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Comparison of Transversal Competence Levels of Engineering Students With Labour Market Requirements

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SUMMARY

The globalization and the great change in technology of the 1990's brought a particular importance in developing transversal competences (Shuman, 2005). ERI-Net defined transversal competences as "skills, values and attitudes that are required for learners' holistic development and for learners to become capable of adapting to change" (Care 2016), for instance communication skills, teamwork, and innovative thinking.

Although there is high degree of agreement on the importance of the transversal competences, employers observe a significant discrepancy between the preparation of graduate students and the academic work and the labour market.

In this study, some curriculum elements are proposed to integrate the curriculum of aerospace engineering (AE) Master students at Delft University of Technology (TU Delft) and a measurement tool is developed to measure the competence level of engineering students.

BACKGROUND / CONTEXT

Some curriculum changes have been implemented to prepare students for future careers, these include: hands-on design projects, experimentation lab, internships in industry (Kamp and Verdegaal, 2015), guest lectures, company visits, etc. Although many institutions eagerly implement transversal competences in their curricula with an aim to better prepare students for the labour market, current literature remains sparse with little evidence of robust and effective measures to assess the development or improvement of transversal competences in engineering curricula. Often, a simple self-assessment of participants is the only form of evaluation; moreover, there appear to be no longitudinal studies where students were followed in the years after graduation.

OBJECTIVES & RESEARCH QUESTIONS

The objectives of the study are twofold:

1) Integrate curriculum elements which focus on the acquisition of communication and lifelong learning competences into an existing course at AE Master degree in TU Delft.
2) Select and build a detailed definition and measurement tool with five transversal competences needed to reduce the gap between the labour market requirements and engineering graduates' competences. This measurement tool will be used to measure the competence level of AE students in the beginning and in the end of the course and to find out the required competence level that students should hold at graduation from industry perspective.

This study is driven by the following research questions:

1) What transversal competences are needed to reduce the gap between the labour market requirements and engineering graduates' competences?
2) What is the level of improvement of AE Master students for each transversal competences after course implementation?

RATIONALE

This study attempts to measure a set of transversal competences on scales with rubric descriptions rather than Likert scales. Therefore, a detailed rubric instrument with four described levels will be used to assess transversal competences of engineering students before and after a course, and to predict the student competence level at graduation from industry perspective. In addition, curriculum elements focusing on communication and lifelong learning will be introduce into the existing Master program of AE.

METHODOLOGICAL APPROACH

A detailed definition of five transversal competences (entrepreneurial competences, innovation competences, communication and networking competences, teamwork and thinking competences, and lifelong learning competences) important for engineering graduates is proposed based on previous literature (Shuman et al., 2005; Adeyemo, 2009; Passow, 2012; Benjamin et al., 2013; Chan et al., 2017) and an industry competence model (Siemens, 2010). These competences will be validated from experts working within the aerospace industry and other engineering industries, and working in engineering universities, through a questionnaire. Furthermore, in this questionnaire a rubric with the selected and defined transversal competences will be used to measure the competence level of engineering students before and after a course of the AE degree in TU Delft.

Curriculum elements focusing on visual, listening and questioning communication, and reflections will be integrated in the curriculum of AE to improve or develop communication and lifelong learning competences.

EMERGENT FINDINGS

The validation of the measurement tool from industry experts is expected until the end of 2017 and the curriculum elements will be implemented from February to April of 2018.

DISCUSSION

The use of a scale with detailed level description will provide information about the level that a graduate should hold at graduation according to industry experts and the influence of the implemented curriculum elements on student competence acquisition. The findings will inform students about the competences they must have at graduation to be successful in the labour market, and university about the impact of the introduced curriculum elements.

CONCLUSIONS & RECOMMENDATIONS

In a fast, changeable and digital world, the cooperation between industry and academia is essential to prepare the students to a successful employment. This study attempts to involve industry and academia by asking them the required levels needed at graduation through a scale with a described level rubric, and by integrating elements which may improve transversal competences needed at graduation.

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