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## From individual supervision to integrated education

### Abstract

Swedish universities now build up "super-departments" with 100–200 postgraduate students. The rationale is often stated in terms of "critical mass". The question we pose is how this critical mass can be mobilised to raise the quality in postgraduate education, using the Evolutionary Biology Centre at Uppsala University as an example.

### Influence of ideas from research students and supervisors

A committee with supervisors and PhD students will be a forum for continuous pedagogical planning and development. We will evaluate how such a committee should work to best promote PhD education.

### Annual follow up of student progress

We will search for the optimal combination of student and supervisor/expert involvement in the annual follow up. Experienced supervisors and experts are needed to evaluate progress; fellow students are creative discussion partners for planning the future.

### Individual study plan

We will develop the annual revision of the individual study plan taking into consideration career oriented points such as publication profile and how to make a PhD in biology competitive on the job market.

### Introduction to postgraduate research

We will initiate the production of a comprehensive guide for the new PhD student. We will also develop introductory courses for PhD students.

### Admitting new postgraduate students

We intend to consult people professionally engaged in staff recruitment to suggest how, for instance, interview techniques could be used to select new students.

### International experience

We will make study tours to pick up ideas on how postgraduate education has developed in countries with longer tradition with large departments.

### National network

We will set up a network for PhD studies in biology to exchange ideas and promote mobility of students.

# **From individual supervision to integrated education**

## **Final report from a project for pedagogical developments in postgraduate education 2001-04.**

This project has contained a large number of elements, and not all the details will be presented in this report. Instead focus is on the core of the project: making use of ideas from students and supervisors, different ways to follow up students' progress, how to introduce students to postgraduate studies, the establishment of a national network, and, most importantly, the organisation and content of a research school. Most of the documents referred to in the text are posted at the website for postgraduate education at EBC [www.ebc.uu.se/postgrad/](http://www.ebc.uu.se/postgrad/).

### **Background**

A noticeable change recently at Swedish universities is the shift from small departments with one professor, 3-4 lecturers and 5-15 postgraduate students, to "super-departments" with 10-15 chairs, 40-50 senior staff and 100-200 postgraduate students. The rationale for these fusions is often stated in terms of "critical mass" in research.

The question posed in the project was how such a critical mass can be mobilised to raise the quality in postgraduate education. The aim was to develop a template for efficient and creative postgraduate education at any large department. We have tried to focus on points that would increase interactions among students and supervisors from different fields of research. The development should be "iterative" so that experiences from students in final stages of their PhD studies should be used as basis for further developments.

The recent development with "graduate schools" in Sweden and elsewhere has proven successful. Many of these schools have postgraduate education within a certain scientific field, engaging students from several departments, often at different locations and attacking the field from slightly different angles. However, the task for a super-department is an altogether different one – here postgraduate teaching is within many fields, not always closely related, but integrated at one location.

### **Postgraduate education at the Evolutionary Biology Centre**

The Evolutionary Biology Centre (EBC) at Uppsala University was formed in 1999 when thirteen "programmes", each with its own study plan for postgraduate education were merged into the Department of Evolutionary Biology. The research spans from molecular evolution to global ecological processes. EBC also embraces large parts of undergraduate education in biology, the Museum of Evolution, several field stations and the Microscopy Unit. We have ca 170 active postgraduate students.

At the outset, the department allocated 20% of a lectureship for Håkan Rydin to co-ordinate and develop the postgraduate education at EBC. The following initial steps were taken:

- An enquiry was made among students and supervisors regarding their expectations and wishes for postgraduate education.
- A simple website with information for PhD students was set up ([www.ebc.uu.se/postgrad/](http://www.ebc.uu.se/postgrad/)).
- A 2-week introductory course was given for the first time in 2000 with philosophy of science, research information, library technique, fundraising etc.

- A joint programme for PhD courses was introduced, including the introductory course, courses on microscopy and on scientific publishing  
These efforts formed the basis for the current project.

After some years the faculty considered our research department to be *too* big. Largely to facilitate administration the research within EBC is from 2004 divided into three units (Department of Ecology and Evolution, Department of Evolution, Genomics and Systematics, Department of Physiology and Developmental Biology). The three new departmental boards agreed to maintain postgraduate education as a joint programme, reflecting the fact that the efforts within the project have been considered successful.

## **Influence of ideas from research students and supervisors**

### PhD Students' Council

When EBC was created the PhD students formed a Students' Council ("doktorandråd") with representatives from the 13 programmes. In many ways this was a major breakthrough in communication across departmental borders – before 1999 there was very little interaction between students from different programmes. An interesting observation is that the merger of the programmes into EBC was to a large extent initiated from above, and met with reluctance in some quarters. This top-down process triggered interactions and co-operation among the students that were earlier inconceivable. The Students' Council had regular meetings and advertised their minutes on the EBC web site.

Early on the discussions compared working conditions and PhD training among the programmes. Concrete suggestions emanated. However, as soon as the most basic urges for information were met and some degree of streamlining of PhD training was achieved, the interest for the Students' Council rapidly dwindled. A few students engaged instead in the Students' Council at the faculty level. In a way this is a reasonable development: as the basic local problems are solved it is easy to acknowledge that the working conditions for a PhD student is more dependent on decisions taken at the faculty level. Whereas the Students' Council at EBC may have an important advisory role, at the faculty level the students can elect members of the Board and its committees.

Even without an active Students' Council at EBC the students still have opportunities to have their voices heard since they elect members of the departmental board and in the Postgraduate Committee (see next section), but the generation of ideas from large meetings of students has to a large extent been lost. On the positive side, the Student's Council at the faculty level is very active, currently chaired by an EBC student. It may be that active groups now start to emanate at the three new departments.

The most concrete example of influence of opinions from the students is our "self-evaluation" of postgraduate research at EBC in 2003, written in response to the questionnaire among all PhD students at Uppsala University (compiled by Quality and Evaluation Unit).

### Postgraduate committee

The supervisors were initially less inclined to spontaneous interactions and exchange of ideas concerning postgraduate training across departmental borders. With the urge to publish and a responsibility towards granting agencies, the individual researchers have to focus on the progress of the research group. For most of them there is little time and few incitements to engage in the pedagogical development. Obviously, the potential advantages with a large department do not come automatically.

We set up a small postgraduate committee as a forum for development of ideas among research students and supervisors, ideas that were then to be realised by the co-ordinator

for postgraduate education. Some ideas could directly be carried out, others were brought as suggestions to the departmental Board. The committee was chaired by the co-ordinator and had three supervisors and three PhD students as members. A meta-function was to develop the routines – what is the best composition of such a committee; what type of questions should be dealt with; what should the mandate be; what should be the relations between the committee and the Board of the department?

This initial committee was too small. The members largely represent their own views, and the committee functions as a forum for discussion among students and supervisors who are genuinely interested in the development of postgraduate education. Not everyone can be present at all meetings, and it soon became clear that a larger group would be more efficient in generating ideas. A somewhat larger committee was also required to include members that represent the whole width of the research. Currently the committee consists of a chairman (the co-ordinator), three PhD students (each with a deputy) and six supervisors (two from each of the three departments within EBC).

A couple of general recommendations regarding the role of a postgraduate committee can be made.

- As a forum to generate and discuss ideas the committee should be fairly large and encompass the various research directions at the department.
- The committee is not a forum to discuss daily routine matters, and meetings should be kept to a maximum of four per year. At such meetings larger policy-like matters should be in focus.
- The committee is a suitable forum to discuss any proposal from the co-ordinator (or anyone else) before it is passed on to the faculty or the departmental board.
- One regular task is to establish course programme for next year, to decide which courses to give and to discuss applications to faculty and elsewhere for funding.
- The overall role for the committee is to be a forum for continuous pedagogical development and discussions on how to raise standards in the PhD education.
- The committee is not a body that should solve individual problems, such as conflicts between supervisor and student. This is the responsibility of the head of department.
- At a large department the committee should not be given the role to evaluate and monitor the progress of individual students.

### **Co-ordination of postgraduate studies**

The recent parliamentary paper suggesting large changes in the Swedish postgraduate education ("En ny doktorsutbildning", SOU 2004:27), stresses the role of the Director of Studies for postgraduate education. Strangely, it is not really well described exactly what the role is and how this person should act. Within the project the following "job description" is now suggested:

- *PhD courses*: Prepare course schedule for the coming year, and apply for funding for courses. Main teacher for some courses (e.g. Introduction to postgraduate studies). For other courses the Director should engage course leader, take part in planning, make sure that courses are advertised and that course credits reported and also be responsible for budgeting.
- *Information*: Responsible for website with information for students, supervisors and administrators. Answer incoming questions about postgraduate education from potential applicants.
- *Maintain national contacts with directors at other universities.*

- *Reports, evaluations etc:* The Director should be responsible for reports that are requested by the faculty, and also take initiative to various questionnaires that are required to improve postgraduate education.
- *Budget.* Propose a budget to the board and apply for funding for courses..
- *Advice:* The Director can give advice regarding administrative matters for individual students, but problems in the student-supervisor relation is a responsibility for the Head of Department.

### **Annual follow up of student progress**

Traditionally, PhD training in Sweden has been very much a matter of individual supervision. The student has worked as an apprentice, under the guidance of the tutor. With very slack time limits, many departments have not had a strict annual follow-up of the progress. As the time limit have been gradually forced by the government, a continuous monitoring of student progress has become more and more important. Quality assessment and improvement is either at the level of the small department (or research group), or at the faculty. The former is efficient but leads to large differences in quality among departments, the latter gives uniform formal standards but does not engage in the scientific supervision, merely the administrative.

An important aspect is that the annual follow up should be helpful for the student. It could be so by leading to concrete suggestions, for instance on how to bring the studies back to time table, or by suggesting useful contacts or new experiments. We stress that the follow up is both an evaluation of progress and an occasion for planning the future. While experienced supervisors and outside experts are needed for the former, fellow students are creative discussion partners for the latter. Our aim was to develop a form for the annual follow up with the optimal combination of student and supervisor/expert involvement.

At the EBC programmes many cultures have evolved, and it would be fatal to impose a scheme on programmes where the routines are satisfactory. Instead we have posted a number of "good examples" as inspiration that can be used to improve the follow-up at any department, not only for EBC use.

Within the narrow field of a research programme it is rather easy to arrange annual seminars to assess the progress of each student. However, input from other biological fields might be very fruitful. How could this be arranged with 170 students? Based on a scheme that seems rather common at British universities a combination is suggested. In short, the programmes should retain their good practices with annual follow-up, or develop such a scheme according to one of the "good examples". But in addition, there should also be a PhD symposium each year at each of the three departments. Here the student will have a poster presenting the aims and methods early in the studies, and a later year give a talk with results (similar to a talk at an international congress). This scheme is describe in some more detail in the proposal for a graduate school (see below).

### **Individual study plan**

This is the formal part of the annual follow up, as required by the Higher Education Ordinance. Our faculty has for a long time had a form for each research student to revise annually – the individual study plan. Again, this is a very useful document, but has traditionally focused on the formal progress, such as credit points, planned and completed research topics etc. Within the project this form was altered, and the revised form is now adopted and used at the whole faculty.

## **Experience from former students**

An important aspect is how to make a PhD in biology a competitive degree on the job market, and to give the students the qualifications that the market requires. While the students today do an excellent job in acquiring scientific skills in the daily job in the research group, the education is not (at least not explicitly) guided by the demands that future recruiting employers might have. We have made use of recently graduated students in a questionnaire. As they start to work or to apply for jobs, what do they feel is lacking in their PhD training? We traced a large number of former EBC students to seek their opinion in this matter. The results of this questionnaire can be used as advice for students and supervisor when planning the individual curriculum.

## **Introduction to postgraduate research**

After our initial questionnaire in 1999 we started with an introductory course. An advantage with a large site, like EBC is, that there are so many new students admitted that it is possible to give an introductory course twice a year. For some students with heavy laboratory engagements during term time it turned out to be difficult to follow a course over several weeks of full time. We have now condensed the content to a little more than week, and suggest that the course in its current shape can be implemented almost at any large department. The course changes continuously in response to course evaluations.

## **National network**

Postgraduate students today often need to take specialist courses, which they cannot find at their own university. Within the project we have established a national network involving people in charge of postgraduate education in biology. Two meetings have been held in Uppsala. The most concrete result is the improved website for PhD courses in biology in Sweden (and also links to courses elsewhere). Sören Nylin (co-ordinator of postgraduate education in biology at Stockholm University) is in charge of this site. An important, but less concrete, result is the exchange of ideas among universities through the network.

## **The main result – a proposal for a graduate school**

The project has contained many elements, and as a final result, it has led to a concrete proposal for a graduate school at EBC. It turns out that many ideas developed in the project fits well with the recent parliamentary paper on postgraduate education ("En ny doktorsutbildning"; SOU 2004:27) which defines the research school concept. Our proposal follows their structure and suggests way to arrange a graduate school in practice.

**The proposal for a graduate school can be viewed as the summary of the project, and even though it describes the situation at EBC, it is suggested that it can be used as a template to arrange postgraduate education making advantage of the broad competence present at any large department.**

## **Dissemination of results and website**

The website for postgraduate education at EBC is [www.ebc.uu.se/postgrad/](http://www.ebc.uu.se/postgrad/). Note especially the page "Improving education" where this project has been continuously reported. Here the most important reports and questionnaires are made public.

The project has been presented at several other large departments at Uppsala University, most recently during a half-day symposium for people with co-ordinating roles (e.g. as Director of Studies) from all faculties ("Lära av varandra", arranged by the Quality and Evaluation Unit).

The website for PhD courses within the country is [www.zoologi.su.se/education/PhD-BIOLOGY/biohome.html](http://www.zoologi.su.se/education/PhD-BIOLOGY/biohome.html)

Many of the experiences from the project were used in the new web based handbook for postgraduate education at the Faculty of Science and Technology at Uppsala University. There are several handbooks for PhD students (for instance the one published by the National Agency for Higher Education), but what we stress in our document is that this is a handbook also for supervisors, administrators, undergraduates who consider higher education etc. The handbook is posted at [www.teknat.uu.se/](http://www.teknat.uu.se/).