CERTAINTY, CREATIVITY AND CHAOS: KEY INGREDIENTS IN COMPLEX CURRICULUM DESIGN IN THE SCIENCES

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BACKGROUND

We all seek more certainty that the curriculum we design in the sciences produces graduates who are valued contributors to the 21st century workforce. These are individuals who can think critically around a diverse range of issues and solve complex problems, are socially responsible, effective communicators who can manage multiple tasks and have entrepreneurial and networking flair as well as technological competence. In contrast to the professions that have accredited programs, the employment pathways for science are often less certain and apparent. This highlights the need for (1) science students to be able to clearly and demonstrably articulate their attainment of appropriate skills and capabilities and (2) the curriculum to provide explicit instruction to the students to develop these skills and capabilities. The "holy grail" of curriculum design is the constructive alignment of learning outcomes with learning and teaching strategies and evidence of student achievement through some form of assessment. This can only be achieved by horizontal and vertical integration of scaffolded student experiences across the program. Ideally this should culminate in a capstone where students demonstrate their proficiencies in all these skills and capabilities. A series of tools and serious financial resources have been devoted to curriculum mapping exercises to provide certainty to university management and government regulators that the curriculum does indeed achieve the intended goals. However, ensuring appropriate levels of certainty in the science curriculum is problematic. Science programs are inevitably chaotic and uncertain due to the complex and multiple pathways students can take within their degrees and the equally diverse career trajectories for graduates. Creative solutions are required to address these challenges.

AIM

We present a meta-analysis of the perceptions of science academic staff at three universities towards two key projects; a science curriculum review with a focus on a pedagogy of inquiry and the "Teaching Research Evaluation and Assessment Strategies for Undergraduate Research Experiences" (TREASURE) an OLT project evaluating undergraduate research experiences.

Sources of Evidence: The curriculum review spanned four schools and 200 academic staff and was sandwiched between a university wide renewal of assessment followed by a university re-structure. The TREASURE project spanned three universities and we interviewed over 20 academic staff from a range of science disciplines about their perceptions of the benefits and intended learning outcomes of undergraduate research experiences.

MAIN ARGUMENT

The review revealed that academics shared perceptions of the benefits for students of disciplinary knowledge, ways of thinking and development of self as scientists. However, there was an overarching negative perception over the continued problematic nature of curriculum design and assessment and the tension between uniformity and diversity of approaches.

CONCLUSION

We suggest that rather than being viewed in a negative light, a pedagogy of rigorous uncertainty, one that is more creative and less deterministic, could bring us closer to the "holy grail" we desire and better achieve learning outcomes and employment opportunities for students.

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