

Modular Approach and Innovations in an Engineering Program Design.

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Context

The review and restructure of the undergraduate Engineering at Macquarie University program created an opportunity to consider the basic structures and intentions of the degree program. The opportunity to move away from the traditional standard approach of large, disconnected units with little overlap or continuity and the potential for redundancy and duplication within the curriculum, was informed by an increasing awareness of and exposure to the principles of *threshold concepts* in contemporary education theory. In this restructure, each module is to be counted as comprising a 3 or 4-week component within the standard 12-week unit structure. This paper discusses the implementation of a fully module-based Engineering program in an undergraduate program. The implementation of threshold concepts in the design of this modular format is discussed as a singularly important influence in this design. The innovation of *threshold concept modules* is introduced and discussed as a potentially significant contribution to the practice of a threshold concepts approach to Engineering pedagogy.

Purpose

A modular approach to curriculum design enables fundamental notions within the curriculum to be developed in an explicitly coherent manner. The core issues are mapped with each other to achieve a comprehensive structure where each element is informed by and informs the modules that proceed or follow. In conjunction with embedded threshold concepts interspersed at key points the modular structure allows a strong development of a deep understanding of the key underpinnings of the curriculum and its disciplinary features.

The innovation of concept modules is intended to allow space within a unit for a module to provide the focus of a specific threshold concept to be developed. The anticipated advantage of this approach is to ensure clarity of overall outcomes and the particularly the significant threshold themes of the unit. The concept module requires that the development of the relevant threshold concept is covered appropriately and comprehended by all participants. It is significant to emphasise that this clarity and comprehension refers as much to the students in the unit as it does for the academics engaged in the program of study.

It further ensures that all key concepts in a unit and program of study are covered within the curriculum and understood by both staff and students, and that they are presented with a clear focus on the process with minimum distractions.

Approach

The intention is that a fundamental threshold concept be presented within the concept module in a variety of contexts with the aim of providing students multiple views of the fundamental learning threshold. This would mean workshopping one core notion, the threshold concept, from a variety of contexts.

To provide an example here: for a first year student in Engineering, it is arguable that the design, content and structure of the program in which they are enrolled is in effect an Engineering project with all the contingencies, variabilities and structures of a professional Engineering project.

Conclusion

This paper proposes to introduce the notion of a *concept module* as a specifically focussed teaching space established for the development and comprehension of a precisely defined and articulated

threshold concept. The role of the concept module is to provide students the opportunity to gain exposure and experience with a threshold concept by engaging with it from multiple perspectives thereby having greater opportunity to recognise the implicit threshold nature of the associated concept.