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From the International Desk

The Evolution of the Roskilde Model in Denmark

In academic 2013-14 Roskilde University in Denmark had approximately 9,000 Danish students, 1,000 international students, 700 faculty members, and 250 technical and administrative employees. About 1,000 students live on or adjacent to the campus, while most commute from the nearby Roskilde or Copenhagen.

For four decades, teaching at Roskilde University has been based on a research-active curriculum (Healey and Jenkins 2009, 122) mainstreaming research-based learning for all undergraduates and graduates. Problem-oriented project learning (PPL) is the cornerstone of a university-wide system that pervades the formal curriculum from day one. Students' orientation toward research is standard and is a central part of the university's vision and strategy (see also Andersen and Heilesen 2015). This contrasts with the dominant situation in the U.S., as well as in Europe, where research-based undergraduate learning is achieved primarily through the construction of special tracks for small groups of students (comp. Kinkead 2003, 7; Katkin 2003, 19; Healey and Jenkins 2009, 33).

In 1972 when Roskilde University was founded, Danish universities were being transformed into institutions of mass education. The concept for the new university evolved from the late 1960s political debate about universities generally being averse to reconsidering existing disciplinary boundaries so as to adjust to a labor market characterized, on the one hand, by increasing specialization and, on the other, a demand for an interdisciplinary approach to the challenges of modernization and of developing the welfare state. The actual design of a university with a focus on interdisciplinary studies, organized into broad basic study programs, was inspired mainly by the student movement that in the wake of the 1968 student rebellion called for student-centered, collaborative, and interdisciplinary study programs; for hands-on social and political engagement; and for a participatory democracy equally representing students, faculty, and administrators.

Roskilde University's approach to education, radical and controversial at its inception, has undergone revisions over four decades, but it still retains many of its original features. At the same time, some of the ideas developed by its pedagogy have become broadly accepted in Danish higher education, notably project work, interdisciplinarity, and problem-orientation. Briefly summarized:

- In the early days, problem-oriented project work reigned supreme. Later, conventional formats such as seminars and lectures were added, so that today project work constitutes only 50 percent of the student's workload, meaning that across all years half of the grades are awarded for project work. In many cases, however, courses are designed to inform and support project work. In nine of the ten semesters of a master's program, all students are required to participate in semester-long project work (see Figure 1). In the beginning, there were evaluations, but no formal exams. Later, group exams were introduced. The format is an oral exam in which all group members participate in a discussion of their project report. Originally, all students undertook a five-year master's degree made up of two years of basic studies and three years of "superstructure" programs. Today, the curricula have been redesigned in accordance with European Union standards and therefore consist of three-year bachelor's programs and two-year master's programs.
- Interdisciplinary basic studies originally lasted two years. Now they have been reduced to three semesters. The remaining three semesters of the bachelor's programs are dedicated to two disciplines, and a bachelor's thesis that is based on either or both disciplines.
- Originally, "superstructure" students (third-year students and beyond) were allowed to integrate various disciplines into a given project, and they might even integrate projects across semesters. Now, at the master's level a project is limited to one discipline at a time, although the thesis that may be interdisciplinary.
- In the early days, the curriculum would stipulate a timeframe of one semester for a project, but interdisciplinary projects on the "superstructure" level might extend over three semesters. Today, the one-semester timeframe is strictly enforced; students are registered automatically for all required exams, courses, and projects; and non-appearance counts as failure.

Figure 1 presents a generic model of an entire program. The bachelor's program is based on the social science program, although minor variations occur within the four bachelor programs (humanities, humanistic technological sciences, natural sciences, and social sciences). Each semester consists of project work and two or three courses. The courses are either subject-oriented (e.g., sociology, political science,

Figure 1. Model of a Roskilde University program

Structure of a bachelor's-program (social sciences)					
semester 1	semester 2	semester 3	semester 4	semester 5	semester 6
Basic project 1	Basic project 2	Basic project 3	Subject A project	Subject B project	Bachelor project subject A and/or B
Basic course A	Basic course B	Subject A course 1	Subject A course 2	Subject B course 2	Subject A course 3
		Elective course	Subject B course 1	Subject B course 3	Elective course
Method course a	Method course b	Method course c	Method course d	Subject B workshop	Method course e

Structure of a master's program			
semester 7	semester 8	semester 9	semester 10
Subject A project	Subject B project	Interdisciplinary semester, Subject A courses Subject B courses	Thesis (project) Subject A or Subject A and B combined
Subject A courses	Subject B courses		

political institutions) or method-oriented (qualitative methods, quantitative methods, strategies for analysis), but all of them are meant to prepare for and support project work within the particular theme chosen for the semester. Two elective courses allow the students either to delve deeper into a subject (A or B in the model) or to take up a third subject. On the master's level, one semester is reserved for each of two subjects, a third semester emphasizes an interdisciplinary approach, and the thesis is written focused on one subject or a combination of the two master's-level subjects.

The Roskilde Model

The Roskilde model of education combines three components:

- A distinctive way of organizing undergraduate studies into four broad bachelor's programs, and offering master's programs that are either double major or interdisciplinary single major. Usually double-major students combine the two subjects introduced in the bachelor's program, but students may take up a new subject within a framework of eight combinations, defined by the study boards for Roskilde University's graduate programs (220 combinations in all).
- A distinctive academic profile allowing students to develop their individual academic profile by combining subjects (within limits) so as to develop an interdisciplinary approach to real world problems.
- Consistent emphasis on problem-oriented, interdisciplinary, participant-directed project work carried out by students working in groups of between two and eight members (PPL) (Andersen and Heilesen 2015, ix ff).

Problem-oriented project learning (PPL) is oriented toward students' active and collaborative learning of content as well as research methodology (comp. Healey and Jenkins 2009, 7). Through project work and courses, students learn about current research in their discipline(s). They engage in research discussions, undertake research and inquiry, and develop skills and techniques for research and inquiry.

In students' project work, teachers act as supervisors, fulfilling their task as "well rounded scholars" combining the discovery of new knowledge, the integration of new knowledge into the body of existing knowledge, and the application of knowledge for practice and enlightenment, as well as teaching students how to become scholars themselves, able to integrate scholarly knowledge with their personal experience as a resource for personal, academic, and professional development (comp. Healey, Jenkins and Lea 2014, 51).

The theoretical basis for the PPL approach is that people learn when they are part of engaging and meaningful communities. Learning is furthered by balancing institutional frameworks or goals and the goals of individuals and communities, their timing and rhythms of production, their perspectives of the future, and their needs for orientation. In order to strengthen conditions for learning, curricula are designed to facilitate processes of inquiry, for research-like courses of study, for participant direction, and for supporting communities of practice both within and across groups of learners.

Example of a Problem-oriented Project

Before embarking on a general discussion of problem-oriented project learning, it may be useful to illustrate the scope of project work with a concrete example.

"A Shared View," a 143-page manuscript, reports on project work carried out in Spring 2013 by a group of eight fourth-semester students in the Humanistic Technological Bachelor Program. The project was inspired by a wish to contribute to

social change by developing a concept for inclusion of visually impaired citizens.

Using methods from ethnography, participatory design, and action research, within a framework of phenomenological understanding and hermeneutic interpretation, the group first carefully mapped its understanding of the problem. Then it met with representatives from the Danish Institute for the Blind and Visually Impaired, and finally conducted three qualitative interviews with representatives from the target group. The outcome was a realization that visually impaired people are neither helpless nor victims, but indeed seem to be quite frustrated that most people fail to recognize their individual skills and willingness to contribute to society.

Thus the group had to reconsider the research design and proceeded by conducting a focus-group interview with representatives and clients of the institute in order to discuss some issues identified in the interviews (cooking, getting around, shopping, and sports). The outcome, however, was not a demand for yet another assistive tool, but an entirely new concept for creating a task force of spokesmen for the visually impaired, charged with disseminating knowledge about the capabilities of the visually impaired. A prototype was created and then tested in another focus group, and consequently a revised prototype was developed for a K-9 course (including teaching materials) to be taught by visually impaired persons. Finally, the concept was tested in interviews with two K-9 teachers.

The report concludes by reviewing the project using relevant theories and also attempting to relate the project's findings to general social, cultural, and educational conditions.

PPL in Practice

Problem-oriented programs involve several of the distinctive elements of research-based education since in these programs students work together on research-like projects. In addition, the learning approach is that of knowledge building and inquiry-driven learning. Groups of students make a collective inquiry into a specific topic, arriving at a deeper understanding through interactive questioning and dialogue, and continuously improving on ideas. In this methodological approach, students must be thoroughly aware of research questions, methods, and analyses, emphasizing the consistent use of methods and academic rules. Here, the ideal relation between teachers and students is that of a collaborative community. The teacher allows students to take over a significant portion of the responsibility for their own learning, including planning, execution, and evaluation.

Projects are carried out by groups formed by the students themselves, in a complex process of identifying research themes, as well as potential collaborators. Supervisors support the students during the process, and once it has been completed, each group is allocated a supervisor. Having designated a theme of study within a broader field of interest, the student group agrees to work upon a problem within the theme. The theme defines the framework for the chosen problem, a context that makes it possible to examine the problem with respect to its broader societal, academic, and subject relevance. The supervisor supports the student group in exploring its theme and in sharpening and clarifying the research question.

Project work must meet academic criteria. This means that students complete systematic literature searches, produce an overview of relevant research, choose the scientific theory and other theories that will serve as the basis of their project work, decide on relevant analytical methods, and reflect upon criteria for inclusion or exclusion of theories and methods.

Supervisors may help with specific proposals, but their main task is to support the students' activities and their self-directed learning. The students reflect critically on their choice of empirical field and then produce and analyze empirical data. Supervisors enter into a dialogue with the students on these issues, and contribute by discussing their own professional experiences in empirical research. Finally, the students draw conclusions based on the project findings, critically reflect on different aspects of their project work, and put the project into perspective. At this stage, the supervisors act as discussion partners who help to both close the project and open it in relation to broader theoretical or societal issues.

Project work is evaluated continuously both in-group, in dialogue with the supervisor, and at seminars where pairs of student groups and their supervisors engage in peer assessment. Final assessment takes place at an exam focusing both on collective (project report) and individual performance (in the oral exam). Grades are given individually according to the student's performance at the exam and based on the quality of the project report.

Curriculum planning includes considerations of ways in which project work and courses at the same academic level can be mutually supportive, as well as how each year's projects and courses can progressively support the next year of study (comp. Healey, Jenkins and Lea 2014, 54)—recognizing that students' own choices of problems, theories, and methodologies constitute an important aspect of the coherency and progression within the study programs.

Project Work and Employability

Aimed at integrating academic standards and social relevance, problem-oriented project work at Roskilde University maintains the academic production of knowledge and skills at a high level while at the same time being open to the

world. Hence, a key prerequisite for project work is to ensure that the educational programs continue to be research-based and that students' work maintains its character of a self-directed research process. However, the university also has a key role in preparing students to function in existing jobs in society, and to understand the broader economic, political, social, and cultural contexts that define the limits and potential for the development of academic and professional work.

Collaborative problem- and inquiry-oriented project work is clearly linked to students' employability in the job market and in society in general. Most often, graduates from problem-oriented programs adapt well to employment. The likely reason is that learning that is student-centered and problem-oriented to some extent meets society's demands for flexible and adaptive education and may foster independent, critical thinkers and creative graduates. For a university that specializes in project work, it is particularly important that students have the skills and competencies demanded by the labor market, not just those relevant to academic study projects (Olesen and Andersen 2015, 278).

In order to strengthen students' employability, Roskilde University continuously seeks to develop exchanges between academic and practice-related professional education, to encourage internships in companies and organizations, and to enable access to research-based education through constant development of student-centered education and collaborative project work.

It is a general tendency, however, that Roskilde graduates are more in demand in times of prosperity than during recession. A likely reason is that faced with a financial slump, companies favor safe solutions, that is, traditional qualifications, while they may be more willing to take risks on individuals during a financial boom by hiring staff with innovative competencies.

Quality Assurance and Impact

All Danish university programs are accredited based on guidelines drawn up by the European Association for Quality Assurance in Higher Education (ENQA), which has received European support to develop a common paradigm based on explicit standards and guidelines for quality assurance in higher education. Accreditation is based on predetermined criteria, called criteria pillars. They include: (1) need for the programs, (2) research-based teaching, (3) competence profile and educational objectives, (4) structure and organization of the programs, and (5) ongoing quality assurance. Accreditation is granted both for existing programs and in the approval of new ones. The accreditation procedure means that all educational programs offered at Roskilde are obliged to meet high standards of quality.

When it comes to examinations in Denmark, there is a long tradition of using external examiners at both the high school and the university levels. The external examiners are responsible for using the same standards for all examinations at the national level, and thus for their quality. One third of all exams must be assessed jointly by external and internal examiners. For the rest of the exams, it is common to use only internal co-examiners. Bodies of external examiners are important partners in quality assurance, as they are required to give feedback to the study boards concerning the quality not only of students' knowledge but also of the exams—that is, how well they are adapted to the skills and competencies that are stipulated for a specific program (Andersen 2015, 199).

Furthermore, all educational programs at Roskilde collaborate with prospective employers. Representatives from business and public and private organizations serve on advisory boards that meet regularly with heads of departments and study boards.

Educational programs at Danish universities are compared on a number of parameters, including the number of applicants, minimum marks for admission, completion time for undergraduates and graduates, dropout rates, employment rates, and levels of income after graduation. However, most comparisons are made among academic main areas or within single educational programs. This information is made publicly available through the Education Zoom, the national web guide to education (www.ug.dk/vaerktoej/uddannelseszoom, in Danish).

Without going into too many subject-specific details, a few comparisons may be made at the university level. At the bachelor's level, Roskilde students' completion times and completion rates are the best, when compared to those of students at the four other multi-faculty universities in Denmark. At the master's level, the figures are average or below. There are, however, harsh administrative and economic pressures on students, as well as on universities, to speed up completion times. This probably will reduce the differences among the universities significantly during the next four to five years.

In general terms, over four decades the PPL-model has had a huge impact on inspiring new ways of teaching at all levels in the Danish educational system.

New Models of Research-based Learning in PPL

Problem-oriented project work that is interdisciplinary and participant-directed involves a hybridization of teaching, research, and experiential learning (Nielsen and Webb 1999; Olesen and Jensen 1999), as well as several of the distinctive elements of research-based education. As described above, for a long time it has been standard practice at Roskilde for students to work together in research-like projects under the supervision of researchers. However, among both students and faculty members there is a desire to further develop the PPL format of research-based learning. Below we outline two different approaches to innovate using the Roskilde model of PPL. The two examples focus on a fundamental issue in problem-oriented project work: how to establish broader

professional communities that engage researchers and students in a common enterprise that exceeds the individual project groups as a framework for the students' work. In the students' normal project work, this objective is not very easily achieved, because project groups tend to be occupied with their own challenges.

One experiment involved the students in faculty members' research, exploring a relationship based on shared practice and collaborative learning processes between students as research learners and teachers assuming the roles of researchers, project managers, and supervisors (Wulf-Andersen, Hjort-Madsen, and Mogensen 2015). The research project used a collaborative research design to study vulnerable young people's participation in secondary and postsecondary education, and the ways in which educational practices and contexts interact with young people's everyday lives, processes of forming identity, and their experience of life's possibilities. Various physical arenas of young people's lives constituted sites for field work and for learning more about the expressions, understandings and (re)productions of different kinds of youth, gender and vulnerability in different contexts by different actors. The involvement of students in their teachers'/supervisors' research provided expanded learning possibilities for both students and researchers.

Groups of undergraduate and graduate students (41 in fall 2012, 18 in spring 2013) worked on subprojects within the research project. The semester began with a seminar for all students involved, followed by students refining their research questions, methodology, and theoretical approaches before going into the field to conduct empirical work. Later, when students had completed most of their empirical work, an analytic workshop was held in order to create common ground for collective reflections and analysis. Throughout the semester, researchers/supervisors monitored, supported, and challenged each group's work.

From the point of view of education, the experiment gave students first-hand research experience and organized their learning processes through interaction with empirical and theoretical fields, informants, research colleagues, etc. It included experience with the delicacy of navigating and reflecting on the multiple contexts and among the many different stakeholders of an actual research project. And it provided supplementary workshops focused on presenting and discussing analyses and interpretations. The shared, collaborative practice changed social relations among students within the project group, among different project groups, and—as students emphasized—changed relations with the supervisors as part of a research community. Students felt they were being "let in" to the research community. This led them to become more committed to learning content and working hard to meet "real research standards" and to be acknowledged and cited for work of value to the larger project.

A very different approach, Anthology Learning, was first introduced in the Working Life Studies Program (Dupont 2015). In this new format, a class of 52 seventh-semester students was divided into four clusters of 14, 17, 14 and 7 participants, each cluster focusing on a theme within the overall subject of the semester. A cluster was made up of supervisors and students organized in case-groups. The cluster functioned as an academic and a social unit, while the students also participated in shared activities such as courses, lectures, reading groups, and field trips. The objective of the cluster was to create an anthology (200 pages) consisting of case-studies from the case-groups, as well as shared chapters introducing the subject, the theoretical and methodological framework, a framework for the case-studies, a conclusion, and a reflection on the work and learning processes.

Distinguishing features of the anthology format are comprehensiveness and complexity. Regarding the former, once they have organized themselves into a cluster during the process of identifying a relevant theme, the students individually and working in groups have to maintain an overview of the theme so as to contribute to the shared chapters of the anthology and put their case-projects into perspective. This is achieved in part by weekly meetings at which cases are discussed across students' groups and with all the supervisors in the cluster. In addition, an editorial board is established, charged with delegating responsibilities and with achieving consistency in the body of the anthology. Thus peer learning, peer assessment, and discussions with several supervisors all contributed to a broader understanding of the theme than would have been achieved in conventional project work.

Having to work collaboratively in a case-group, as well as well as in a cluster of case-groups, requires skills in organization, communication, and documentation. Thus, a spinoff of the new format is hands-on experience in managing and documenting complex projects. Moreover, evaluations indicate that the organization of clusters has a positive effect on the social environment of the class. Students feel commitment to both case-group and the cluster as a whole, and they establish interest-driven relationships with other students across case-groups in the cluster.

Final assessment of students in Anthology Learning took place at an oral exam based on the anthology as a whole and used a brief synopsis produced by each student as the basis for the individual examination and assessment.

Looking Ahead

Looking ahead, three important trends may be distinguished in the endeavors to strengthen Roskilde University research-based learning:

1. Increasing student participation in faculty members' research. This may involve project work, as illustrated by the example above. But this can also be done in courses in which, for instance, teachers use their own research as a point of departure, with students contributing such

items as literature reviews and analyses of empirical data.

2. Introducing alternative output formats, as illustrated by the Anthology Learning example. In that framework students combine work on their own projects with collaboration across project groups, and the presentation format changes from the conventional report to an academic anthology. Another solution may be to give students the opportunity to write scientific papers instead of project reports.

3. Strengthening students' critical self-reflection concerning the coherence of their educational activities. How can they consolidate their academic interests and use them in the processes of developing research questions for the nine semester-long projects that they have to complete in the course of their bachelor's and master's education.

To sum up briefly, strengthening research-based learning is a question of integrating students' project work and the research of their supervisors, of collaboration across the projects of the student groups, and of longitudinal reflection on the orientation of all the projects that the student has to complete during the course of his or her studies.

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