ENCHANCEMENT OF FACULTY COMPETENCE – HEALTHCARE AND ENGINEERING EDUCATORS ON WORKING LIFE PERIOD

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ABSTRACT

Enhancement of faculty competence is one important element in CDIO programs. The programs should support the faculty to improve their own competence in personal and interpersonal skills, and product, process and system building skills. One possibility to support this is to provide periods in the industry to the faculty members. An example of this is InnoHealth-project were the working life periods were to develop education and faculty competence by improving interprofessional collaboration, utilizing health informatics and supporting practice to meet the challenges of working life in eHealth sector. During the project 18 health care lecturers and 10 engineering lecturers were involved in the project. The practice placements situated in South-West Finland and were chosen by the lecturers' personal interests, but the places had to have a connection to healthcare sector and to health informatics. For each working life period a set of goals were defined from two perspectives: the industry and the university. The project results show that our faculty's personal and interpersonal competence has improved, our teaching is more working life relevant, new collaboration has started with the industry and collaboration within the university has increased as well. The results show positive feedback from the industry perspective as well.

KEYWORDS

Faculty Competence, Healthcare, Engineering, Working life period, Standards: 9

INTRODUCTION

Healthcare sector is nowadays more and more moving towards eHealth. Healthcare education has to respond to these changes, but engineering has the potential to support this shift with education specializations such as health informatics and health technology too. Actually, our engineering education should respond to these demands in the healthcare sector. To support our faculty to educate our students towards these challenges and opportunities in healthcare we want to provide possibilities to our faculty update their competences. This is actually what CDIO standard 9 defines (CDIO, 2014): CDIO programs should provide support for the collective engineering faculty to improve its competence in the personal and interpersonal skills,

and product, process, and system building skills. These skills are developed best in the context of professional engineering practice. The standard description rationalizes the enhancement of faculty competence very clearly: *If engineering faculty are expected to teach a curriculum of personal and interpersonal skills, and product, process, and system building skills integrated with disciplinary knowledge, as described in Standards 3, 4, 5, and 7, they as a group need to be competent in those skills.* Another well accepted rationale for this is that the rapid pace of technological innovation requires continuous updating of engineering skills.

There are basically three alternative ways to increase faculty competence (Crawley, Malmqvist, Östlund, Brodeur, & Edström, 2014): a) hire new faculty members with industry experience, b) provide educational programs or sabbaticals leaves to work in industry and c) recruit senior faculty to mentor younger faculty members. Turku University of Applied Sciences have mainly used the first two alternatives. This paper focuses on the latest project placing our faculty members to industry or clinical for short periods. In this paper we describe the InnoHealth project in detail. We will provide examples of the working life periods and describe the results of the working life periods. Finally, we will conclude with the overall analysis on the enhancement of faculty competence.

INNOHEALTH PROJECT

Since joining CDIO initiative Turku University of Applied Sciences has supported faculty competence enhancement by providing opportunities to work short periods in the industry. Typically we have had external funding for creating this kind of collaboration with the industry. All our projects have aimed at mutual benefits in the industry and in the university. The latest project we have had was InnoHealth, which was an ESF (European Commission, 2014) funded RDI project from 2012 to 2014. It was a joint effort of two faculties: Faculty of Business, ICT and Chemical Engineering and Faculty of Health and Wellbeing. The InnoHealth project was based on the Open Innovation paradigm (Chesborough, 2003a). Open innovation is a paradigm that assumes that neither firms nor public organizations cannot succeed by themselves (Chesborough, 2003b). Creating innovations, implementing them and internal renewal require that one can complement his competences with partners' competences. This requires ability to make partnerships, ability to work in network crossings and ability to cross borders when necessary. (Chesborough, 2003a; West & Gallagher, 2006)

The InnoHealth project aimed exactly for enhancing networking and practical co-operation between industry and university. The focus areas of this project were utilization of eHealth technologies, interprofessional collaboration and improving working life relevance in education. The project implementation included 1–2 months' working life periods for lecturers, short updating education periods for working life partners and workshops and student projects. The ultimate aim of the project was to develop education by improving interprofessional collaboration, utilizing eHealth technology and to support health care personnel and related staff as engineers to meet the challenges of working life, for example in health promotion, patient safety, patient orientation and supported self-care. (Roininen, Lakanmaa, Heinonen, Kontio, & Raitoharju, 2014) Furthermore, a tool to evaluate the outcomes and felicity of the lecturers working life periods was developed. The development process and results of this Competent Teacher scale (CTS) –tool are reported elsewhere.

WORKING LIFE PERIODS

Altogether 28 working life periods happened during the InnoHealth project. The length of these working life periods varied from 1 to 2 months. Salary of the lecturer was paid by the project

during the working life period. In all, 18 health care lecturers from Turku University of Applied Science and Turku Vocational Institute and 10 engineering lecturers from Turku University of Applied Science were involved in the project. The practice placements were situated in South-West Finland and the places were chosen according to the lecturers' personal interests. However, there were certain prerequisites that has to fulfill: the places had to have a connection to healthcare sector and to health informatics.

After the working life period, each lecturer wrote a report and described the benefits the period had brought him/her. These descriptions were analyzed with content analysis. The main results are shown below grouped into four categories:
- Interprofessional collaboration
    - new possibilities to network and collaborate
    - meeting experts from different practice areas
- Health informatics:
    - the use of health informatics in education
    - updating the lecturer´s own competence to use technology (e.g. medical devices, health care information systems and software)
- Development of education:
    - updating the lecturer's own practice competence
    - getting new contents to the course plan
    - getting authentic cases to the education
    - getting a better idea of the correct and adequate competences in education
- Practice
    - Focusing healthcare and health informatics education on the demands of working life
    - helping the transition between education and clinical practice
    - identifying the needs of continuous education
    - concrete collaboration with clinical or industry practice e.g. in student projects
    - multiprofessional collaboration in clinical or industry practice with students.

In general, all lecturers were very satisfied with their working life periods and wished them to be a constant procedure. Knowledge of working life and clinical or industry practice are essential parts of lecturers' competence.

Half of the working life partners represented industry and the other half represented public sector organizations. The working life partners wanted to join this project mainly for two reasons. First, they saw the expertise of the lecturer as an empowering actor that can support the development of personnel and processes in the partner organization. Second, the costs of the working life period were minimal for the partners and most of the lecturers already had some connections with their working life partner organization beforehand, which speeds up the valuable collaboration. The feedback collected from the partners after the working life periods emphasized interprofessional collaboration as the most important result of the working life periods. The working life partners recognized the impact on the development of education as important result too. Altogether the partners saw the working life periods very concrete and high level. The partners hoped that collaboration will continue in forms of thesis, practical placements of students, R&D projects and study visits.

As mentioned earlier there were 10 engineering faculty members that had a working life period during this project. These periods and effects on the faculty competences are shortly

introduced in the table 1. The results show that a lot of practical knowledge and expertise are gained during the working life periods. In addition, all our lecturers were placed in an unfamiliar environment and they had to learn how to work with new people, how to communicate with them, and how to understand the organizational aspects.

Table 1. Engineering Lecturers' working life places and effects on faculty competence.

Working life places	Effects on faculty competence
Palvelukoti Ilolansalo (Elderly home care service provider)	• Practical knowledge on home care work processes • Software development together with end-users
Turku Region Joint Emergency Services (Hospital District of Southwest Finland)	• Practical knowledge on the implementation process of a new health informatics systems • Practical knowledge on collecting and using patient related information in the information systems and medical devices
Lingsoft Ltd. (Language Management Company)	• Practical knowledge on business strategy implementation • Practical knowledge on customer processes and needs • Experience on the business process model planning
Perkin Elmer Oy (Solutions provider in the areas of Diagnostics, Life Sciences, and Environmental and Applied Markets)	• Experience on product development process • Practical knowledge on health informatics software development • Experience on utilizing analysis templates with data from different software
CGI (information technology and business process services)	• Knowledge on medical device product delevelopment process • Materials for engineering education
Labrox Ltd. (manufactures and develops plate readers)	• Experience on multiprofessional collaboration • Knowledge on medical device testing
BCB Medical Ltd. (Provider information systems to the health care)	• Experience on personal skills and multiprofessional collaboration • Confidence on the working life relevance of the education

Turku PET Centre (Finnish National Research Institute for the use of short-lived positron emitting isotopes in the field of medical research)	• Experience on medical device reporting • Experience on the medical data collection and management • Practical knowledge on analyzing medical device data
Perkin Elmer Ltd. (provider solutions in the areas of Diagnostics, Life Sciences, and Environmental and Applied Markets)	• Practical knowledge on EU's RoHS-directive (the restriction of the use of certain Hazardous Subtances in Electrical and Electronic Equipment) effects on product development • Knowledge on different restrictions and rules in health informatics sector
Evondos Ltd. (Medical device manufacturer)	• Experience on implementing enterprise resource planning system in medical device manufacturer • Knowledge on the medical device production process

CONCLUSION

Since joining CDIO in 2007 we have had several projects that have provided our faculty a paid period in the industry. Typically the length of the periods have varied from 1 to 3 months. All these projects have been very successful and beneficial for all parties. Our lecturers have updated their working life knowledge and skills – improved their personal and interpersonal skills, and product, process, and system building skills. The working life partners have been very satisfied with the projects too. The reputation of our university has increased and the partners have learned the possibilities of collaboration with us. The experiences on both sides support the ideology of open innovations too.

All our previous projects have resulted to continuous collaboration activities after the actual working life periods have finished. This InnoHealth project has just finished, but there are already new collaboration openings in research and development for example. We can say that the working life periods have actually initiated a continued faculty development cycle.

The key element to make these working periods possible has been the external funding. This funding has given us the possibility to send our lecturers to working life and hire additional persons to support on internal activities. The external funding has also made the working life periods almost costs free to our partners and this had eased the decisions to provide periods to our lecturers. Nowadays we try to embed some periods in working life in all possible R&D projects.

CDIO standard 9 focuses on very important aspect on maintaining high quality and working life relevant engineering education. We strongly recommend that all CDIO members take this standard into closer consideration if not already done so.

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