Chapter 7
Employability Skills for Civil Engineering:
The Complexities of Equipping Students With 4th Industrial Revolution Skills

Thokozani Isaac Mtshali
https://orcid.org/0000-0002-9643-5708
University of Limpopo, South Africa

Sylvia Manto Ramaligela
University of Limpopo, South Africa

Abstract

One of the striking characters of civil engineering is its emphasis to the development of hands-on practical skills, innovation, and creativity. Civil engineering's unique epistemological feature is heavily geared towards equipping individuals with relevant skills for occupational safety.. The purpose of this study was to identify employability skills that civil engineering teachers use to prepare students for 4IR. This study used a mixed method approach, where questionnaire and interviews were used to collect data. This study was guided by EASTA's "employability skills for TVET graduates." This study found that most civil engineering teachers have a challenge in equipping their students with various employability skills. This is as a result of a PAT that only focuses on generic skills than core skills and personal traits. Therefore, this study recommends that the approach for civil engineering course to Fourth Industrial Revolution (4IR) should be viewed through an employability skills lens and calling for teachers to challenge their comfort zone in preparing their students with skills that are pertinent to the 4IR needs.

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INTRODUCTION AND BACKGROUND

One of the striking characters and pedagogical approach of Civil Engineering is its emphasis to the development of hands-on practical skills, innovation and creativity. Civil Engineering includes infrastructure such as bridges, roads, earthworks, structures, dams, tunnels, harbours, rails, drainage, safety and labour-enhanced construction (Mtshali, 2020). Civil Engineering's unique epistemological feature is heavily geared towards equipping individuals with relevant skills for employment (Isaac & Manto, 2019). As such, all teaching and learning activities are directed to equip individuals with employability skills [Dempsey, 2013; Department of Basic Education (DBE), 2011]. The approach of this course to this 4th Industrial Revolution (4IR) should therefore be viewed through an employability lens. In fact, Civil Engineering consists of theoretical and practical components that requires a background in the built environment. (Maeko & Makgato, 2014; Mtshali & Ramaligela, 2020). Over the years, it has successfully contributed towards the shaping of the world structures and has driven economic growth for decades (Schmidt, 2017). Clearly, its contribution to previous industrial revolutions has been meaningful. Thus this study claim that its contribution to 4IR and beyond will be equally substantial. It is a premise of this study that Civil Engineering teachers need to equip students with skills that are 4IR-responsive, they need to be in tune with what in fact constitutes employability skills. However, this issue is not receiving enough attention in the academic space. Thus leaving a gap to understand the complexities of equipping Civil Engineering students with employability skills that are pertinent for 4IR, and this study explore that gap.

Most African countries are developing innovative strategies and educational policies that are pertinent to the current era of living (Manià, Mabin & Liebenberg, 2018). There is currently no blueprint that outlines roles and responsibilities for governments, the educational sector and industry in the realization of 4IR. At this stage, most developing countries adopt a more reactive approach, simply learning how to use innovative products produced elsewhere (Schwab, 2015). It is time such as this where South Africa and other developing countries learn how to become producers rather than consumers. Better yet, it is also important for developed countries to know skills that developing countries are challenged with so they can mentor them. For instance, manufacturers and industries in Germany have prepared well for 4IR production, yet they have not changed the machines used in their production processes. Rather, the very same machines are used to develop new technological hardware (i.e. robots) (Lee & Lee, 2018). The German approach, therefore, is to stimulate the power of 4IR to produce more effectively for consumers (Lee & Lee, 2018).

To date, the biggest challenge in South Africa is that many students graduate from TVET institutions and do not get employed afterwards, despite of the technical

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