


# Chapter 3

## The Alignment of Civil Engineering Tools and Equipment Between TVET Colleges and Industries: The Preparation of Industrial Contemporary Skills Required for the 4IR Era

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### Abstract

*This study was conducted in response to the call made by the Department of Higher Education and Training (DHET) in South Africa to strengthen the awareness levels of TVET colleges' readiness to embrace the 4IR era. The purpose of this study was to focus on equipment alignment between TVET colleges and industries. This study used Eulau and Karps' theory of responsiveness as a guide to explore the purpose. Also, this study purposefully sampled five TVET colleges in Limpopo province and two civil engineering industries linked to these institutions. This study used a descriptive qualitative research design. Document analysis and non-participant observations were used as data collection instruments. The study found that the working tools and equipment used by these TVET colleges were not fancy or showing prospects*

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*of Fourth Industrial Revolution. This was the same thing with the linked industries. Hence, all tools used were simply outdated when it comes to 4IR integration. And so, the study recommends that TVET colleges should institute new partnerships with 4IR responsive industries than being linked to industries that are using conventional tools and equipment.*

## **INTRODUCTION AND BACKGROUND**

Civil Engineering has generally been labelled as laggard and slow in its response to change while the 4IR is creating overarching conditions that have important implications for the built environment (Alade & Windapo, 2019). To date, there are no forms of laid down standards of tools and equipment for 4IR in the Civil Engineering field. This is worrisome as the 4IR is presenting another moment of change in the project-based space and it is influencing different industries on their strategic positioning (Doucet, Evers, Guerra, Lopez, Soskil & Timmers, 2018). And so with 4IR, Civil Engineering industries have the opportunity to advance to more efficient production strategies through the use of 4IR responsive operational equipment. And so, it is important for TVET colleges, as engineering training agents, to continuously align their tools and equipment with those of industries in order to prepare students with industrial contemporary skills relevant for 4IR. Thus this study explore this phenomenon.

Like most of the Engineering sectors, Civil Engineering tools and equipment should advance and at a rapid speed. A lot of manufacturers are focusing on making their machines smarter through the use of technological systems that make operations more efficient (Phuyal, Bista & Bista, 2020). These manufacturers have been developing partnerships with industries to offer intelligent systems that transform how the engineering industry does business at the jobsite. Perhaps TVET Colleges should also forge and obtain partnerships with these manufacturers in order to advance their current Civil Engineering tools and equipment. There is a glaring silence on how Civil engineers should perceive 4IR, better yet, which parts of Civil Engineering should experience technological advancement. Argued in this study is that technological advancement should be on the tools and equipment for Construction, Civil services and Woodwork courses.

Construction is one of the Civil Engineering discipline that deals with Residential building construction, Industrial construction, Commercial building construction and Heavy civil construction (Anindo, Mugambi, & Matula, 2016). However, the South African TVET Colleges tend to focus on residential building construction, hence this study opine for technological advancement of tools and equipment used in residential building construction. This means that the advancement should be

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