Chapter 4
An Innovative Framework for the Design of Higher Education STEM Induction Programmes

Alisha S. Rodgers
https://orcid.org/0000-0001-5060-1179
University of Warwick, UK

Chloe Agg
Imperial College London, UK

Elia Gironacci
University of Warwick, UK

Joanna F. Collingwood
https://orcid.org/0000-0002-8423-4183
University of Warwick, UK

Thomas J. Popham
University of Warwick, UK

ABSTRACT

This chapter presents an innovative framework detailing 14 best practice recommendations for the design of higher education STEM induction programmes. The framework has been devised through a student-led initiative as part of a fourth-year engineering undergraduate group project undertaken at the University of Warwick. The framework aims to successfully facilitate student transition by bridging the gap between prior schooling and higher education. The framework can be used as a supporting tool by other educators to assist in the delivery of higher education induction programmes for multiple subjects of study. The design of an induction programme is presented to provide an example of how the framework's recommendations can be implemented in practice. The programme has been specifically designed to facilitate first-year engineering undergraduate transition. It is anticipated that the reader may take inspiration from these designs and implement their own novel induction programme successfully facilitating student transition into higher education in alternative study contexts.

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The transition from prior schooling into higher education can be challenging and not all those who begin university are successful in making it. This issue is evidenced by student attrition rates, where HESA data reveal that in the academic year 2016/17, 6.3% of full-time first-degree students did not continue their degree after the first year of study (Higher Education Statistical Agency, 2022). The reasons for student non-continuation are complex and are variable between individuals; for example, reasons include poor preparation for higher education, isolation/lack of socialisation, and lack of academic and institutional support (Crosling et al., 2009; Beer and Lawson, 2017; IBSCA, 2019). These issues appear widespread across the student population across higher education institutions and are well documented in the academic literature, albeit there is lack of discussion as to how these issues can be addressed and mitigated to help support students with this transition. Underlying themes are also identified within the literature with respect to these issues of student transition. For example, lack of sense of belonging and inclusive practices, and unfamiliar teaching, learning, and assessment approaches utilised within higher education have been shown to lead to student dissatisfaction and drop-out (Biggs and Tang, 2011; Meehan and Howells, 2019; Theobald et al., 2020; Thompson et al., 2021).

In an attempt to address these issues concerning student transition, induction programmes may act as an intervention to successfully bridge the gap between prior schooling and higher education. Although induction programmes are commonly performed during the first week at many higher education institutions, there is little consensus as to what these programmes should encompass. This chapter, therefore, presents the findings of a student-led project that draws upon multiple domains of knowledge to identify the determinants required for successful higher education induction experiences.

Although the framework developed in this chapter is non-subject specific and can be applied to multiple domains, the origins of the work presented revolve around Science, Technology, Engineering, and Mathematics (STEM), with a specific focus on engineering education. Engineering is a very broad subject and is therefore difficult to define, but to give a simplified definition, engineering utilises the application of mathematics and science to solve real-world problems. It focuses on the design, production, and maintenance of products, much of that which may be taken for granted in everyday life, from systems transporting water to and from homes to everyday electronics such as phones and computer systems. Due to the broad nature of engineering, the teaching of the subject is also varied. It lends itself to utilising experimental and hands-on based learning techniques such as those promoted in a laboratory-based setting, as well as group-work based exercises. This context should hopefully be sufficient to support understanding of the rest of the content presented in this chapter.

PROJECT CONTEXT AND POSITIONALITY

In the academic year 2020/21, an interdisciplinary team of six Master of Engineering (MEng) students at the University of Warwick undertook the challenge of designing an induction programme: an induction experience designed by students, for students. The induction programme was centred around an outdoor adventure theme and aimed to facilitate the transition of first-year engineering undergraduate students into higher education in their first week of university.

The programme design reflects an interdisciplinary engineering approach for introducing students to the core elements of the main engineering disciplines. All students on the School of Engineering courses at the University of Warwick (i.e., where this project took place) follow a general engineering curriculum for one-and-a-half years of study and thereafter have the option to specialise into one-of-nine