Section 7

Quality development and evaluation of research and education

1. Introduction

This section describes the most important mechanisms for controlling and ensuring the quality of the education and research conducted at Danish universities. The section is divided into two parts:

- The first part concerns the educational aspects: At the decentralised level the universities are responsible for the evaluation of education and teaching; whereas at the central level one finds for instance the quality evaluations and method development made by the Danish Evaluation Institute as well as the board of external examiners [1].
- The second part concerns quality development of research: The classic 'peer review' and the academic society's own quality criteria and evaluation processes, the universities' responsibility for research management and surveillance, as well as various other forms of research evaluation and quality development of research.

Reference is made to the existing development contracts between the universities and the Ministry of Science, Technology and Innovation, to the so-called 2nd generation development contracts, and to the procedures for approval of new educations.

Furthermore, the questions of dropout rates, periods of study, and unemployment are also central quality indicators. Low dropout rates and short completion periods can be considered an indication that the educations have succeeded in raising the quality, improving the tutoring and strengthening the study environments. The student completion rate is influenced by the activity dependent funding system, which rewards the universities each time a student completes one year of full time studies. The system of *full-time student equivalents*[2] is expected to give the universities an incentive to improve the study environments and to strengthen the tutoring efforts, as this will increase the students' completion rate .

In addition to external *peer reviews* the Danish quality development system for university research and education is to a high degree based on the universities' own quality work, self-evaluations and quality development mechanisms. This is supported by an appropriation system that makes the incentives visible and penetrates from a decentralised perspective.

2. Quality development of the educations

2.1 Educational evaluation according to the University Act

Today's quality development is based on the former University Act, which provides that the Minister for Science, Technology and Innovation sets the rules of the quality control regarding university educations and teaching, including the rules of the body of external examiners. Furthermore, the Act placed a clear responsibility for the teaching on the study programme director.

In the general notes to this Act the external quality development of the university educations and teaching is defined to include two aspects:

[1] In Danish: Censorinstitutionen
[2] In Danish: STÅ-systemet (STÅ = Fulltime Student Equivalent (FSE))

- The body of external examiners as a test authority and assessor of the educational quality and the relevance of the educations to employers.
- Systematic evaluations of the university educations, for instance with the help of the Evaluation Centre for Tertiary Educations, now the Danish Evaluation Institute, see subsection 2.2.

If the quality or academic level of the educations is not in accordance with the requirements stipulated by the educational rules and regulations, the minister may revoke the educational approval; limit the programmes offered, or reduce the student intake of the educations concerned.

The study programme director's responsibility for quality development and teaching has resulted in internal quality development mechanisms that are crucial to the quality of the educations: elaborate and detailed procedures for evaluation of the teaching, each element of the educational programmes, and the educations in general have been developed, and many resources have been invested in internal quality assurance systems. The study boards also play an important role in the continuous internal evaluations. The fact that the students hold 50% of the votes on the study board, gives them influence on the quality of the educations and the teaching, which contributes to improving the continuous quality assurance and development.

The universities' annual reports, yearbooks and accounts providing detailed information about their activities during a calendar year are also an important part of the internal quality development. Typically, the institutions also produce strategic research and educational plans for e.g. 5-year periods. By focusing on, selecting and evaluating present and future activities these plans also contribute to the institutions' quality development in research and education.

2.2. Educational evaluations by the Danish Evaluation Institute

The history of the Evaluation Institute

The Evaluation Centre was founded in 1992 as one of the first four European quality assurance institutes. Up until the foundation of the Danish Evaluation Institute (EVA) in 1999, the Evaluation Centre evaluated almost all long and medium tertiary educations in Denmark.

The Danish Evaluation Institute (EVA) is a national knowledge centre for evaluation of educational systems. The institute investigates single areas of education; assesses the correlation of various educations and the educational system; develops and renews evaluation techniques and methods; and gathers national and international experience with educational evaluation.

Evaluation method of the Evaluation Centre/ Danish Evaluation Institute

Quality evaluations
The Evaluation Centre carried out a total of 67 quality evaluations of tertiary educations, primarily university educations but since 1999, the Danish Evaluation Institute has been assigned to implementsystematic evaluations.

Basically, the quality evaluations assess the quality of the educations concerned individually based on their own definitions of what constitutes good quality. There are no common, objective and predefined quality criteria as is the case with accreditation. Nonetheless, the quality evaluations have often resulted in exchange of knowledge and experience between educations, and have thus prepared the ground for better learning processes across educations with a certain degree of comparability in contents, profile and structure.

The quality evaluations of the Danish Evaluation Institute consist of the following parts:

- A preliminary investigation based on legislation, orders, curricula and other existing material, such as statistics.
- A self-evaluation conducted by an internally appointed group at the university based upon guidelines issued by the Evaluation Institute.
- A survey often carried out by an external consultant.
- A site visit by the evaluation group.
- A conclusive conference with the involved universities and the evaluation group.

The ministries and the universities follow up on the recommendations of evaluation reports in various ways. In a few rare cases an evaluation has lead to limitations on the student intake, until strongly criticised matters were improved. In some cases, the universities have been asked to make follow-up plans. Often the universities' own work with the self-evaluation has lead to changes of curricula and study plans, already before the publication of an evaluation report.

General features of the quality evaluations

In a report *Kvalitet i uddannelsessystemet* ("Quality in the educational system" – in Danish) the former Evaluation Centre described the quality criteria used in the first quality evaluations of tertiary educations.[3] When supplemented with the knowledge acquired during the evaluations, the following common recommendations become apparent:

- To improve the teachers' teaching qualifications , their tutoring and the educational development.
- To continue the work on establishing quality development mechanisms at the educations
- To highlight the priorities in relation to the educations' objectives thereby increasing the professional integration of the educational elements.

In addition, several evaluation reports have discussed the lack of research at some educations, high dropout rates, the progression from bachelor to master level, the poor study and career tutoring, and indistinct qualification profiles and low business relevance of some educations.

2.3 Body of external examiners[4]

In Denmark at least one third of the ETCS-credits required for graduation from a university must be earned at exams attended by external examiners. Therefore Denmark has a body of external examiners covering all university educations. It is important to note that the use of external examiners is not limited to university educations; external examiners attend examinations at all educational levels in Denmark. The use of external examiners is a defining and characteristic feature of the entire Danish educational system.

For each education or group of related educations there is a joint interdisciplinary corps of examiners, which in principle provides nationwide coverage. The high degree of external examination is regarded as an essential element in the external quality control at the universities. The activity dependent funding system[5] and the body of external examiners combined result not only in a high number of examinations. but also to a relatively comprehensive testing of the students leading to a relatively extensive quality development compared with foreign universities.

According to the order on the external examiners from 1993 the examiners have two tasks:

[3] The Evaluation Centre, *Kriterier for kvalitet – status over Evalueringscentrets evalueringer af de videregående uddannelser, September 1997, Bilag 9 i Finansministeriet m.fl., Kvalitet i uddannelsessystemet* ("Quality criteria – status of the Evaluation Centre's evaluations of the tertiary educations, September 1997, appendix 9 in *Kvalitet i uddannelsessystemet* ("Quality in the educational system") by Ministry of Finance et al. – in Danish), Copenhagen 1998.
[4] In Danish: Censorinstitutionen
[5] In Danish: STÅ-systemet

- *Control*. The examiners must see to it that the regulations set out in the order, the curriculums etc. are observed. They must secure the students a homogeneous, just and reliable evaluation – in other words they are to attend to the legal rights of the students. The examiners also check that the students have achieved an academic standard of an adequate and required level.

- *Advice*. The examiners are to advise the institutions on the quality of their educations and their relationship with the labour market.

These two concepts have not yet been fully implemented and based on an evaluation in 1998,[6] the Evaluation Centre concluded, that the external examiners had not achieved the required independence, and that the body of examiners did not contribute to the quality development of the educations in a sufficiently systematic way.

There is a very large variation in the size of the app. 111 corps of examiners. As an example, the corps of examiners for the humanities counts 35 examiners on average, compared to the average of 237 for social sciences. Technology features an average of 468 examiners. 88% of the small corps (between 1 and 20 examiners) are found in the humanities, and 87% of the small corps covering only one institution are in the humanities.

In addition to the above-mentioned tasks for the body of external examiners, it is worth emphasising that the nationwide corps of examiners often leads to the establishment of professional networks across educations and institutions. This contributes to raising the level of the work on quality improvements giving it a more self-sustaining decentralised character for each education.

2.4 Accreditation as quality assurance tool on the international education market

Danish discussions on accreditation have focussed on the increasing pressure from a more and more internationalised and intransient education market. The question is how universities, students and employers find their way in the "educational jungle" when the number of knowledge producers, educations and educational types almost explodes. Accreditation provides answers to some of these challenges, as the tool is based on common and predefined quality standards that make international credits and recognition of degrees possible. Accreditation must, however, also be seen in a more commercial light as e.g. professional educations such as the engineering and pharmaceutical educations experience an increasing need to "validate" themselves in an international market for education and competence. Consequently, accreditation is also used as a tool to market each university and its educations.

Accreditation is based on predefined criteria, and expresses recognition or lack of this of an educational institution, a specific education or a certain educational level. The recognition is expressed in the form of a quality stamp or by allocation of certain rights, such as the right to provide certain educations at a certain level. In addition to this, accreditation is also a continuous assurance that the educations and institutions adhere to the adopted quality standards. As part of the accreditation, quality evaluations are published. [7]

Accreditation can either be an expression of a public, often state recognition, of a specific education; or the approval of an institution to offer a certain education; or the recognition of a private organisation based on adopted quality standards, for instance in the form of a quality stamp. In the last case there is no authoritative decision or recognition attached, such as the right to offer an education. Therefore,

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[6] The Evaluation Centre, *Censorinstitutionen i forandring. En undersøgelse af samarbejdet mellem censorinstitutionen og videregående uddannelser* ("The body of external examiners is changing. A survey of the cooperation between the body of external examiners and tertiary educations" – in Danish), Copenhagen 1998.
[7] Cf. The Danish Evaluation Institute, *Akkreditering. Et perspektiv for kvalitetssikring af de videregående uddannelser* ("Accreditation. A perspective for quality assurance of the tertiary educations" – in Danish), Copenhagen 2002.

accreditation as a state quality development system is often differentiated from certification as a private concept.

Accreditation in Denmark

In Denmark the only examples of accreditation/certification are the cases where Danish university educations have been recognised by international organisations. For instance the Business Schools in Copenhagen and Aarhus were granted the quality stamp EQUIS, "European Quality Improvement System". Since 1997 EQUIS has been used by "The European Foundation for Management Development" to create a European quality stamp for the commercial university educations ("business" educations), and thus ensure transparency for students and employers.

Copenhagen Business School and Roskilde University were evaluated by the European university cooperation then in force, CRE, in 1996 and 1999.[8] CRE's evaluations took place at departmental level and thus did not only include educations but also accreditation and benchmarking-like elements.

Furthermore the European Centre for Strategic Management of Universities (ESMU) has evaluated the Copenhagen Business School twice.

These accreditations and educational and departmental evaluations have not had and will not get immediate influence in relation to appropriations or the like for the departments and educations concerned relative to the national administration of the universities.

Accreditation of master programmes for adults

The new ministerial procedure for approval of master educations for adults contains an element of accreditation as the approval is based on predefined criteria. For ministerial treatment of proposals for a new master education the application must include a clear description of the following nine items:

- Admission requirements
- User and employer influence
- Purpose and contents
- Target group and job profile
- Modulisation
- Length
- Quality mechanisms
- Taximeter ranking
- Background of the study order

Due to the shift of jurisdiction between the Ministry of Education and the Ministry of Science, Technology and Innovation, cooperation procedures have been introduced in relation to the educations offered in a number of areas. This includes for instance approval of ordinary educations (bachelor and master) and tertiary educations (candidatus and master). Before an education is approved, the ministry under whose jurisdiction this education belongs, initiates a discussion of the issue with the other ministry to ensure coherence, flexibility and relevance in the educations offered from short over medium to long tertiary educations.

3. Quality development of research

While the responsibility for the quality development of the university educations is clearly placed at university level and in well-defined independent bodies, such as the body of external examiners, the Danish Evaluation Institute or other external evaluation institutes and the ministry (approval of new educations and administration of orders), the quality development of the university research takes on many forms.

[8] CRE merged with the Confederation of EU Rectors' Conferences in 2001 and founded the EUA, The European University Association.

3.1. Internal quality assurance

The most important quality assurance of the research activities is primarily carried out internally at the universities at three levels: the individual researcher, subject areas and institutions.

The researchers' results are evaluated individually through the peer reviewing taking place prior to publication of the research results in international magazines, and through the management's follow up on the research of the employees.

Since the 1980s, a number of disciplines have been evaluated on the initiative of the government and later by ministries and research advisory bodies. The reason was an acknowledgement of the fact that certain research areas were very important to society, and it was therefore important to evaluatenot only the quality of the researchbut also its applicability and the return on society's investment in these areas of research.

These evaluations are also based on peer review carried out by (foreign) researchers within the discipline concerned. During the period 1978-1980 evaluations of the fields English and Physics were carried out. In the following years the research councils initiated four evaluations: Crystallography (1985), Hydrobiology (1986), Danish Concrete Research (1987) and Danish Metallurgy Research (1988). The field of environmental research were evaluated in1989. Subsequently, evaluation reports on physics (1992), agricultural and veterinary science research (1992), health research (1993), social science research (1997) and fishing research (1997) have been published. The evaluation of Roskilde University in 1992 was the first evaluation of a whole institution.

There is no tradition in Denmark for university ranking. Therefore, quality assurance is mainly carried out through internal monitoring in the form of annual reports where each department accounts for the various research activities that have been carried out during a calendar year. Some of these accounts consist of lists of activities while other departments take it one step further and work out real quotation analyses etc.

3.2 Increased use of performance indicators

It has become increasingly common to use so-called performance indicators also within research. Even though it is difficult to measure research quality, the publication and quotation analyses are ever more frequently used as a scale of research quality, at departmental, university and national level.[9]

The scale is based on the recognition of quality implied when an article is published in a recognised, preferably international scientific magazine with anonymous referees. Furthermore, the publication and quotation frequencies can be supplemented by an evaluation of the magazine quality (impact factor).

Relative to the key figures issued by the European Commission, Danish research in general enjoys a good ranking based on the number of scientific publications in relation to the number of inhabitants. These figures, however, cover large differences from one area to the next: there is for example a notable predominance of scientific articles published in the fields of technology, natural science and health sciences.

Publication and quotation analyses are carried out to an increasing extent at the various faculties and disciplines to acquire knowledge about the production activities of the departments and universities. It has for instance also been suggested to include this in the new performance contracts.

[9] Publication analyses calculate the number of scientific articles published in recognised scientific magazines. The magazines evaluate the quality of each article. The number of published articles is therefore a measure of the research quality. The quotation analyses count the number of articles referring to a specific article. This is based on the assumption that the more research that rests on a specific result the higher the quality of this result.

3.3 Respecting the characteristics of the research areas

However, it can be discussed whether publication and quotation analyses are the only suitable means of measuring research activity and whether they are relevant to all disciplines and faculties because there are considerable differences in the publication practices from one discipline to another; and because research is a multi-faceted activity generating outcome other than scientific publications.

Therefore, other factors and standards are often brought into the debate on quality development of research and the various elements are combined. The research and publication traditions at the universities vary considerably. Statements of research productivity – rather than research quality – must be evaluated differently depending on the professional environment concerned.
For example Copenhagen Business School operates with 8 categories:

- Higher doctoral dissertation
- PhD thesis
- Books (and edited works)
- Articles and prefaces in anthologies
- Articles in magazines
- Contribution in proceedings
- Working papers
- Other written research publications

In other areas it is also interesting to assess the research productivity and quality based on the number of patents and/or licences. This is especially valid for the social sciences as well as for technology/natural sciences.

As the universities open up to the world and enter into new partnerships and ways of interacting with external parties, it must be expected that evaluation of research quality and productivity will take on new forms that to a higher degree mirror legitimate external needs and requirements to the research.

For the Danish universities it will become more common to attach new external users and employers to the advisory boards for research and education. The balance to strike, however, is that university departments should not be asked to perform so-called modus 2-research[10] while at the same time being evaluated based on modus 1-research criteria.[11]

As an example of increased openness and transparency for the wider public and stakeholders, the universities have created public research databases where citizens can search information about university activities, either to find relevant partners from e.g. university departments, or to get research results on concrete themes.

3.4 Economic and departmental matters of indirect relevance to quality development

Besides the above-mentioned academic aspects of quality development there is also an economic one. The present lump-sum grant scheme is not in itself a quality evaluation of the university research.

Research funds are basic grants allocated regardless of activity targets such as research production or research quality. On the contrary, the university grants to a large extent reflect the historic conditions at the universities and political agreements of the past two decades.

In recent years, however, a share of the grant has been made activity dependent as extra grants and new research pools have been distributed among the universities according to a model of activity parameters

[10] For modus 1 and 2, see Gibbons, Michael et al., *The new Production of Knowledge*, London, 1994 and Nowotny, Helga et al., *Re-thinking Science, Knowledge and the Public in an Age of Uncertainty*, Oxford, 2001.
[11] Hansson, Finn and Lars Frode Frederiksen, *Forskningsvogtning eller forskningsudvikling?* (”Research watch or research development ?” – in Danish). *Danish Sociology*, no. 4/12. year., December 2001.

for student production, education of researchers, and ability to attract external funding. The same applies to the government efforts to make the public sector more efficient, according to which 2% of the grants to public institutions, such as universities, are retained for productivity improvements. This share is returned to the universities via the 50-40-10-model, see below.

The 50-40-10-model was introduced to increase the universities' incentive to fulfil a number of central political targets, and the ministry has therefore introduced a kind of marginal budgeting to the university area. With the marginal budgeting the university grants are allocated according to a 50-40-10 principle:

- 50% is divided proportionally in relation to each university's earned educational grant[12].
- 40% is divided proportionally in relation to each university's research funded by external sources.
- 10% is divided proportionally in relation to each university's number of awarded PhD degrees.

The model rewards the universities in relation to the number of bachelor, master's and PhD degrees they award. Thus internal quality development mechanisms become vital to the universities' economic grants and the universities are rewarded on the basis of relevance, meaning the universities' ability to attract funding in a competitive environment. Relevance is also perceived as being a part of the purpose with the universities' quality work.

The universities are subject to checking by The National Audit Office, whose primary task is to audit the state accounts and to examine whether state funds are administered in accordance with the decisions of the Parliament (Folketing).

Each year the universities report to the ministry the number of students they can admit to their educations. Based on the number of study places the universities expect to be able to offer each year, the ministry makes an economic prognosis in order to compute the annual grants to the universities. This prognosis, which ex ante is the basis for the universities' economy, influences to a certain degree the way in which the universities plan their research and educational activities with regard to quality assurance and development.

4. The former University Act and the new University Act

The quality development of the research is based on the management responsibility delegated to various levels of the university administration. Both the former and the new University Act provide that the head of department is responsible for allocation of work tasks, including research tasks while respecting the freedom of research, and for checking the employees' research activity and productivity .

The management responsibility also includes research management, e.g. by delegating authority to some of the university's researchers. The purpose is to create the best conditions for active and dynamic research environments, and to support creativity and the development of ideas.

4.1 The managerial responsibility for quality development, evaluation and follow-up

The new act gives the managements at faculty and department level more responsibility for the quality development of the educations. This means that the management and the study board continue taking care of developing the teaching and the educational quality. Furthermore, at least a third of a university education must be subject to evaluation by external examiners as described above. At the same time, continuous and systematic quality evaluations must be made by an independent external organisation using internationally recognised evaluation principles, methods and procedures.

The new University Act gives the dean of faculty a prominent role regarding quality assurance and development. According to the Act the dean of faculty is to:

[12] Measured as student full-year equivalent in relation to both general university educations (bachelor, master) and open university (master for adults etc.).

- ensure the interdisciplinary internal quality development
- initiate quality evaluation of the individual educations of a main area
- ensure continuous and systematic dialogue with and contact to employers and graduates in relation to the contents, profile, quality and relevance of the educations
- ensure development of the management culture in the main area and manager development for heads of department and study programme directors

In addition the deans of faculty and heads of department are responsible for systematic follow-up on evaluations of education and teaching, by involving the study board and study programme directors. The university development contracts are to specify evaluations and plans for follow-up, and will determine the form and frequency of the evaluations.

By comparing with similar educations abroad, the quality evaluations will be part of a natural interplay with systematic benchmarking with relevant foreign universities, since benchmarking is meant to be included in the university development contracts.

Evaluation reports and plans for follow-up on the education and quality evaluations must be publicly available, and in their charter the universities are to lay down clear guidelines for the documentation system.

4.2 Future approval of new educations

According to the new Act the ministerial approval of new educations is limited primarily to evaluating the economic aspects in relation to the taximeter ranking, evaluating society's need for the education, and to checking that the education adheres to the rules and regulations laid down for the education. This means that the universities are to ensure the academic environment, content and relevance of new educations.

The new Act increases the universities' freedom to decide which educations they want to offer within their main areas, but also suggests a higher degree of decentralisation and freedom with regard to the universities' own evaluation of the professional quality of the activities they offer.

The universities are to ensure that the activities they offer are in accordance with society's need for educations within the various disciplines, and they must make qualified assessments to ensure that their students are not trained for unemployment.