

Collaborative Quality Assurance in Engineering Education – The Finnish Model

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1 INTRODUCTION

The main aim of this paper is to provide one documented approach with results how national level can be utilized in degree development work. The paper is written about

a national level quality assurance process where a graduate feedback survey, managed together with Finnish universities providing engineering education and by the Academic Engineers and Architects in Finland – TEK [referred to as “TEK” from now on], is the main tool for information and content for both quality assurance per se and quality enhancement in developing the engineering education in the selected HEI’s. A checklist of recommendations for the education developers is provided in the “Conclusions” part of this paper. Case universities have different backgrounds concerning the feedback process. Lappeenranta University of Technology has been a partner in the survey process since 2004. University of Turku has just joined the process during the academic year 2012-2013 and it is the newest partner to the process.

2 COLLABORATIVE QUALITY ASSURANCE OF ENGINEERING EDUCATION: WHY AND HOW?

There are several factors influencing why quality assurance has been gaining more and more attention in Higher Education. Among them are opening globalization of Higher Education and labor market, increasing competition on funding and students as well as development of ICT enabling e-learning [1,2].

In general, increasing interest in quality assurance can be seen as part of the phenomenon of increasing importance of stakeholder approach in higher education hastened by the opening up of the innovation environment [1]. As creation, application and distribution of knowledge are increasingly intertwined in simultaneous processes that appear in integrated networks, universities cannot function as entities separate from society [3,4]. The stakeholder approach enables to take into account actors and networks other than the government and higher education institution. As an example this includes feedback from just graduated students, alumni and industry. [1]

Degree accreditation has proved to be the quality control tool for engineering education in many countries [5]. The main aim has been to assure that graduates from accredited programs are prepared for professional practice. However, in worst case, the accreditation criteria can become increasingly prescriptive, inhibiting development of innovative programs to reflect the changing needs of practice [5]. In Europe and in the Nordic countries in particular, the expansion of quality assurance and autonomy movement of HEI’s are characteristic [6]. This has created pressure to find common ground in quality assurance and feedback systems.

Quality in the context of higher education can be divided to two parts: a) quality assurance and b) quality enhancement [7]. In Finland the quality assurance and accreditation has evolved and developed significantly in recent years [8] and it emphasizes the need for different feedback systems. The graduate survey provided by TEK and the universities has a clear and important role as national level feedback system with the goal of acting both as a quality assurance and quality enhancement tool. This is especially important at a time when several universities in Finland and abroad are developing their engineering education degrees to meet the challenges of future working life and the needs of societies [9,10,11].

2.1 Reforming Engineering Education

Engineering education in many HEI's in Europe, like also in Finland is going through an extensive reform process where the whole bachelor and master level curriculum is reformed to better meet the requirements of the Bologna process. The main emphasis is both on reforming the structures as well as adapting to new ways of educating the students. Bologna process [11], social constructivism [12] and problem-based learning [13] are important structural policies and educational philosophies in the reform process. The overall aim in most cases is to a) integrate more working life skills in to the curriculum and b) give the engineering education a clear international and in many cases an interdisciplinary profile [14]. These goals are usually partly co-created with the industry and academia in Finland and partly settled upon after benchmarking different engineering education theories and practices [14,15]. Reasoning behind this is that in Finland the engineering students have excellent problem solving capabilities and in depth knowledge of science and technology [16,17]. Entrepreneurial, communication, interpersonal and teamwork skills on the other hand need to be developed [16,17]. However, this paper focuses on the quality of degree education, and in Finnish context particularly.

Developing education demands willingness, long-term commitment, decision making and cooperation. It must be based on accurate and comparable data and information. Graduation is a good time to gather feedback from university graduates on their education, the competencies they have gained and how that relates to their employment and career prospects. For the university the received feedback serves as one tool to evaluate the quality of university education and to identify needs for further improvement. Political decision makers receive system-level feedback on the Finnish engineering education and find out needs for development. The results of the survey can also be utilized as a source of management information in the steering of universities.

2.2 National Graduate Feedback – the Finnish Model

Collaborative stakeholder approach has increasingly been used in the development of engineering education in Finland. It has been noticed by the key players – HEI's, representatives of employers and employees, political authorities and other relevant stakeholders – that they share common goals as well as challenges. Therefore it makes sense to join forces. For example, over the last five years the achievements of the stakeholders of Finnish engineering education include a national strategy [18], formation of the expected learning outcomes [2] of the and a profile map of the various HEI's providing higher engineering education [19]. A doctoral thesis has also been conducted analyzing the challenges of the Finnish engineering education in the knowledge economy by applying face-to-face and anonymous stakeholder processes [1]. In addition to these results, the overall collaboration, networking and a sense of mutual trust has been increased.

In Finland, feedback from HEI graduates has been collected already over decades. Previously the graduates have answered overlapping surveys by TEK and their universities. As a result of the stakeholder cooperation, a joint national feedback survey has been created. The main target is to collect comparable feedback data in

order to develop the national engineering education and to give tools for the universities to benchmark themselves to the other HEI's.

The joint feedback survey was at first launched in 2011 by Lappeenranta University of Technology, Tampere University of Technology, the Department of Technology in Oulu University and the four schools of Technology in Aalto University. Since the beginning of 2013 also the engineering departments of University of Turku and University of Vaasa have participated. The national feedback system is coordinated by TEK in close cooperation with the participating universities. The survey currently covers around 95 % of all M.Sc. graduates from the field of technology, making it a very extensive research. Last year, 62 % of the annual graduates answered the survey (1228 out of 1978).

A steering group consisting of representatives of each participating university and TEK is responsible for carrying out the feedback survey in practice. The steering group has created and continues to develop the set of questions focusing on various themes, such as employment situation, competencies gained by the degree, work experience during studies as well as the overall satisfaction and open feedback regarding the performance of the universities. The graduates are contacted by their departments/universities prior to graduation and asked to participate in an electronic survey. The data from a certain year is collected by TEK which also reports the national and university specific results around the beginning of March the following year.

Collecting and analyzing feedback data is important, but it is equally important to implement the results in practice for the development of the engineering education. The results of this survey are distributed widely to the universities including management and other administrative staff, teachers, professionals of developing education and student bodies. Results are also presented for example in various work shops and discussion groups for universities as well as other stakeholders, in articles and press releases. In spring 2013 the results of 2012 were noticed also by various national newspapers. An annual work seminar has also been organized in May. Invitees to the seminar include university representatives on various organizational levels, students, representatives of employers and employees, research organizations and political authorities. The target of the work seminar is not only to discuss the results and their meaning using collaborative stakeholder approach but to create and share best practices for the development of engineering education. A summary of the survey results and the outcomes of the work seminar are collected into an annual publication.

3 EXPERIENCES AND BENEFITS OF THE PROCEDURE

3.1 Case Lappeenranta University of Technology – LUT

Lappeenranta University of Technology (LUT) brings together technology and economics in scientific research and academic education. LUT provides engineering education in degree programmes of Mechanical Engineering, Chemical Engineering, Electrical Engineering, Energy Technology, Environmental Technology, Computer Science, Industrial Management and Technical Mathematics and Physics. LUT has been developing graduate feedback system since 2004 first as an internal process and since 2009 in collaboration with other Finnish Technical Universities and

Academic Engineers and Architects in Finland – TEK. This co-operation gives important benefits for the graduate feedback system: both institutions, LUT and TEK, can get the feedback they need on a single survey and response rates are higher because of a single survey instead of several surveys; the university gets important benchmarking information concerning other Finnish universities with engineering education; the participating universities can utilize TEK's resources in analyzing and reporting the feedback data

In the first phase, LUT developed the feedback system solely for its own needs to gather qualitative data in order to develop the education processes at the University and the degree programmes. After the first years the response rate has decreased from 70% to 50%, but the level is still quite satisfactory.

From the very beginning LUT has seen it very important that also the degree programmes get the feedback their own students have given, in order to utilize the feedback thoroughly. Every degree programme has created the best suitable way to utilize and discuss about the feedback together with the personnel and the students. At the university level the results are reported for the top management and all the degree programmes are 'ranked' according to certain indicators drawn from the questionnaire. Still the efficient and systematic utilization of the feedback is the main challenge and development target in the process. It is anticipated that by effectively utilizing the feedback and communicating the results to the students the response rate can be kept relatively high and the constructive feedback culture can be created.

3.2 Case University of Turku – UTU

University of Turku – UTU is a multidisciplinary science university. It is the second largest university in Finland and the largest that has engineering education. This gives the engineering education a special profile as integrating the different disciplines into its master's level studies. UTU has just joined the national level survey and academic year 2012-2013 is a pilot year where UTU monitors the procedures. UTU engineering also participated to the survey but the goal was to see how the process goes through to the administration and how the students react to this particular survey. Results are described in "Conclusions" part. In UTU the process of participating in the national level graduate feedback survey is still on implementation phase. There is a parallel although not as thorough survey done by the university recruitment services. University survey is for all the graduates from the university and important in that sense. Should the engineering graduates then answer two surveys is yet to be determined. It is, however, clear that UTU must engage in national, and international level quality assurance and degree evaluation and collaborative graduate survey is a comprehensive approach for national needs. As for the actual results for the development of engineering education this engagement process in the national forum provided by TEK has been a fruitful one. It has caused: a) alignment of feedback processes inside the faculty, recruitment and alumni services of the university, b) also clear issues for development inside the university and faculty have risen during the process, c) it has made benchmarking of national level results easier and more co-operative, d) it has enabled the engineering education of UTU into benefitting from the policy work done by TEK e) given also a national level channel and forum for communicating the development done in UTU and finally f) it has strengthened the national level vision and mission of quality assurance and enhancement of engineering education. So even though the result of integrating UTU into the graduate survey is still moderate during Spring 2013, the activeness and participation of UTU in the process itself has been a beneficial one.

4 CONCLUSIONS

The main objective for this paper is to present action based results of the national level graduate feedback survey collaboration for the engineering education community in case there are similar needs in other countries and or communities. In the end it all comes down to pragmatic work and hands-on project management. This, however, is easier and goes smoother when there is a clear and concrete checklist to support the work.

1. Clear objectives and shared vision for the collaboration in graduate feedback

The university's different stakeholders must have a clear idea, goals and incentives about what they want to achieve from the collaboration. Administration, education developers and other university operators all might have different objectives. Transparent and open communication between the stakeholders is of paramount importance. Without commitment to distribute, market and use the actual results without clear belief in its importance and value will drain all the efforts.

2. Making sure that the response rate is high

Information bloat is enormous and ever increasing. In addition to reaching the students there is always the risk that without clear incentive the recently graduated do not want to answer. How to make the surveys as an integral part of the graduation process? This is a major issue that needs to be dealt a) within the university administration and different stakeholders such as faculty and departmental organisations, university level alumni relations, recruitment services, students associations etc. and b) with the graduating students themselves. According to the best practices of national university partners, it needs to be more or less a standard and preferably an obligatory procedure.

3. Using the results for systematic education development inside the university

Integrating the results as part of systematic education development including eg. curriculum and learning methods development. National level status has a big role to play here as the benchmarking becomes considerably easier.

4. Having a national level forum and a facilitator to manage to the process

The role of the facilitator of the survey process as the project manager and national level collaboration provider is crucial. In this case TEK takes care of all the practical arrangements starting from summoning the universities, creating a platform and a forum for survey development and planning, providing the actual e-questionnaire, analysing the survey results, providing help for marketing and consultation of the results inside the universities and organising training

for engineering education developers based on the results. Representatives of TEK visit yearly every HEI participating to the process and run workshops to discuss results of the survey.

5. Commitment of top management to the process

In order to get the needed resources to run the survey and to develop it, it is important that top management is committed to the graduate feedback survey. This is the case in the facilitator organization as well as universities participating the survey. Results of the survey need to serve management as one source of information to work towards organization's goals. For the management purposes it is important to summarize the key results of the survey.

6. Clarified roles and responsibilities to utilize the survey

Stating clearly the responsibilities and ownership of the survey process is vital. Who is the contact person in the university and with what authority? Especially in large universities it is very important to have an understanding who does what, why and with what authority. There are several stakeholders and communication and information sharing within a university is already time consuming. Administration and recruitment services for example have a good understanding about the official issues concerning graduates, but do they have an understanding on how to utilise the information from the survey? Probably most often not, and this means that the faculty should be involved as well.

7. National forum creates strength and enables sharing of experiences and best practices

In Finland the national level collaboration in graduate feedback process is multidimensional. The results of the survey are used in development of individual universities as well as in system-level development of the Finnish engineering education. Results of the survey are discussed in university- and school-level workshops as well as in a national workshop once a year. The steering group of the survey consisting of representatives from each participating university and TEK meet several times a year. They analyse the results, develop the survey, share experiences and best practices and organize annual engineering education development seminars. The power comes from collaboration!

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