

USING SELF-EVALUATIONS FOR COLLABORATIVE QUALITY ENHANCEMENT - A CASE STUDY

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ABSTRACT

This paper describes the application of a process to enhance the quality of higher education. At the heart of the process is a cross-sparring collaborative model, whereby the two institutions are critical friends. The cross-sparring is set up in a way where a study programme first self-evaluate (on criteria that among other things include the CDIO standards) (step one), the institutions that can learn-and-inspire each other are paired based on three - five criteria each institution have chosen (step two). Following that, the institutions visit each other and discuss the criteria each institutions wants to learn-and-inspire (step 3). At the end, each institution reflects and identifies possible enhancements criteria (step four).

This article describes a case study of this process where the Health Care Technology Bachelor programme at Aarhus University and the Health Informatics Bachelor programme from Helsinki Metropolia University of Applied Sciences were critical friends. The article focuses on the third and fourth step in the above described process and reports on the outcomes from the cross-sparring.

KEYWORDS

Quality Assurance, International Collaboration, Faculty Development, Standards: 1, 10, 12

INTRODUCTION

Quality enhancement and development is in the forefront of almost all higher education institutions. In many countries, education is seen as one of the key element to keep the competitiveness and development of the country. One example is the so called Modernisation Agenda presented by the European Union (European Union, 2011). More specifically, with this agenda, a goal has been set to improve the quality and relevance of higher education.

Throughout history, the quality in higher education institutions has been expressed in dissimilar ways. At least three different systems have been found (Amaral, 2012). The old English universities of Cambridge and Oxford were self-governing institutions where quality was defined by the professors. The quality system there resembles the quality system of journal - peer-review. The professors had the power to remove unsuitable employees and hire new staff.. The University of Paris had a 'top management quality system'; the Chancellor of Notre Dame was the rector and had all the power to make decisions. Finally in Bologna, the students have the power to 'hire and fire' professors. This is more a quality system driven by customer satisfaction.

In general, quality in higher education institutions was not on the general public's agenda before the 1980's (Neave, 1994). Amaral (2012) argues that the reason for the quality need (as seen by government) was based on four factors: massification of higher education, market regulation, new public management and a loss of trust in higher education institutions and their professors.

This has - in many countries - led to the development of accreditation bodies. They can be either national (like the Danish Accreditation Institution (2016)) or accreditation bodies that cover an area like engineering (e.g. EUR-ACE (ENAAE, 2016)). Accreditation is - however - a control system that typically ensures that the quality system is in place. Unfortunately, in many cases, the focus is very much on quality assurance, not the steps towards improvement, are not fully considered. This tension is captured extensively in the literature (see e.g. Filippakou & Tapper (2008) or Houston (2008)).

In many instances, accreditation is seen as a process with a very limited value for the participants. It is seen as a process where the institutions delivers "proofs" for the chosen quality criteria, but do not receive much back that can help to improve the quality. Consequently, a model that focuses on developing quality by using light-weight processes already known from accreditation could be useful. With such a model it would afford the community the opportunity to establish international collaborations and to improve international comparability across HEIs

In order to address this weakness, an EU funded ERASMUS+ project has been initiated (Kontio, et al., 2015). The project comprises 8 institutions and their mutual interest was in the implementation and development of the CDIO (Conceive Design Implement Operate) Approach to engineering education. The eight European universities are Reykjavik University, Iceland; Turku University of Applied Sciences, Finland; Aarhus University, Denmark; Helsinki Metropolia University of Applied Sciences, Finland; Umeå University, Sweden; Telecom Bretagne (a French Grande Ecole), France; Aston University, United Kingdom; Queens University Belfast, United Kingdom.

However, the 12 CDIO standards are not the only one in focus. By looking in many different sources, a total of 28 criteria were chosen. For a more in-depth description of the criteria and the sources of inspiration, see (Clark, et al., 2015)

THE PROCESS

This section gives a short overview of the process, the steps and artifacts involved

This is based on a prior self-evaluation, where the institution/programme identifies quality criteria it wants to improve.

The process is done in four steps:

1. **Self-evaluate.** Evaluate own programme/institution. This evaluation is based on 28 criteria. The criteria are a superset of different self-evaluation frameworks including the CDIO self-evaluation. When the self-evaluation is finished, you identify 3-5 criteria you want to improve (called learn-and-inspire criteria).
2. **Pairing.** Two institutions are paired. A good match is two institutions where the difference between their self-evaluation scores on the learn-and-inspire criteria are rather large.
3. **Cross-sparring.** The two institutions visit each other to learn and inspire each other

4. **Enhance.** Based on inspiration and what is seen, actions to develop one's own programme/institutions are planned (and hopefully executed)

The self-evaluation is based on a continuous model like the capability-maturity model (CMMI Product Team, 2006). Each criterion are measured on a 0 - 5 scale; zero indicates that no focus on the criterion what so ever, 5 that there is a continuous improvement process based on solid evidence in place. The same scale is used in the CDIO self-evaluation rubric (see Bennedsen, Georgsson, & Kontio (2014))

The pairing is done by calculating the distance between the score of the learn-and-inspire criteria from the self-evaluations. As an example consider the following (part of a) self-evaluations:

Criterion	Institution A	Institution B	Institution C
1) A holistic view of learning	4	2	1
2) Appropriate learning outcomes (developed from required competences)	3	4	3
3) An integrated curriculum	2	4	3
4) A sound subject foundation	1	4	3
5) Active learning approaches	3	3	5
6) Appropriate workspaces and equipment	3	3	3

The gray cells are the learn-and-inspire criteria for the institutions. Here the distance would be 7 between A and B, 6 between A and C, and 3 between B and C. The distance between A and B is 7 since the learn-and-inspire criteria involved are 1, 3, 4 and 6. The distance in learn-and-inspire criterion 1 is 2 (4-2), criterion 3 is 2 (4-2), criterion 4 is 3 (4-1) and criterion 6 is 0 (3-3). The best match will then be A and B.

The cross sparring will start by both institutions exchange self-evaluations. When institution A is visiting institution B, the focus of the agenda is criteria 3 and 4 since that is what institution A wants to improve. When institution B is visiting institution A, the agenda will focus on 1 and 6.

During the cross-sparring, the visiting institution takes notes and at the end of the visit prepares a list of actions that could be seen as beneficial to implement for enhancing its own study programme.

THE AARHUS EXPERIENCE - AND VISIT TO METROPOLIA

This section describes the process that Aarhus University, School of Engineering have gone through. The focus is on the rationale, the time used and the outcomes.

Preparation

As described above, a self-evaluation was done as a starting point of the cross-sparring. The self-evaluation was done by the responsible for the study programme in focus. The programme responsible has done several self-evaluations using the CDIO rubric, so the concept of self-evaluations was not new to her. Besides a genuine interest in development of the study programme, the study-programme is going to be accredited in the fall. This gave the programme responsible additional motivation to do the self-evaluation.

Learn and inspire

As described above, a self-evaluation was done. The self-evaluation showed some criteria where the score was low and the programme responsible wanted to improve. In Table 1 the selected learn-and-inspire criteria are given together with the score and rationale for the score.

Table 1 Criteria that Aarhus University wants to learn-and-inspire

Criterion	Description	S c o r e	Argumentation
Appropriate work-spaces and equipment	Learning environments, artefacts and resources that support and encourage engaging professional learning are needed to bring the discipline alive and ensure meaning is being made. The building of disciplinary knowledge and skills is best achieved in workspaces that are student-centred, user-friendly, accessible, and interactive.	3	There are workspaces available for students working alone or in groups. We are working on improving group facilities for project work. Professional learning is trained in laboratories and by hands-on learning. Interdisciplinary is highly valued in this programme and is trained in a workshop with nursing students in 3 rd semester and collaboration with hospital staff in 4 th semester.
Faculty development (knowledge and teaching)	Actions that enhance faculty disciplinary competence, professional and teaching skills need to be undertaken. This ensures subject relevancy is maintained and that teaching practices promote learning and a positive student experience.	3	Regarding teaching practise: we have a two year programme for new teachers in pedagogics planned by our CDIO Development Lab (CDL). CDL also plan one day per semester for all staff, where pedagogical development and new pedagogical methods are discussed. Regarding disciplinary knowledge, we want to do better by implementing more R&D opportunities for our staff. Right now we lack staff and funding to be able to do better.
Feedback is timely, appropriate and formative	An important feature of the assessment process is the provision of feedback to students on their work. If the feedback is timely, appropriate and formative it allows students the opportunity to learn more deeply and develop effective skills in addressing the assessment tasks they are set.	2 3	Blackboard gives a range of possibilities which are explored by several teachers, in many courses there are tests during semester to give students feedback, students get feedback in Blackboard courses and exercises.

Research is used in teaching	Research informed teaching is embedded within the programme for example in the form of student engagement in research and course content that is enriched with research results. This suggests that the education provided is topical and at the forefront of current thinking in the discipline, thus ensuring the currency of the students on graduation.	2	According to the Danish education system we are a professional bachelor education, and hence not research based. We joined Aarhus University in 2012 and are working on establishing more research and development projects, searching for funding, training staff, employing new staff etc. We are working on replacing and supplementing textbooks with research articles.
Problem solving opportunities (links to the research process)	Problem solving opportunities are embedded in the learning and research approaches used throughout the programme. This is aimed at developing the students' ability to question and critique situations in search of new knowledge, ideas and solutions, something that is of value in the world of work.	3	We work very much on employability and engineering problem solving, CDIO is implemented as an engineering work process. Students work on engineering problems, learn to work structured with engineering methods, to do literature searches, to read research papers, to integrate knowledge from R&D in bachelor projects. Historically we are an professional bachelor programme, but since we joined the university mere emphasis is laid on research

The entire self-evaluation was send to Metropolia as well as the selected learn-and-inspire criteria. A couple of weeks before the actual cross-sparring meeting, Metropolia sent a proposal for an agenda

The cross-sparring

The actual cross-sparring took place on November 25-26 2016. From Aarhus two persons participated - the programme leader and a colleague. The effective meeting time was 24 hours (flying from Aarhus to Helsinki takes approximately five hours).

The meeting was arranged around three major elements:

1. Introduction to Metropolia
2. Visit to teaching facilities and labs
3. Discussion of the learn-and-inspire criteria

Introduction to Metropolia

The introduction was indeed a good thing and helps understand the context and the "specialities" of the Finnish system. We all have our own understanding of how an educational system is and operates. By starting with an introduction to the general system, the university and the study programme, many misunderstandings were avoided.

Teaching Facilities

A walk-through of teaching facilities was done. It was inspiring to see the different facilities, even though the facilities at Metropolia are older and (from the viewpoint of Aarhus) not supporting either project- or lab work better than the facilities we have in Aarhus.

Discussion of Learn-and-Inspire

Metropolia had gone through a major revision of their study programme in the summer, so many of the things discussed were either obsolete (since they have been changed) or there were no experience so far. However, using the criteria to focus the discussion was very useful; prior to the visit we had knowledge of Metropolia's status (strengths and weaknesses) so that the discussion could stay on track and be very detailed.

The findings and action plan

It was an inspiring and fruitful visit to Metropolia. The study programme at Metropolia and Aarhus were at the "same age" so we have had many of the same experiences and problems - and therefore easy to find common grounds.

One of the major changes was the introduction of a common first year for all study programmes with a major IT component. We had detailed discussions about the cons and pros of this approach - and at Aarhus University we decided that it is not the way for us to go forward since one of the consequences was a major drop in the intake of female students. However, Metropolia's strong focus on the well-being of the first year students was indeed an inspiration. At Aarhus we have a project each semester - we intend - inspired by Metropolia - to put a more systematic follow-up on student's presence and well-being on the project supervisors.

THE METROPOLIA EXPERIENCE - AND VISIT TO AARHUS

This section describes the process that Metropolia has gone through. The focus is on the criteria where Metropolia considers having the most added value to learn from Aarhus University.

As the programmes belong to the same discipline, many of the content based matters were addressed and in addition thoughts about future cooperation in projects and courses were discussed. That was considered as adding value, and combining the interest of quality management expert and content expert.

Preparation

The programme of Health Technology at Metropolia executed the self-evaluation in two steps, adopting the method developed earlier in the KOLA project (Schrey-Niemenmaa, 2011). The process included 5 persons (Dean of the department, head of the programme, key teachers and coordinator of the project). Firstly all involved studied, answered and scored the questions alone, then a consensus meeting was held. In the consensus meeting all the questions were discussed and a common understanding created. Additionally the proposed development actions were collected for further decision making. Each of the participants had used from 2 to 4 hours for the preparation and additionally the consensus meeting took a further 6 hours.

Learn and inspire

The Self-evaluation board of Metropolia's programme of Health Technology identified following 6 issues to be addressed during the cross-sparring session:

1. Programme evaluation to promote continuous improvement
2. Collaborative learning
3. Technology to engage in learning
4. Wider stakeholder input to programme development
5. Student retention
6. Work placements are promoted

These criteria and their argumentation are explained in more details in the table 2.

Table 2 Evaluation criteria that Health Technology programme of Metropolia wants to learn-and-inspire

Criterion	Description	Score	Argumentation
Programme evaluation to promote continuous improvement	Programme evaluation is required to determine the programme's effectiveness and efficiency in reaching its intended goals. To achieve this, a system that evaluates the programme against defined criteria, and provides feedback to students, faculty, and other stakeholders for the purposes of continuous improvement is essential.	1	<p>Programme is evaluated by various internal parties: students, faculty, peers and management and external parties like Industrial advisory board and national organisations of colleagues. The outside stakeholders' contribution concerning the new study plans should be made systematic. The alumni should participate in the development of new study structures. The programme is so new that alumni is still rare.</p> <p>Programme evaluation was recognised as an important method for further development.</p> <p>Plenty of feedback is collected from students and will be used for curriculum and course development.</p> <p>Weekly teacher meetings take place for planning and coordination.</p>
Collaborative learning	Collaborative learning opportunities should be provided throughout the programme in the form of projects or other similar learning experiences. These opportunities are a valuable introduction to the world of work beyond higher education.	3	<p>Team works, lab exercises and visits to industry are included.</p> <p>Is it the correct goal to measure collaborative learning only in course level - or should it be the learning experience in the context of working life and society. Collaborative learning approach is implemented for the first year and the approach will be applied also to higher grade-levels.</p>
Technology to engage students in learning	Technology is a valuable resource when considering the design of engaging learning experiences. It is important that technology is used throughout a programme in a thoughtful way that adds value to learning. The modern world is technology rich and today's students are often very tech-savvy.	3	<p>Platforms for supporting various learning activities are in daily use.</p> <p>Digital learning environment could be more promoted, facilitated and supported There is a recognised need to expand their usage both on-campus and off-campus</p> <p>Plenty of hands on laboratory working is a regular practice.</p>

	Incorporating technology into learning and teaching can also help to develop the students' technology competences further.		
Wider stakeholder input to programme development	With a focus on preparing students for life beyond higher education, it is important that programme development takes place in a way that engages a range of internal and external stakeholders e.g. Industry Advisory Board and Benchmark Statements. This ensures that the programme is 'fit-for-purpose' and has the potential to produce the best possible graduates.	3	Industrial advisory board meets four times a year. Students' continuous visits to companies are executed. Projects are done from authentic changing topics relevant to industry. More systematic way of collecting, analysing and using the needs of stakeholders should be developed.
Student retention	The retention and progression of students is continuously monitored and acted upon to ensure the health of the programme.	3	First year of 4 times 15 ects modules encourage students to effective commencement of studies. Four modules serve as an introduction to studies in engineering giving a holistic view to the profession. Similar kind of module system is also used in Health Technology major. The University cannot kick out students due to their performance. If less than 55 ects are gained, University does not get respective funds from the ministry.
Work placements are promoted	In order to best prepare students for their life after higher education, opportunities should be provided at points in the programme to allow students to engage in work based activities.	4	Work placements are compulsory elements of the curricula - they are well established and evaluated. The communication with the employer could be more structured. School tries to organise internships to those who do not manage to find the place by themselves.

The reason to choose those criteria originates from the feeling that Metropolia needs to find a more systematic way of collecting feedback and using it as a source of information for development activities. Additionally the financing of the university is dependent on the student retention, graduate, and employability. We think that most of the above mentioned questions reflect these criteria.

The cross-sparring

The principal lecturer and project coordinator from Metropolia made a two-day cross-sparring visit to Aarhus University in December. The actual time spent including travels was 38h - two

working days and one evening when the cross-sparring issues were spoken in a more relaxed way over dinner.

Two days seems to be sufficient to go through the well prepared questions. Additionally it would have been beneficial and interesting to have more time to interview students and other teachers and visit some lectures and lab works. However the couple of discussions with the teachers and students which were included were very good.

The findings and action plan

The process was very fruitful for Metropolia. Ideas how to improve students' possibilities for team working and other collaborative learning efforts were found. The visit was strengthening the value of some practises Metropolia has already implemented - however those need to be developed further. Student retention needs even more attention - and according to Aarhus model, that could be done by supporting students with their efforts of finding internships and coaching them, tracking the advancement of the studies more frequently and enabling distance education to create flexibility. Employability can be improved by strengthening the involvement of industry by industrial reviewers in exams and thesis works.

CONCLUSIONS

In general the use of an extended self-evaluation brightened understanding of the strengths and weaknesses of the study programmes involved. Both of the institutions found the time spend on the self-evaluation gave a good payoff.

The actual cross-sparrings were seen as worthwhile. Both study-programmes involved are at the same development point and had many mutual challenges like the lack of literature for the certain subjects and the difficulty for the students to figure out what Health Technology Engineering is.

Many examples of good practices were discussed and gave inspiration to both programmes. The fact that Metropolia's study programme just had gone through a major revision naturally made it difficult to see how things are done in detail. However, the way they focus on lowering the retention rate by focusing on the integration and well-being of each individual student was a major inspiration to Aarhus University. Metropolia's major inspirations were in the area of "soft skills" like learning to work in teams with the help of mentality and working style analysis. Additionally the use of distance learning and coached internships inspired Metropolia.

FUTURE WORK

The idea of cross-sparring is seen as a productive way to initiate study-programme development. Discussion is continuing on how the pairs should be matched - in the future it might be beneficial to give the participating units an opportunity to tell their preferences not only based on the evaluation criteria, but also based on the match of discipline. More experience is needed to create a working market place to fulfil the needs of different programmes.

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BIOGRAPHICAL INFORMATION

Jens Bennedsen, Dr. Philos, Senior Associate Professor in engineering didactics. He received his M.Sc. degree in Computer Science from the Aarhus University in 1988 and the Dr. Philos degree in Computer Science from Oslo University in 2007. His research area includes educational methods, technology and curriculum development methodology, and he has published more than 40 articles at leading education conferences and journals. He is the co-leader of the European CDIO region and member of the CDIO council.

Katriina Schrey-Niemenmaa, has a broad experience in developing education, especially engineering education. Following graduation with a Master degree in electrical engineering, she has 30 years work experience in industry (KONE Corp & Nokia) TEK (Academic Engineers and Architects in Finland, where she was Head of educational policy) and as a member of Metropolia's academic staff. Also during her career she has received a Master degree in Quality Management and a Licentiate in Technology additionally to the teachers' pedagogic studies. Throughout her career she has been active in national and international co-operation to develop education. Currently she is chair of the working group of engineering education attractiveness in SEFI (The European Society for Engineering Education), a Council member of IACEE (International Association for Continuing Engineering Education) and vice chair of the Educational Board of TEK. Additionally she has been active in numerous international projects and has published over 40 papers about education.

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