

Preparing and developing skills for better employability for STEM and engineering graduates

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Abstract—Increased demands from industry on specialists in engineering and in general on STEM jobs in Europe and all over the world need a more diverse skills profile comprising both hard skills, core transversal competences like digital skills and soft skills. Preparing engineering and STEM candidates with non-technical skills, including skills such as critical thinking, idea generation and interdisciplinary ways of working, seems particularly important and necessary task.

Keywords— *Soft skills, Stem employability, engineering education.*

I. INTRODUCTION

Regardless of the domain of soft skills in any workplace education engineering is no stranger to this fact.

However, despite the growing interest in incorporating soft skills in engineering studies curricula, there is no common agreement in many aspects. For example, it is not clear which soft skills should be selected, how they should be taught, or how they should be assessed.

On the other hand, there are also differences depending on the university institution involved or the geographic area. At present, the recent push towards digital transformation that society now requires has increased the number of frameworks and lists of soft skills.

Another characteristic of these skills is that they need to be acquired in an active way, which has become a challenge that has given rise to multiple pedagogical approaches.

II. OVERVIEW

Increased demands from industry on specialists in engineering and in general on STEM jobs in Europe and all over the world need a more diverse skills profile comprising both hard skills, core transversal competences like digital skills and soft skills. Preparing engineering and STEM candidates with non-technical skills, including skills such as critical thinking, idea generation and interdisciplinary ways of working, seems particularly important and necessary task.

III. RESOURCES

Those are just a few examples of resources to aid teachers and students in soft skills:

[1] The objective of this paper is to investigate and identify the common soft skills that occupationally required in the Chinese job market and academically fostered for graduates in Thailand. In this paper, the Chinese top 20 well-paid occupations are chosen as a research sample. An interview was carried out to know the soft skills enhancement requirement among Chinese students, content analysis based on O*Net Content Model and National Qualification Framework (TQF) for Higher Education in Thailand were used in this process.

[2] This empirical study attempts to find out on the views of lecturers versus the engineering students on integration of important soft skills in the teaching of technical courses. The study was based on quantitative method, utilizing two sets of self-developed questionnaire survey. Perspectives from both the lecturers and final year students were sought. The findings pointed out that on the views of lecturers and students regarding the integration of soft skills in the teaching of technical courses were similar on Critical Thinking and Problem Solving skills, and Communication Skills, but significantly different on Team Work and Leadership skills. The implications of the findings are further discussed.

[3] This paper examines the seven elements of soft skills promoted by Institute of Higher Learning (IHL). These soft skills are demonstrated in one of the event organized by Faculty of mechanical Engineering, Universiti Teknikal Malaysia Melaka (UTeM) which is known as Formula Varsity. The event had been participated by a number of IHL in Malaysia and received good feedback from participating institution, staff and students. In order to study the effectiveness of the event and relate it to the soft skills elements, soft skills matrices for each team has been developed and discussed. The result show good relation and fulfil all the element of the soft skills.

[4] In the academic year 2012-2013, the Faculty of Science and Technology of the New University of Lisbon (FCT/UNL) conducted a complete revision of its curriculum, with the goal of enhancing the training of its students and increasing the employability of its graduates. In its new profile, the

FCT/UNL now includes three distinct teaching periods in an academic year, with the introduction of a five-week period between the two traditional semesters. During this period, several transferrable skills courses are taught in an intensive regimen. In this article, we present the motivations that led to the creation of the course entitled “CTCT - Transferable Skills for Science and Technology”, its incorporation into the new curricular profile of the FCT/UNL, its main objectives, and its syllabus.

[5] This paper presents first a definition and categorization of soft skills, then characteristic soft skill fingerprints elaborated for requirements engineering practices, illustrated by a number of examples, and finally guidance for applying that knowledge in project and human resource management.

[6] In this paper we review a set of jobs advertisements offering job positions related to software engineering in order to identify what soft skills are most in demand by software companies in Uruguay. We also compare our findings with the ones reported in other recent studies carried out with data from other countries. This comparison shows that evidence exists about a common set of basic soft skills software companies demand when looking for new staff for software engineering activities.

IV. PLANNING SPECIAL SESSION COMMITTEE

- Co-Chair, Edmundo Tovar, UPM, Spain
- Co-Chair, Anna Friesel, EAEEIE, Denmark
- Rolf Aslaksrud Kristiansen, EUROMASC, Norway
- Laura Grindei, UTCLUJ, Romania,
- Dante Augusto Couto Barone, UFRGS, Brazil
- Dorian Cojocaru, UCV, Romania
- Patricia Olga Caratozzolo Martelliti, TEC, Mexico
- David Navarro Durán, TEC, Mexico
- Marko Hölbl, UM, Slovenia
- Jaromír Hrad, CVUT, Czech
- Bernardo Tabuenca, UPM, Spain
- Juan José Morillas, UPM, Spain

V. TOPICS

This special session focuses on different training approaches and traditions, different work cultures and international perspectives to soft skills and transversal skills teaching. We invite submissions for papers, panels and discussions, which address the following themes:

- STEM employability skills like defined in your country
- Soft skills and transversal skills trained at different level of education
- Undergraduates or graduates training in soft and transversals competencies
- Exploring needs for non-technical skills for better employment
- Industry’s demands for soft and transversal skills
- Investigating employment opportunities for STEM candidates with no previous industry employment
- Engaging NEETs (Neither in Employment nor in Education or Training) for STEM education

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