

An Evaluation of the Efficacy of a Contemporary Engineering Education Framework

Clodagh Reid^{1, †}, Dr. Rónán Dunbar¹.

¹ Department of Engineering, Athlone Institute of Technology, Athlone, Co. Westmeath.

[†] Corresponding Author Email Address: c.reid@research.ait.ie

INTRODUCTION

The research aims to determine the role of cognitive abilities in problem solving in engineering education. The investigation of these abilities will contribute to a key objective of the research, informing curricular design and provision of engineering education at AIT, ensuring an integrated approach.

Engineering education often places significant emphasis on knowledge and skill acquisition, however, attitudes (soft-skills) are a pivotal role of a contemporary engineer [1]. As such, engineering education frameworks, such as CDIO, are striving to achieve an integrated approach (Figure 1) to engineering education [2].

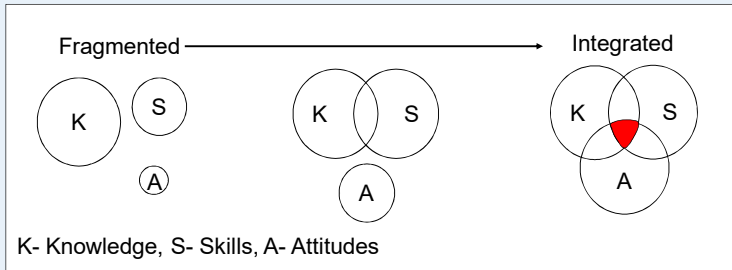


Figure 1. Values placed on Knowledge, Skills, and Attitudes in Engineering Education throughout its development

AIMS AND OBJECTIVES

A key milestone of the study is for AIT to become an affiliated CDIO member. The CDIO standards ensure that an integrated, design oriented approach to engineering education is employed.

The research Methodology aims to investigate and validate the effectiveness of the CDIO approach and contribute to the development of the international engineering education framework. As a result, the study aims to ensure that the project oriented problem based learning (POPBL) approach of the framework develops the intended cognitive abilities required for the development of successful 21st century engineering graduates.

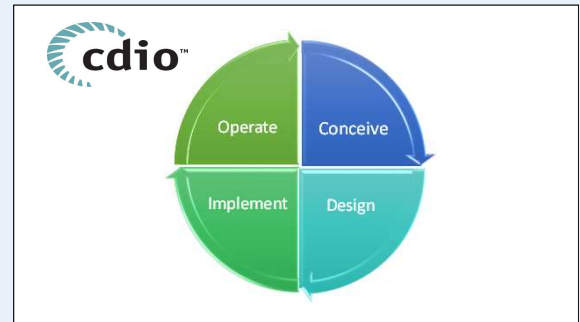


Figure 2. CDIO Engineering Education Framework

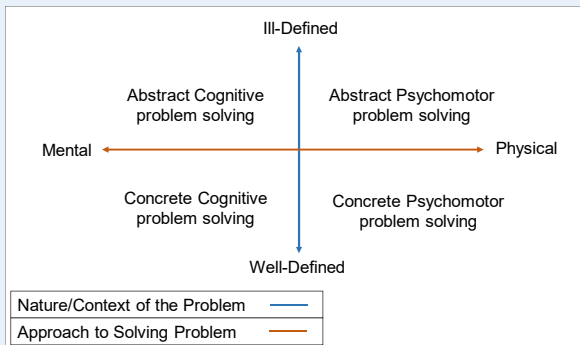


Figure 3. Problem Solving in Engineering

APPROACH

The initial phase of the research has focused on the development of a model to describe the cognitive abilities required for problem solving (Figure 3). The cognitive abilities necessary to solve a problem are dependent on the context and approach to the problem [3].

Through the analysis of problem solving approaches in CDIO affiliated schools, the framework can be evaluated and validated for its capacity to support the integrative acquisition of contemporary engineering skills through engineering education. This work has been presented to UK and Ireland CDIO affiliated members (18/04/2018), of which a number have expressed interest in participating in this research study.

REFERENCES

1. European Society for Engineering Education (SEFI). (2016). Developing Graduate Engineering Skills. SEFI Position Paper.
2. Crawley, E., Malmqvist, J., Östlund, S., Brodeur, D.R. & Edström, K. (2014). Rethinking Engineering Education: The CDIO Approach.
3. Lubinski, D. (2004). Introduction to the Special Section on Cognitive Abilities: 100 Years After Spearman's (1904) "'General Intelligence,' Objectively Determined and Measured". *Journal of Personality and Social Psychology*. 86 (1), 96-111.

PUBLICATIONS

Papers awaiting review for publication:

- Communication Skills in Engineering Education: A Fundamental Aspect of Information Processing. (SEFI)
- Uncovering the Importance of Spatial Ability within Engineering Education. (SEFI)
- A model to describe the Cognitive Abilities required for Problem Solving in Engineering Education. (PATT36)

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Since the beginning of this research study, the investigators have become members of the Technology Education Research Group (TERG).