/ organisations
In competition Faculty board Department/Supervisor collegium	**Enrolment**	Hand-picking Supervisors
Defined by applicant Quality assessed by faculty board or department/ supervisor collegium	**Project**	Defined by the supervisor Quality formally assessed by the faculty but in reality by the funding agencies
Appointed by faculty board or department, to meet project demands and student request	**Supervisors**	”Self-appointed” by virtue of funding and project ownership
Supervisor	**Role of supervisor**	Project leader
Single author Monograph	**Authorship**	Co-authoring with supervisor, other students and researchers
Large: Supporting the thesis and broadening the curriculum	**Extent of coursework and other elements outside the research/thesis**	Small: Supporting the thesis

Table 1. *What shapes Swedish doctoral education?*

In the table and in our description of how Swedish doctoral education is formed, two loci of influence emerge. The first comprises the faculty board in interaction with departments and supervisor collegia. The other presents single successful researchers/supervisors, or research teams, in interaction with research funding bodies. How far influence has been shifted towards either extreme can be related to the relations between faculty-controlled funds and external research funds earmarked for doctoral education within the various subject fields.

Doctoral education is of great significance, both in short-term and long-term perspectives, for academia's possibilities of operating along its entire width: through research, education, outreach and engagement. There are several issues that Swedish universities need to take stands on, especially subsequent to the autonomy reform, in order for doctoral education to develop propitiously. Moreover, there is a need for more knowledge about doctoral education, how it is lead and managed, and how quality can be promoted.

This chapter has shown how doctoral education, as a practice, is intricately intertwined with all the activities and missions of academia, but especially with research. Circumstances for research and researchers greatly affect doctoral education and supervision. These circumstances are partly dictated by universities themselves. But to a larger extent, conditions for doctoral education are formed in the nexus between research and research funding bodies, policy makers and different political stakeholders. These actors often operate in an international context and their primary concern is usually doctoral education's contribution to research or to political and economic goals. An important question is the extent to which these actors safeguard, or can even be expected to safeguard, doctoral education's contribution to the whole width of academia, its practices and contributions to society.

DOCTORAL EDUCATION AS AN OBJECT OF KNOWLEDGE

Doctoral education is treated as an object of knowledge in many contexts. The most obvious example is when doctoral education is made the object of research studies. The body of research on doctoral education has grown in the last few decades, albeit not as extensively in Sweden as internationally. However, this is not the dominating context for the formation of knowledge about doctoral education. Parallel to research on doctoral education we will pay attention to two further contexts in which knowledge is generated.

One of these contexts is related to various forms of evaluations, follow-ups and systems for quality assurance that can be linked to universities' aspirations to manage and develop doctoral education through the use of evidence and performance indicators. This is an evolving practice internationally as well as nationally and can be related to new ways of managing and controlling higher education in the audit society (see Power 1997, Neave 2009).

The other context for knowledge generation transpires through supervisors and educational leaders, who in or in close proximity to doctoral programmes pass down traditions, share experiences, and develop doctoral education. When obligatory courses for research supervisors were introduced in Sweden in 2002, a new arena for sharing experiences emerged and the development of knowledge in close proximity to practice intensified. Additionally, some universities have arranged courses for pedagogical leaders within doctoral education, aimed at, for example, those who have been appointed directors of study. Thereby, experiences and practices could be shared, compared and critically reviewed in a broader context. Course leaders, in turn, were introduced to many different educational traditions and situations by the participants of such courses. The required reading for these types of courses for doctoral supervisors has been published and conferences about doctoral education and supervision have gathered hundreds of participants. Through this movement, doctoral education has become an object of knowledge based on proven experience[32].

[32] Proven experience is a Swedish term for knowledge derived from experience that has been verbalised, documented and shared with peers to undergo some sort of verification and approval

Below, we describe doctoral education as an object of knowledge under three headings:

- From self-reflection to proven experience
- Quality assurance and evaluation
- Research on doctoral education

From self-reflection to proven experience

The complex function that doctoral education serves within universities and university colleges in combination with the varied, discipline specific and individual character of doctoral studies, make it difficult to generalise when discussing development of doctoral education. The most essential parts of doctoral education take place in the exchange between supervisors and doctoral students within local subject cultures which are not transparent to external parties or, indeed, to the university itself. Doctoral students' evolving competence as researchers and academics and supervisors' increasing ability to support doctoral students' development often take place relatively unseen up until the points in the process when some type of external review is introduced such as, for example, seminar presentations, submissions of articles, final seminars and public defences. Unless someone raises the alarm, it is assumed that the doctoral student's development and project progress according to plan. Ordinarily, it is only if or when the relationship between doctoral student and supervisor bumps into major problems that attention from anybody other than those immediately concerned is stirred. Still, everyone knows that the journey from admission to public defence is not an easy one to travel for either doctoral students or supervisors, even if everything turns out fine in the end.

There has long been a need, among doctoral students, to share experiences and contribute to providing new doctoral students with a realistic view of what doctoral studies involve. This need has generated several different stories which are often retold in narrative form – self-reflections or autobiographical accounts in which a doctoral student or a supervisor is the protagonist. The anthology *The dissertation – to become a researcher*[33] (Strannegård 2003) is a typical example. In the various chapters of the

[33] *Avhandlingen – om att formas till forskare*

anthology, a number of active researchers reflect on their own dissertation process, on entering a community of researchers and on their successful development towards becoming independent researchers. The purpose of these texts is to serve as a source of inspiration for students and new supervisors. The anthology *Solid advice from doctoral supervisors*[34] (Bergenheim & Ågren 2008) has come about in the same vein, but it has an even clearer pedagogical purpose.

As pedagogical research and development projects have gradually started to focus on education at doctoral level, so have companions and course literature, largely, started to refer more to relevant research. The comprehensive anthology *Research supervision on master's and doctoral level*[35] (Dysthe & Samara 2006) was published in Norway and combines the experiences and advice from doctoral supervisors with an account of pedagogical methods that have been tried and tested and which primarily focus on how to facilitate doctoral students' writing processes. Also the two most proliferated course books on doctoral supervision in the Swedish context (Handal & Lauvås 2008, Appel & Bergenheim 2005) build on collected experiences from doctoral supervisors although the books are not in the form of an anthology. The focus in these books is primarily on the close relationships between students and supervisors, which supervisors, regardless of discipline, need to take into consideration. Different supervisor roles and approaches, the importance of communication and conflict management are also dealt with. The significance of gender, ethnicity and class with regard to the relationship between doctoral students and supervisors is also highlighted (Schnaas 2011). *Supervision of doctoral students*[36] (Lindén 1998) can be added to the category of literature which systematises experiences of supervision as it builds on 400 stories told by supervisors about problems they have come across when supervising. The analysis presented in relation to these stories provide supervisors with points of departure for reflecting proactively on the fact that also supervisors can contribute to problems for doctoral students.

These books effectively demonstrate a major difference between educational challenges on the more regulated and formalised undergraduate levels and the doctoral level. Considering context is vital in order to describe the chal-

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[34] *Forskarhandledarens robust råd*

[35] *Forskningsveiledning på master- och doktorgradsnivå*

[36] *Handledning av doktorander*

lenges of/within doctoral education as well as problematizing them and drawing conclusions for measures: What is the discipline in question? What are the circumstances and what type of project is the doctoral student working on? Any attempt at investigating a particular supervision situation requires descriptions and insight into the context of the doctoral programme. The general descriptions with regard to doctoral education that exist on a higher level (such as degree outcomes, regulations or instructions concerning individual study plans) do not provide enough information to elucidate the pedagogical and research-related challenges that supervisors and doctoral students are faced with.

The introduction of mandatory courser for supervisors in Sweden has meant that contexts related to doctoral education and supervision now are described and elucidated to a greater extent than before. As a result, there is more material available today, in the form of, for example, cases or project reports which depict doctoral education in the context of departments and disciplines. Courses that bridge faculty and departmental borders, as well as courses for leaders for doctoral education, have promoted the communication of experiences, initiatives and knowledge.

Subsequently, procedures, traditions and experiences from doctoral education within many different research fields have come to be compared, described and problematized. On a national level, this has transpired through the NFU[37] network – a network for teachers teaching courses for doctoral supervisors. In 2012, Lund University arranged the national conference *Doctoral education on equal terms*[38] (Brodin 2012) which focused on gender equality. Two large international conferences gather university administrators as well as supervisors and researchers in the field of doctoral education. Since 2007, Stellenbosch University in South Africa has arranged the biennial conference *Research into doctoral supervision*. The theme for the conference in 2013 was *Candidates, supervisors and institutions: Pushing doctoral boundaries* and involved the following topics:

- the emergence of a variety of doctoral formats, models and programmes;
- the practice of different forms and modes of supervision;
- evidence of inter-/transdisciplinary doctoral research; and

[37] *Nätverket för forskarhandledarutbildare* http://www.swednetwork.se/natverk/

[38] *Forskarutbildning på lika villkor*

- (inter-)national research collaboration.

The other conference is QPR - *Quality in Postgraduate Research* and is the largest. It has been arranged biennially for 20 years at the university of Adelaide. In 2012, the theme was *Narratives of Transition: Perspectives of Research Leaders, Educators and Postgraduates*. The proceedings comprise 300 pages of both abstracts and full papers. The most common topics were: studies on supervision, issues pertaining to quality and leadership, employability and doctoral student writing.

Literature pertaining to doctoral education has multiplied internationally also and is used in various forms of development courses. Texts can deal with doctoral supervision (Lee 2008 & 2012) as well as the development of educational programmes and new perspectives on the management of doctoral education (Boud & Lee 2009, Lee & Danby 2012). A specific area concerns assessment both with regard to doctoral education in general (Trafford 2003, Maki & Borkowski 2006) and with particular focus on the dissertation (Lovitts 2007). The latter two highlight outcomes- and criteria-based assessment of doctoral students' work.

The focus in courses for doctoral supervisors, as well as in the literature and conferences, is often on approaches to supervision and conditions for supervision. Up close, doctoral education appears almost limited to supervision and the student's project. The specific subject content of the student's research tends to fall into the background while various general aspects related to the previously described educational emphasis are emphasised, for example, the relationship between supervisor and student, regulations and syllabi, and student writing. Having worked with courses for doctoral supervisors over a decade and having met hundreds of supervisors, our impression is that supervisors as well as doctoral students are generally happy with doctoral education and the changes it has seen. This is confirmed by, for example, a survey made at Lund University (Holmström 2013). At the same time, however, a number of issues keep recurring in our courses for supervisors. These issues relate to the complex conditions for doctoral education and how changes of these conditions on a general level with regard to, for instance, recruitment, research funding, terms and conditions of employment and tenure, the orientation of research and publication traditions, are mirrored in the close interactions between doctoral students and supervisors.

Great variation in the structural support offered to supervisors and doctoral students. Supervision is conducted under conditions that differ greatly. There

are major differences in the support that students are offered besides supervision. In some cases, doctoral students' education and educational contexts are constituted merely by supervision, a handful of courses and some formalised checkpoints. Supervisors may receive no administrative support or backing from the administrative levels. In other cases, the research environment is plentiful and there is well-developed leadership and administrative support for doctoral education involving both supervisors and doctoral students.

Demarcation of the supervisor's tasks. Supervisors often conceive of their responsibility for doctoral students' education as far greater than what is reasonable and formally warranted. In situations where there is little collegial and/or structural support for supervisors, this conception can be viewed as an adequate response to the circumstances. Some supervisors reveal that dispensing with the task of supervision may be difficult, for instance, when doctoral students turn out to be unsuitable for doctoral studies. Such circumstances could cause great problems in subject areas where co-authorship between supervisors and doctoral students is taken for granted.

Built-in conflicts in the supervisor's role. When supervisors also are project leaders of externally funded research projects within which their students' education takes place, conflicts between safeguarding the efficiency of the project and offering the students legroom to learn sometimes arise.

From handpicking to international recruitment. Being admitted to a Swedish doctoral programme and receiving a doctoral studentship for four years is a very attractive deal for students from many countries. Subsequently, the share of non-native applicants has increased even in areas where doctoral students used to be "cherry-picked" from a select group on the undergraduate programme. This transition places strain on selection processes as a large number of applications are now to be competently and accurately evaluated by an admissions organisation with very limited resources.

The department's possibilities for discontinuing doctoral education if the student cannot cope with his or her studies. This question is raised on almost every course. Many course participants point out that once a doctoral student is admitted, he or she has an almost absolute right to complete his or her training and, furthermore, to earn the degree of doctor. Apart from being a general quality issue for Swedish higher education, this circumstance generates problems for supervisors who have to spend valuable time aiding

students they perceive lack the capacity to develop towards independent researchers.

Research projects that are unsuitable for doctoral studies. This problem appears in contexts where doctoral education takes place within large externally funded research projects that employ many researchers and doctoral students. The comprehensiveness of such large projects can lead to fruitful results, but if the specific part of the project that a particular doctoral student is assigned to work with does not offer opportunity for independent and critical thought and challenges, then the doctoral student might find it difficult to develop his or her competence, despite the fact that the articles that he or she has contributed to constitute enough research material for a thesis

Equality and gender equality is difficult in "close" relationships. Doctoral students' know-how of academic culture and how to navigate within the academy often develops slowly. They often find themselves depending on a small number of people within the particular research environment to which they belong. Some environments are characterised by a bias in relation to sex and class. Opportunities for developing competence and an academic career are often given informally in the way of, for example, "a push in the right direction", help to find "the right company" or introductions to important networks. Access to such informal support depends to a large extent on whether the student is included in the local academic community and viewed as a full member. Without this type of support, students risk isolation and increased dependence. The informal character of this type of support can cause disadvantages to women, students with other ethnic backgrounds and students with scholarships rather than studentships.

A difficult intersection between legal frameworks, rules and traditions. Swedish doctoral students are subject to the Higher Education Act and Ordinance and various local rules for doctoral education. Students with studentships (i.e. employed by the university to study) are also subject to the Labour legislation and the Work Environment Act and other national laws as well as local rules related to employment. Finally, as researchers often in collaboration with other researchers, students are subject to guidelines and agreements related to research. Consideration to how these regulations interact must be taken in doctoral education, especially in situations where problems arise. Supervisors' and doctoral students' knowledge of these regulations varies a great deal. The rapid increase of doctoral studentships that are funded, primarily, by external funding, in combination with an increased formalisation of

doctoral education, place increased demands on leadership and administration.

From one supervisor to several. A great deal of literature on doctoral supervision, as well as general perception, conceives of supervision as a relationship between two persons. This is not the case in Sweden anymore. All doctoral students have at least two supervisors and regularly even more than that. Several supervisors reduce the risk of students becoming isolated in situations where supervision is not working. At the same time, however, a lack of communication might run the risk of misunderstandings and ambiguities about the distribution of responsibilities. Additionally, conflicts of interest between supervisors, for example, about research orientations, can cause major difficulties for doctoral students.

Doctoral students and supervisors from different countries. The number of students as well as junior supervisors that are not native to Sweden is increasing. The use of English, both as a working language and for dissemination of research, is frequently taken for granted in ways that may conceal a number of problems that may reveal themselves if neither the student nor the supervisor has any experience of Swedish society, the routines at the department or the organisation of doctoral education. Moreover, it is a problem if nobody can communicate the contents of the research in Swedish[39].

A transition to theses by publication. Theses by publication have been the prevailing form of dissertation for a long time in the fields of medicine, the natural sciences and engineering. However, with the increase of external funding in the social sciences and in the humanities, theses by publication are becoming more common within these fields also. This development is reinforced by the fact that senior researchers' qualifications are increasingly assessed in terms of publications in scientific journals and, as a consequence, co-authorships become a significant path towards success for supervisors. This entails considerable changes of working methods for subjects that traditionally revolve supervision and publication around the monograph, and especially if language is switched from Swedish to English. The organisation

[39] Swedish universities are expected to communicate research to the general public. Moreover, the Higher Education Degree Ordinance for the doctoral degree requires students to be able to "present and discuss research and research findings authoritatively in speech and writing and in dialogue with the academic community and society in general" – the latter entailing Swedish

of doctoral students' projects, time management as well as supervision strategies become affected. Issues concerning the future of the monograph, and how to arrange research environments in which both thesis formats can co-exist, should be discussed further.

The challenges of co-authorship. Various methods for monitoring different parties' rights and obligations have developed in those fields where co-authored publications have been a matter of course for a long time. However, these methods vary between different research fields. At the same time, supervisors who supervise both monographs and theses by publication raise several important issues concerning the ways in which doctoral students' contributions to both research and research texts can be highlighted in relation to co-authorship. Many supervisors argue that doctoral students' contributions to the articles included in their theses should be particularly indicated.

PhDs within the realm of professional practice. Swedish doctoral education was incorporated into the European Qualification Frameworks in 2007. The frameworks' perspectives on a straight course from bachelor degree through the level of master and on to the degree of doctor, tends to conceal the fairly distinctive study paths towards the degree of doctor that exist within various professional fields, for example, for medical doctors, teachers, psychologists and artists. Here, doctoral studies are often conducted on a part-time basis and in close proximity to the student's professional practice. The more research policies focus on major, externally funded, projects, the more difficult it seems to base a research career on a professional practice, which increasingly is perceived as an "exception".

The relationship between dissertation, public defence and the intended learning outcomes for Swedish doctoral education. Previous to the introduction of the intended learning outcomes in the Swedish Higher Education Degree Ordinance in 2007, the dissertation and public defence were regarded, without much dispute, as the assessment of the entire doctoral programme. However, on close inspection of the intended learning outcomes in relation to what is assessed through the dissertation and public defence, it becomes apparent that within most research fields several of the learning outcomes need to be assessed in other ways. This situation raises two questions: How are the outcomes that cannot be assessed through the dissertation and public defence tested, and are grading committees expected to assess dissertations against the learning outcomes?

To a limited extent and for short periods of time, the administration and leadership of doctoral education has been in the spotlight – in national and international workshops and conferences as well as in courses. Generally, it is possible to identify a reinforcement of both administration and leadership as well as the need for further development. This reinforcement and the increased attention given to administration and leadership are linked to the fact that doctoral education has become much more diversified and complex, which requires both a re-structuring and alignment within and between different levels. Moreover, various types of evaluations have contributed to a shared understanding about the problems that exist and that can emerge within doctoral education. A number of experience-based themes can be identified from national courses and meetings in which administrators and leaders for doctoral education have participated.

The need for a collective responsibility. The resolution of many recurrent problems, including relationship problems between individual students and supervisors, necessitates collective efforts. In many cases situations can be related to structural factors, which further emphasises the need for collective action. For instance, when doctoral students want to change supervisors or have to be assigned to new projects, the need for leadership and collective responsibility becomes apparent.

The importance of the individual study plan is often highlighted. These plans have contributed to a development towards greater transparency and constructive monitoring from administrators and leaders as well as from colleagues. When problems in doctoral education have been identified through different PhD surveys, increased measures to follow-up the individual study plans have often been taken.

A strong research environment with many enthusiastic senior researchers is, by many, considered the most significant contribution to the quality of doctoral education. Still, it may be difficult to conjure up a collective sense of responsibility for supervision and for the intellectual climate at a department, for example, through active participation in seminars and other departmental activities or through a general attendance in the work place. A department's ability to promote a strong research environment is essential for the quality of its doctoral programmes. However, how such promotion is manifested is an open-ended question with no easy answers.

Clarifying the significance of leadership. Leaders on many different levels and with various types of positions are involved in the management of doctoral

education. The tasks of leaders and their relations to each other appear to be vague and unstated. More discussions and clarifications of responsibilities and obligations are called for.

When courses for supervisors were made obligatory in Sweden in 2002, a relatively large group of academics at different universities had to gather, systematise and build the content for such courses. Experience-based literature already existed, but during the first decade of the twenty-first century, production of course literature in Sweden increased as well as activities in various networks and conferences where experiences were shared. Leadership courses also contributed to this development. Additionally, this content has been substantiated by the projects that course participants submit and which are reviewed by colleagues and discussed in seminars and which, as a result, have contributed to the construction of themes presented above in this section.

Finally, we would like to argue that the process of peer review is the most fundamental contributor to experience-based knowledge in academia. The phenomenon is the foundation for what Boyer (1990) defined as *academic scholarship* and is central to education on doctoral level. Peer review is not only present when the student is researching, participating in seminars and conferences, writing and taking part in the process of publishing, but also in the courses, checkpoints and assessment that also constitutes doctoral education. What we call the *internal quality system* of doctoral education is consistently characterised by peer review and academic collegiality. We will return to this matter in the final chapter of this report.

Quality assurance and evaluation

In the last few decades, the importance of introducing, implementing and improving systems for evaluation and quality assurance have frequently been emphasised in policies for and within universities.

In connection with the reform of Swedish higher education in 1993, a national system for universities was established. Between 2001 and 2008, evaluations of educational programmes, reviews of universities' processes for quality assurance as well as thematic studies were conducted, and in this period, also doctoral education attracted interest. Evaluation of doctoral education also took place when university colleges where allowed to apply for degree awarding powers on the doctoral level. Furthermore, in 2003 and in 2008, the

Swedish National Agency for Higher Education conducted surveys of doctoral students' views on their studies, the so-called *PhD-mirrors*[40].

During this time, the Swedish National Agency for Higher Education published several reports that considered the quality of doctoral education, *Criteria for assessing doctoral education*[41] (Degerblad & Hägglund 2001) and *Tradition and regeneration in Swedish doctoral education*[42] (Degerblad & Hägglund 2002). In the preface to the first report, Sigbrit Franke, who was the Swedish University Chancellor at the time, substantiated the arguments carried by the authors regarding the need for caution when formalising qualitative criteria for doctoral education.

> *It cannot be stressed enough that subject-specific and area-specific qualities, what is unique, cannot be captured with the help of a set of general criteria (our translation) (p. 5)*

In the preface to the second report, the University Chancellor notes that doctoral education has become increasingly significant as society has become more and more complex and the labour market requires employees with higher levels of competence. According to the University Chancellor, the report raises the issue whether or not we can afford not to include an element of *Bildung* in the development of doctoral education. Degerblad and Hägglund (2001) argue that

> *…it is possible to analytically specify a number of general criteria for a good doctoral programme – if these are considered necessary, but not solely sufficient, components in order to achieve a high level of quality. These criteria can be regarded as a set of "minimum conditions" in order to achieve a good doctoral programme. However, for a comprehensive assessment of doctoral education it is necessary to assess the "results" of the practice, in the broadest sense of the word (our translation) (p. 6).*

They also highlight the fact that many quality indicators are subject or area specific and that differences can be related to the nature of knowledge objects, to subject-specific learning characteristics or to stakeholders'

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[40] *Doktorandspeglar*

[41] *Kriterier vid bedömning av forskarutbildning*

[42] *Tradition och förnyelse i svensk forskarutbildning*

requirements. The authors have aspired to develop general criteria and they underline the following: economic and infrastructural pre-requisites, recruitment of doctoral students and supervisors, organisation and management and criteria specific to subjects or disciplines such as specialisations/cross-disciplines, links to research activities, qualified supervision, research collaborations and the existence of creative environments. Finally, they include the results of doctoral education and give emphasis to output such as numbers of degrees awarded, dissertations produced, etc. They argue that the result indicators can be divided into scientific productivity, scientific quality and the use of resources. Originality is highlighted as an essential concept in discussions about scientific quality, which, in turn, is linked to the production of new knowledge. The report formed a point of departure for the Swedish National Agency for Higher Education's subsequent evaluations of subjects and programmes on doctoral level.

In 2004, the Swedish National Agency for Higher Education together with Hägglund and Degerblad, published yet another report, *The benefits of doctoral education. Swedish doctoral education in an international perspective*[43]. Some of the conclusions drawn are that Swedish doctoral education, in terms of throughput and the number of degrees awarded, ranks high in international comparison. They also observe that the risk of unemployment is slightly lower for those holding a degree of doctor in Sweden and that there is a growing market for them outside of academia. They caution against a symbiosis between academia and industry and commerce which, they contend, could jeopardise the production of original knowledge. Furthermore, they note that doctoral education nowadays is not only about producing researchers but, to an equally large extent, involves

> *…an education towards becoming university teachers or towards qualified positions in industry and commerce or public sectors. In that sense, doctoral education fills diverse needs in society and, accordingly, must be adapted to the disparate demands that can be placed on it from within as well as outside of the labour markets of academia (our translation) (p. 12).*

In 2011, a comprehensive transformation of Sweden's national evaluation procedures was introduced. This transformation has been succinctly summarised in the title to a report published by the Swedish National Agency for

[43] *Nyttan av forskarutbildning. Svensk forskarutbildning i ett internationellt perspektiv*

Higher Education: *From review and assessment of quality work to evaluations of study results*[44] (HSV 2012). A new distribution of responsibilities was established and the government's supervision of university practices became more scrutinising and controlling than constructive and enhancing. Since 2011, focus is geared towards reviews of degree awarding powers and evaluations of programmes on all levels. These evaluations result in performance bonuses for programmes that achieve particularly good results. When evaluating courses and first and second cycle programmes, the independent degree projects that students produce constitute the primary basis for evaluation. Already before this new quality system was introduced, it was subject to considerable criticism, which has been described by, among others, Lars Brandell and Lillemor Kim in *Quality assurance in higher education – a drama in several acts*[45] (2010). In view of the next series of evaluations, some adjustments of the procedure have been made. However, the focus on results remains.

Doctoral education has not yet been evaluated within this new system and methods remain to be developed. Lars Haikola, who was University Chancellor 2010-2014, contends in an interview with the student magazine *Lundagård* (Kullving 2011-12-13) that the Swedish National Agency for Higher Education[46] cannot evaluate doctoral dissertations in the same way as first and second cycle degree projects, but that the Agency can relate to the assessment done by the grading committees. Haikola argues that universities have ownership of their own internal evaluation procedures; a standpoint which can be related to the so-called autonomy reform by which universities have been assigned responsibility for their own development and quality assurance. Hence, an essential question for university administrations and for the development of Swedish doctoral education in general, is how a national quality system focused on control and results will be operationalised, considering the complex character of doctoral education and with regard to the autonomy of universities.

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[44] *Från granskning och bedömning av kvalitetsarbete till utvärdering av utbildningsresultat*

[45] *Spelet om kvalitetsgranskningen på högskoleområdet – ett drama i många akter*

[46] No longer exists. As of 2013, the Swedish Higher Education Authority (*Universitetskanslersämbetet*) has taken over the agency's responsibilities

Sweden participates in a number of international contexts in which doctoral education is the focus of various projects, surveys, focus groups and workshops. In these contexts, administrators and leaders from national public authorities and universities present the organisation of Swedish doctoral education and present result from different studies. Additionally, some Swedish universities participate in various international, comparative projects.

The ARDE project *Accountable Research Environments for Doctoral Education*, which was carried out between 2011 and 2013, and which focused on the quality assurance of doctoral education, recently published their final report *Quality Assurance in Doctoral Education – results of the ARDE project* (Byrne, Jørgensen, Loukkola 2013). The starting point for the project is the quality processes that have been developed in the last few decades. The authors of the report maintain that quality procedures and doctoral education have developed independently of each other but are starting to merge. Furthermore, they argue that doctoral education is gradually being managed more professionally through the emergence of graduate schools and due to universities' increasing focus on procedures for the distribution of responsibilities and quality improving activities. Reforms have been initiated in many countries and implementations of these are underway. The authors particularly stress the fact that doctoral programmes are evaluated by several external parties at the same time and that these are not coordinated.

One chapter of the report presents internal and external models of evaluation. Some of the latter involve programme accreditations, university reviews, national frameworks for qualifications and learning outcomes. Internal evaluations that are used to monitor the development of doctoral projects are also considered as well as various guidelines for supervision and the rights and obligations of both supervisors and postgraduate students. The authors discuss the particularities of doctoral education and stress the importance of creative research environments with a large enough critical mass and opportunities for doctoral students to develop originality. The ARDE project shows that many different indicators are used to gauge the quality of doctoral education. The most common are scientific publications, number of awarded degrees, drop-out rates and supervisors' qualifications. The internal and external evaluations used in one and the same country primarily apply the same indicators. There was some consensus on the importance of choosing indicators that can be used over an extensive period so that trends can be

distinguished. However, no consensus was reached on which those indicators were. The discussion ends with the following statement:

> *In conclusion, concerns about over-reliance on key performance indicators were expressed. It is advisable to bear the following issues in mind when evaluating doctoral education:*
>
> - *While indicators can be useful for monitoring the performance of a programme, they need to be complemented by other sources of information.*
> - *Indicators should always be considered in the context of the programme and institution as a whole. The interpretation of completion rates and time-to-degree should be, for example highly dependent on regulations concerning admission to doctoral education. Moreover, terminology concerning key performance indicators is not uniform. This, as well as the lack of context-sensitive indicators, are hindering comparison between systems and institutions.*
> - *There may be a need to develop indicators to meet different needs. External evaluation bodies may have different needs to strategic management at the institutional level or management at the programme level.*
>
> *(Byrne, Jørgensen, Loukkola 2013, p. 27)*

The authors of the report note that career guidance of doctoral students is a less developed area which needs monitoring and reinforcement.

Another project that focuses on doctoral education is CODOC, *Cooperation on Doctoral Education Between Africa, Asia, Latin America and Europe* (Jørgensen 2012), which was managed by a consortium with support from Erasmus Mundus in 2010-2012. The starting points for the project involved the global research community, mapping of doctoral education, stimulating cooperation and building capacity. A multitude of themes are discussed and a convergence with regard to the discourse of the knowledge society can be observed. The number of entrants and degrees awarded in doctoral education, as well as the number of teachers with doctoral degrees, have increased. However, the number of degrees awarded is insufficient in relation to the expressed needs. Unanimity was also reached with regard to the significance attributed to collaboration within doctoral education, such as, for example, double degrees,

joint degrees or, alternatively, coordinated programmes. However, reasons for collaboration vary, alternating from prestige and strategy to getting access to advanced technology. The importance of a critical mass and the necessity of preventing drop-outs were emphasised. Aligning doctoral education with capacity building agendas is advised and convergence of doctoral education is perceived as a path towards a richer research community.

Erasmus Mundus will also fund the FRINDOC-project, *Framework for the Internationalisation of Doctoral Education*, which has been initiated by the EUA. The project aims to promote international collaborations as part of the integration of the EHEA and the ERA so that Europe can reach its full potential. Here, doctoral education is highlighted as an important instrument. The project aims to acquire an overview of best practices regarding internationalisation and to develop a web-based tool that can facilitate universities' planning, implementation and realisation. Starting in 2015, EUA members can volunteer to be part of the test group that will be developing this tool.

Doctoral education is often evaluated in relation to education, research and outreach/engagement. Several actors are involved: supranational organisations such as the EHEA, ERA and OECD; national organisations such as research funding bodies, foundations, higher education authorities and other governmental authorities of investigation. Also, the universities themselves initiate evaluations on various levels. Contrary to what many might think, there is no lack of quality assurance. Rather, we would argue for an evaluation overload that also due to a lack of coordination is problematic. This lack concerns not only coordination between transnational, national and different local evaluations but also the coordination between evaluations that focus on different aspects of universities' practices and missions. It is essential that universities as well as departments allot time and resources to critically assess this multitude of evaluative initiatives in order to evaluate their worth and to be able to make use of results for constructive development of local environments for doctoral education.

Research on doctoral education

Looking only at the Swedish context, research that explicitly focuses on doctoral education is relatively limited. Various aspects of education on the doctoral level have been examined in little more than ten dissertations and a few monographs over the last thirty years. The focus of these studies is

predominantly on doctoral students and most often in the context of doctoral education in the social sciences and the humanities. Already in the 1980s, Strömberg Sölveborn (1983) studied doctoral students' situations. A number of studies have placed emphasis on psychosocial aspects, some looking at doctoral students' work environments (Lindqvist 2003) and some looking at the relationship between the psychosocial research environment and productivity (Widenberg 2003). Studies with ethnological, sociological and pedagogical perspectives have provided images of the type of cultures within which doctoral education takes place. In *The doctoral hat*[47], Gerholm and Gerholm (1992) present an investigation of doctoral education within six disciplines in the social sciences, focusing particularly on how disciplinary cultures, seminar cultures and student cultures are manifested within the various subjects. Karlsson (2004) interviewed doctoral students from different research areas to demonstrate how doctoral students' socialisations to becoming researchers could be perceived from a lifeworld perspective. In an empirical study on doctoral students' philosophy of life, Mårtensson (2009) examined how doctoral students in a medical research department were affected by the character of the research environment. Wallgren (2007) studied learning situations in several different corporate graduate schools. In the study *On the first step*[48] (Schoug 2004) doctoral students' and newly awarded PhDs' experiences and opinions of academia are presented. There is one dissertation that focuses on supervisors: *It depends. Experienced research supervisors' views on good supervision*[49] (Lönn Svensson 2007).

Some studies have problematized postgraduate education from the perspective of a more general or organisational context. Odén (1991) provides a vivid historical depiction of the changes in doctoral education from 1890 to 1975. Heen (2000) has studied doctoral programmes within the subject of economics in France and Norway. Collaborations between universities and university colleges with regard to doctoral education are highlighted in one dissertation (Hidalgo 1992). Haraldsson (2010) examines how management of doctoral education has been shaped through the reform of 1998. It is worth mentioning that there are studies that have analysed research within particular subject fields and in relation to this studied dissertations (see, for example, Lindberg & Lindberg 1983). Most of the dissertations were published after

[47] *Doktorshatten*

[48] *På trappans första steg*

[49] *Det beror på. Erfarna forskarhandledares syn på god handledning*

the turn of the century. In other words, it is possible to detect a growing interest in doctoral education.

Approximately thirty other publications exist that deal with Swedish doctoral education. Here, also, many studies focus on the experiences of doctoral students, but there are a greater number which deal with supervisors' perspectives. Gender perspectives, equal opportunities, educational goals and opportunities for doctoral students are dealt with, albeit a little more sparingly (see e.g. Öhrn & Lundahl ed. 2013). Some studies concern doctoral education within a single discipline (see e.g. Gren 2005). Additionally, the characteristics of the Swedish public defence are used in some texts as starting points for analyses of other aspects (see e.g. Björklund 1991, 1996). Several publications are published as contributions to pedagogical conferences or Festschrifts but researchers at Swedish universities have published also in Swedish, Nordic and other international journals. From this summary we can conclude that Swedish research on doctoral education is under formation rather than an established field.

As discussed above, there are a number of investigations that have been carried out by public authorities, former higher education councils and institutions and by the Swedish National Audit Office. Moreover, several studies have been published as results of governmental investigations. Statistics Sweden also collects basic data for authorities and regularly publishes reports on doctoral education. Several universities conduct their own quality assurance in the form of follow-ups, investigations and evaluations. The need for universities to present bibliometric data on publications and citations has increased as a result of the introduction of a performance-based distribution of resources. This begs the question what data is collected, how it is categorised and what the results will be used for and whether or not the system is quality enhancing. This form of management, which is based on data, needs to be the subject of systematic studies.

Furthermore, there are reviews that examine international research on doctoral education. Although national and cultural contexts are significant when studying academia, experiences from other contexts may provide relevant perspectives. In an issue focusing on doctoral education in the Nordic countries, *The practices and problems in doctoral studies in the Nordic countries* (Kansanen & Hansén Eds 2003), the editors state that a lively development process is underway in all Nordic countries at the moment. Michael Jones' (2013) survey *Issues in Doctoral studies – Forty years of journal*

discussions: Where have we been and where are we going presents a similar view. Jones has studied 995 articles written between 1971 and 2012 in 45 established journals in the field.

The diagram in figure 5 clearly shows an increased interest in studies relating to doctoral education. From the mid-1990s and onwards there is a considerable increase in the number of articles dealing with doctoral education. Concealed in this diagram is the fact that almost two-thirds (65 %) of the articles are published in the United States. Australia follows with 12% and subsequently Great Britain (10 %) and Canada (3 %). Less than 1,5 per cent of the articles have been published in other countries, including Sweden.

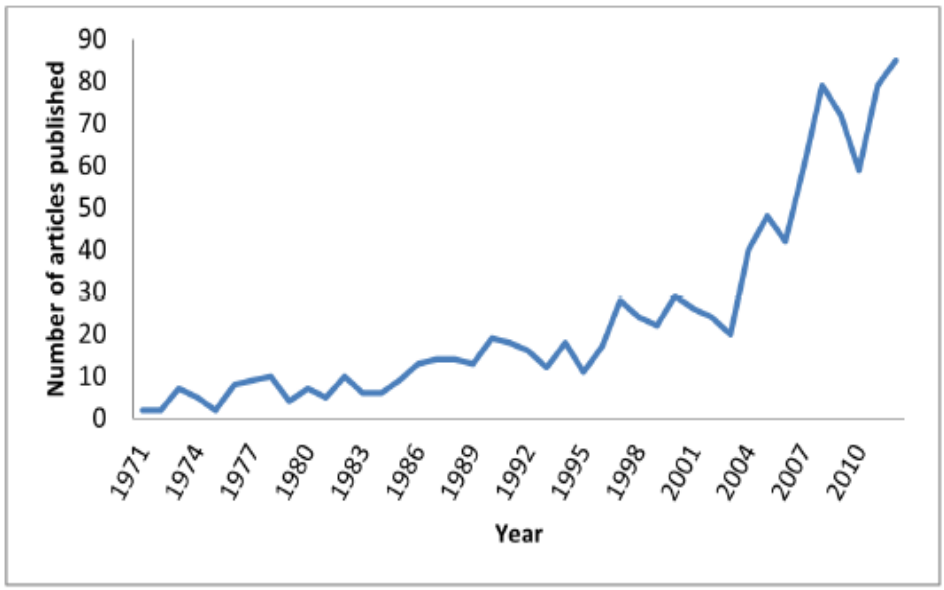

Figure 5. *Distribution of articles between 1971 and 2012 based on the year of publication. Source: Jones (2013).*

Jones' analysis shows that, in a long-term perspective, the research on doctoral education can be comprised within six themes: *teaching, doctoral programme design, writing and research, employment and career, student-supervisor relationships* and *doctoral student experiences*. Figure 6 illustrates the extent of each theme.

The bulk of research on doctoral education deals with *programme design* (29 %). Many aspects have been studied to approximately the same extent.

These aspects include admission and recruitment; funding of programmes; linkages with practice and industry; methodological issues; quality and scope of doctoral training; selection of location, programme and topic; funding for students; flexible delivery; examination and assessment as well as professional doctorates.

A large and important theme in much of the literature written on doctoral education deals with *student experiences* (26 %). Problems discussed involve topics such as discrimination, inequities, isolation, alienation, and loneliness. Doctoral students are depicted as deprived of resources and relationships and in need of financial support and support from colleagues, employers, faculties and families. Doctoral students must learn to navigate various cultural contexts, such as, for example, cultures on departmental, organisational and disciplinary levels. Moreover, individual doctoral students face a number of challenges regarding autonomy, competence, motivation, identity and independence. Additionally, time management is an important challenge.

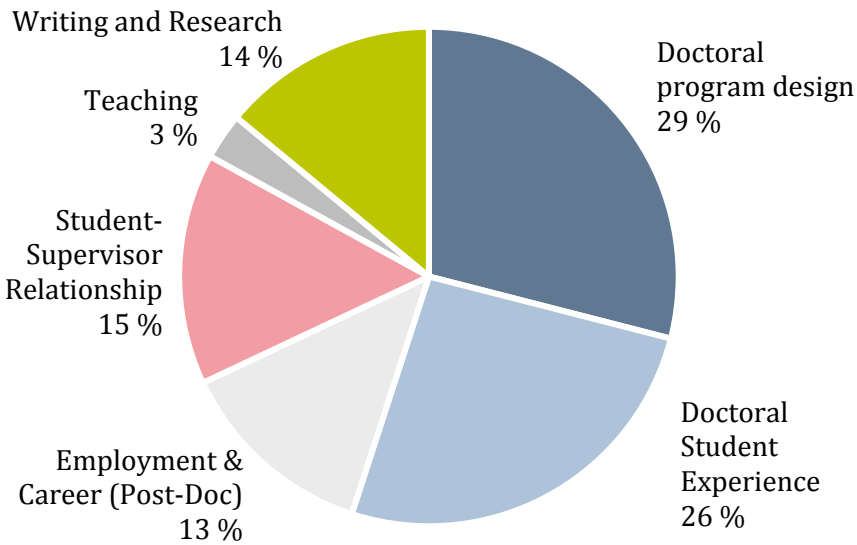

Figure 6. *Thematic distribution of the contents of articles. Source: Jones (2013).*

Two urgent areas in this category concern processes of socialisation and the progress of the dissertation. Socialisation is acknowledged as crucial for preventing termination and for doctoral students' success. Referring to Gold

(1998), Jones identifies four functions that socialisation serves. Through socialisation, doctoral students develop skills which allow them to answer questions such as "can I do this" (intellectual competence), "do I want to be a doctoral student" (do I fit in and will I survive), "do I want to work with these tasks" (career choices) and "do I belong here" (balancing career and private sphere). On a general level, socialisation involves learning the rules and cultures specific to the discipline and acquiring knowledge, values, approaches, habits and ways of thinking within academia.

With regard to the dissertation, the articles focus on four essential areas: completion times; retention and termination; stress, exhaustion and anxiety; and the balance between student and personal life.

The relationship between supervisors and doctoral students is also a relatively frequent theme (15 %). Two general results are discerned. The first concerns the lack of attention paid to the role of supervisor and mentor and the lack of relevant training that is needed to correct these circumstances. There are a number of skills that supervisors can acquire, improve and be evaluated on. These involve their competence as researchers, teachers, advisors, administrators, and co-workers. The second result concerns group supervision as a way of transcending the one-on-one relationship that often signifies relations between supervisors and doctoral students. The studies show that group supervision promotes socialisation, support and leadership.

With regard to the relationship between supervisors and doctoral students, most articles deal with students' views on supervisors.

> *The reason that this primary factor (student's perception) is more important is because perception is reality. The supervisory relationship is likely to make or break the doctoral candidature. A poor relationship with one's doctoral advisor will ruin a good doctoral project regardless of any or all of the other elements which may support it. Therefore, a lot of research and discussion has gone into understanding this relationship, and seeking to improve it, or at least failsafe it. An associated area which receives a lot of empirical attention looks at the factors which lead to selection of a student's 'ideal' supervisor. (Jones 2013, p. 12)*

As a consequence of the audit society, the pattern of publication has changed in academia. This is corroborated by an analysis of *writing and research* (14 %) where the "pressure to publish" is a common issue. Further aspects on this theme deal with attitudes to writing and individual and collaborative

approaches to promote academic writing. The latter could increase productivity and improve quality as well as foster support from colleagues and promote socialisation. Yet another theme regards research productivity and several factors are identified as central for doctoral students' productivity, such as, for instance, factors linked to the student as an individual, factors concerning supervision, organisation and faculty-bound factors and issues external to the university, which concern doctoral students' future labour market etcetera.

Several articles concern doctoral students' future *employment and career* (13 %). Primarily, this involves the possibilities PhDs have of finding jobs and starting their careers. These questions are most pressing in times of recession in academia. However, studies on selection, mobility, tenure tracks and salary structures are also comprised here. In other words, the research of this theme deals with factors that relate to recruitment and future possibilities of doctoral students.

Much less attention is paid to *teaching* (3%). Articles discussing this theme focus mainly on the significance of teaching and teacher training, or, to be more accurate, the lack of possibilities for doctoral students to learn how to teach.

> *Institutions expend resources which focus on completion times and retention and which prepare students for the research side of the academic career. However, very little emphasis is placed on preparing our burgeoning academics for the other side of the post-doctoral (and even co-doctoral) experience which is to teach students. (Jones 2013, p. 5-6)*

Furthermore, Jones suggests that teaching should be much more prominently situated within doctoral education.

> *This complementary issue presents calls for teaching to become a formal part of the doctorate and generally to be acknowledged as a serious component in the training, socialization and, employment of doctoral students. (p. 6)*

Consequently, Jones identifies a few areas for further study, such as, collective supervision, supervisors' perceptions of doctoral students, doctoral students' awareness of the research conducted by their supervisors and other senior researchers and the conditions for this research as well as various types of feedback in doctoral education. Research has generated very little knowledge

about assessment within doctoral education. The need for empirical studies is stressed.

In a survey of international literature about doctoral education, Charl Wolhuter (2011) identifies some shortcomings. The collected literature spans four fundamental areas: the contextual factors that shape doctoral education, access and recruitment, the process of doctoral education (leadership and administration; funding; supervision, student issues; methods; contents and programme structures; assessment and quality control) and the outcomes of doctoral education from the perspectives of both graduates and society. According to Wolhuter, research does not take power relations in society into consideration and there is not enough evidence to substantiate claims for the significance of doctoral education to the knowledge society. Hence, Wolhuter's contention undermines the basis on which many collaborative projects on doctoral education have been initiated since the turn of the century.

Finally, it should be noted that at the same time as doctoral education has become an increasingly important area for policy, as well as an expansive field with regard to the number of actors, arenas and institutions involved, as a research object it is less extensive and developed. Nevertheless, there is a relatively sizeable amount of literature on the topic, but it is primarily related to Anglo-Saxon contexts. These texts often deal with issues closely linked to practice and doctoral students rather than to aspects concerning the conditions and opportunities of doctoral education.

As doctoral education is rooted in research, it is necessary to also focus on the study of science, contemporary as well as historical. The socialisation of young researchers constitutes one strand, among many, in such studies. Studies of the practice of research and its dependency on the character of the research object are also of interest. Doctoral students are key figures in the production of knowledge, in the reproduction of the disciplines and in the development of new areas of inquiry. Two further areas that can contribute to knowledge about doctoral education are studies on policy and governance of universities and departments, and research on academic leadership. The relationship between collegial leadership and systems for administrative and data-driven quality assurance is particularly interesting. Generally, quality in doctoral education is under-researched.

LEADERSHIP AND QUALITY IN DOCTORAL EDUCATION

In previous chapters, doctoral education is described in terms of policy, practice and as an object of knowledge. In this final chapter, we discuss these areas in relation to quality and leadership in doctoral education. We stress the importance of academic culture and collegiality when developing leadership and quality systems for doctoral education.

Doctoral education – the *solar plexus* of academia

The management and leadership of doctoral education takes place within a realm of a, in many respects, changed and global educational landscape. In this landscape, doctoral education serves as a link between political spheres, levels of governance and management, practices and actors. Doctoral education appears not only as something that needs direction and leadership, as an object for which policy is drawn up, but also as a policy instrument and as a means towards other ends. In European policy contexts, doctoral education is expected, primarily, to reinforce Europe's position as a knowledge economy by training successful researchers and contributing to the development of internationally competitive research.

The positioning of doctoral education at the *solar plexus* of academia, allows it to both shape and be shaped by the university's core practices: research, education and outreach/engagement. Doctoral education has several purposes and is a practice that is becoming increasingly different with regard to contents, form and assessment. Doctoral education is shaped by various scientific, disciplinary and academic traditions. In sum, it is possible to speak of a highly differentiated practice. Additionally, the doctoral students are becoming increasingly heterogeneous as a group. At the same time, we have pointed to European and Swedish processes of standardisation and homogenisation, which has contributed to an increased number of regulations and structures and which, in turn, stress management issues. In other words, doctoral education is a practice that is characterised by both differentiation and integration.

The contribution of academia to the knowledge of doctoral education is great. Lately, both experience-based and research-based knowledge has grown. In Sweden however, research on doctoral education is still relatively weak compared to Anglo-Saxon research. Changes in how universities are governed

have increased the requirement for data-informed management and quality assurance on various levels: internationally, nationally and locally within universities. Data of various kinds is increasingly collected through reports, evaluations and audits in order to compare performances of individuals, collectives, departments and universities and to assess quality, identify best practices as well as to establish and spread results in rankings.

As made apparent in this report, doctoral education is complex and multi-faceted. Just as the universities as a whole, doctoral education is, in some respects, subject to major changes at the same time as it is characterised by stability. High quality in doctoral education involves safeguarding experiences gained, protecting desirable qualities and creating opportunities for further development. This, in turn, involves critically questioning and challenging both the status quo and on-going changes. What constitutes high quality within doctoral education is not a given, but should be determined within the realm of collegial conversation and practice.

Enhancing and safeguarding quality in doctoral education

Competent leadership and a differentiated quality system are necessary for the development and safeguarding of quality in doctoral education. Leadership that involves both students and supervisors in its everyday practices is essential as doctoral students are, at the same time, students, employees and junior researchers. This form of leadership is carried out in a field of tension where policies, practice and knowledge of doctoral education intersect. Moreover, it highlights the responsibilities and mandates that are shared between faculties and departments and between heads of department, directors of study, research leaders and supervisors.

When discussing the development of leadership and quality systems in doctoral education, we take academic collegiality as our point of departure. With reference to Göran Bexell, Henrik Björk (2013) discusses collegiality in terms of academic collegiality, collegial decision-making processes and collegial leadership.

> *The former concept is superordinate and describes a condition and approach between colleagues, which is necessary for success in the core activities, i.e. research and teaching. It is an approach of continuous quality assessment that incorporates critique as well as respect with a shared*

goal to design creative environments for education and research (our translation) (Björk p. 28).

Collegial decisions involve participation of colleagues and formal decision-making in academic bodies such as faculty boards. Collegial leadership entails being *primus inter pares*, the foremost among equals, showing respect for the competence of colleagues in combination with a strong sense of integrity. A lack of respect could break down well functioning traditions or prevent necessary changes. A lack of integrity could mean neglecting problems or showing a laissez faire attitude to colleagues who act inappropriately. One of the most essential tasks for academic leaders is to facilitate collegiality – which is not primarily about consensus but rather about constructive criticism.

In conclusion, Björk contrasts the principal of collegiality with the principal of management. While the former stresses freedom and trust, norms and qualities, mirroring the idea of the seminar, the latter emphasises order and control, regulations and quantities. Below, we use a similar distinction when discussing quality assurance and enhancement in doctoral education, through internal collegial quality systems as well as external quality systems. The external systems can, but do not need to, be external in relation to universities. We define them as external when they have been initiated and are maintained by actors not directly involved in the doctoral programme or research environment. We argue that the current and legitimate quality systems internal to doctoral education – the collegial systems – need to be strengthened and made more sophisticated. At the same time, it is necessary to develop and coordinate external systems for quality assurance in those cases when collegial approaches are not functioning or are insufficient.

Internal collegial quality systems within doctoral education.

Doctoral students face collegial criticism and scrutiny in various ways and in various circumstances starting from when they are recruited through to their final examination. Already with their application to doctoral education, active researchers may examine applicants' project plans. When doctoral students' submit their research proposals, obligatory within some subject fields, these are reviewed by colleagues in special seminars. Conversations with supervisors and other researchers within the research environment entail opportunities for peer review. Students who submit articles to academic journals will have their work and writing reviewed by external reviewers

before publication. Many subjects arrange so-called final seminars in which doctoral students' manuscripts are reviewed. Finally, at the public defence a grading committee assesses the dissertation.

These instances of peer review serve crucial functions in doctoral education as they involve both feedback and quality assurance. However, in the current Swedish legal framework, peer review does not constitute means for terminating doctoral students' studies should there be problems with these.

Other instances of peer review in doctoral programmes are not directly aimed at the students' projects but are constituent parts of academic practice. Doctoral students are expected to participate in these contexts and, furthermore, to assess the work of others and by so doing, contribute to a collective whole. Thereby, doctoral students' education and development as well as their research are shaped and re-shaped.

Although peer review and academic conversations are crucial for doctoral education, they cannot be taken for granted. Research environments are often greatly strained by other concerns than doctoral education. Peer review takes time and researchers are rarely reimbursed for their participation. At crucial junctions in doctoral programmes, peer review may be absent altogether, for example, when an externally funded research project automatically is expected to be appropriate as a project for doctoral education, or when a student is assigned to a development project commissioned by industry.

Moreover, collegial influence over doctoral students' training can be problematic. Both scientific and pedagogical qualities are necessary. Seminars can be destructive and turn into arenas where power struggles are played out. Supervisors may override students or prevent them from taking responsibility for or devoting time to important research tasks. Senior researchers' individual interests and ambitions may overtrump a collective concern for doctoral education. Additionally, there may be a lack of knowledge at departments about doctoral education and doctoral students' roles and rights. In other areas of higher education, there is a clear trend towards more reflective and research based approaches to teaching. Teachers try out new methods, evaluate and reflect on results, compare with colleagues' attempts and share their experiences and results in writing and at conferences. Doctoral supervisors also need to develop similar approaches, and arenas for this form of development are a national concern.

In research fields with a high degree of external funding, there is a shift in power in doctoral education towards individual researchers and supervisors. Here, leadership is often located quite far from the doctoral students and their research and, furthermore, can be administrative and reactive rather than collegial and interactive. Policy can be developed to reflect the many important purposes of doctoral education as well as the values at stake, not least for the universities themselves. Additionally, in order to support active leadership, it is important to understand and acknowledge how doctoral education takes shape, from funding and recruitment to public defence and postgraduate careers.

Leadership serves an important function for facilitating and organising the important collegial quality enhancing processes in doctoral education. To support such development, informed conversation between leaders is necessary and, hence, the systematic collection and analyses of experiences from doctoral education becomes essential. It is also important to build further knowledge of the collegial quality systems in doctoral education and how to further develop academic collegiality, collegial decision-making and collegial leadership. The importance for leadership to take responsibility for protecting, as well as nurturing and developing, systems for peer-review, has also been mentioned by others (see Boström 2011 and 2013).

External quality systems

As doctoral education has not been subject to external quality reviews to the same degree as other levels of education, it is sometimes considered neglected in terms of quality assurance. However, in reality, the contrary is true. The position doctoral education holds at the *solar plexus* of academia engages it in many types of evaluations regardless of whether they focus on education, research or outreach/engagement. Doctoral education's function as a boundary object also contributes to its subjection to review by various actors, internal as well as external to academia. But primarily – and as mentioned above regarding internal quality systems – doctoral education is imbedded in a continuous quality process through peer review and collegial leadership.

Nevertheless, it is necessary to regard doctoral education from an outside perspective as well. Research on doctoral education and different types of evaluations and comparisons can be used to assess and develop doctoral education.

Governance and management of universities have changed considerably in the last few decades, in Sweden and worldwide, and as a consequence, demands for quality assurance and new forms of accountability have increased. Insofar as government regulations have decreased in Sweden, as a result of the autonomy reform, external reviews and demands for accountability have increased. Increased dependency on external funding and more collaboration on doctoral education augment these tendencies. Additionally, the establishment of guidelines, associations and activities on European level has contributed greatly to an increased focus on quality. The new Swedish national higher education quality system, which focuses explicitly on results, does not yet extend to the doctoral level[50]. However, a model for evaluating also third cycle programmes is underway. We would argue, in relation to this, that there is extensive experience worth considering in the form of reports produced for the previous Swedish quality audition.

More and more information concerning doctoral education is collected. Databases are launched and web-based platforms for exchanges of best practice are created. Data is collected at units for institutional research, evaluation and quality assurance, within universities as well as on national and European level. This growing activity is not particularly coordinated and, as of yet, we know little about the consequences it may have.

What signifies high quality in doctoral education depends on how the purposes and goals of a particular programme are envisioned, how these can be realised and what the prerequisites are. Consequently, an important issue concerns the understanding external reviewers have of these matters, regardless if they are assessing, for instance, student situations, contributions to the discipline, academic practices in general or the contributions of academia to society as a whole. Different reviewers, and actors, will have different perspectives and, hence, can contribute to development in different ways.

To this end, university administrations can contribute to critical discussion and reflection. It is vital that quality assurance does not consume so many resources that it becomes counterproductive. Rather, results need to be used in order to enhance practice. It is also important that quality assurance is not used for the wrong reasons, for example, for boosting rankings, which, potentially, can distort practice. External quality procedures are important complements to internal, collegial, quality systems. However, it is important

[50] A new system will be implemented in 2016

that they do not impede on internal procedures but, instead, contribute to quality enhancement. From a management point of view, it becomes crucial to create the type of infrastructure that facilitates such positive interactions.

Even though the contributions from academia to the production of knowledge about doctoral education are large, there are good reasons to fund research on doctoral education on a national level. Such research could well transpire as collaborations between supervisors and other parties who have direct knowledge of the practice of doctoral education. The focus on research on doctoral education in the social sciences and in the humanities that we have seen, perhaps, testifies to the need for such research within other fields also.

As the question of qualified knowledge about doctoral education concerns all of academia, universities need to bring it up in discussions with external funding bodies so that they, to a greater extent, contribute to research about higher education and especially to research about doctoral education. It is especially significant to study issues concerning leadership and management, as well as, different quality procedures. It is worth noting that three fundamental areas with regard to academia – doctoral education, quality assurance systems within postgraduate education and academic leadership – are not studied to a satisfactory degree.

Doctoral education shapes academia – what shapes doctoral education

Doctoral education serves important functions for society and holds a central position within academia. Doctoral education shapes academia – but what shapes doctoral education?

It is possible to discern an on-going shift of power with regard to doctoral education – from academia to politics and funding bodies.

Universities and their faculties, departments and supervisor collegia have in fact the formal responsibility for their doctoral students' education and for the research, education and outreach/engagement that in both short-term and long-term perspectives are shaped by doctoral education and through which academia serves its mission in society.

This is the universities' responsibility and not the responsibility of external research funding bodies. Still, distribution of resources is one of the most important mechanisms of influence and control. Funding greatly affects both the orientation and organisation of doctoral education. As a result of the

increasing dependency of universities on external funds for research and doctoral education, the power over doctoral education has been shifted from local collegial bodies and departments to individual successful researchers in collaboration with research funding bodies. We have identified a movement which can be described, albeit somewhat caustically, as follows: Wherever money goes, research and doctoral education follows, which in turn, will shape the future of academia.

The purposes, objectives, practices and consequences of doctoral education are not absolute and should be subject to continuous collegial discussions. This is not just a question for the quality of doctoral education, but also for academia and for society as a whole.

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This report describes and analyses doctoral education as a strategically important instrument by which universities produce and reproduce knowledge. It identifies changing conditions as well as heightened expectations and general trends. Leadership and quality in doctoral education is discussed in terms of policy, practice and knowledge. Doctoral education emerges as a focal point for national and international policy, as deeply incorporated within universities' core practices, and as an object for experience-based knowledge, evaluations and research. It is integral to universities' whole mission, today and in the future and also serves as the gatekeeper to academia. Hence, on-going changes with regard to, for example, the composition of doctoral groups, formal requirements on the organisation of doctoral education and research funding have consequences for academia and its practices. High quality in doctoral education involves safeguarding experiences gained, protecting desirable qualities and creating opportunities for further development. The authors of this report aim to provide a basis for institutions, leaders and supervisors to critically question and challenge both the status quo and the on-going changes of doctoral education. The policy trends, changing circumstances and challenges discussed are to a large extent international and Sweden specifically, with its long history of government regulation of doctoral education and swiftness to adapt to the ideas of the knowledge economy, provides an interesting case.

Together, the authors – Maja Elmgren, Eva Forsberg, Åsa Lindberg-Sand and Anders Sonesson – have held positions as heads of department, directors of study for doctoral education, faculty board members, quality coordinators and educational developers at the two largest Swedish universities, Lund and Uppsala. This report has been translated from Swedish and adapted for an international audience. The original report was commissioned by the Association of Swedish Higher Education.