Developing an Approach for Measuring the Impact of Curriculum Interventions in Chemistry

**Level**  PhD  
**First Supervisor**  Dr Dylan Williams  
**Second Supervisor**  Dr Richard Blackburn  
**Application Closing Date**  4th February 2020  

**Development of a strategic approach, with international relevance, to measuring and comparing the impact of different curriculum models in the chemical sciences**

**Development of a critical evaluation of existing research tools which are used to research a number of defined areas of educational innovation in the physics sciences**

**Measuring the impact of curriculum innovations at a range of UK higher education institutions**

**Project Description**

The recent rise in the number of teaching dominant/focussed positions across the sector and the increased strategic importance of pedagogy in the lead up to the Teaching Excellence Framework (TEF) has resulted in an increase in educational innovation and curriculum redevelopments in the chemical sciences. Their successes strengthening department’s and institutions ranking in both TEF, and the many league tables that heavily rely on this metric to produce their own rankings. Due to the diverse nature of many of these projects, the methods used to evaluate their impact on student performance, skills development and attitude tend to be somewhat varied (e.g. questionnaires developed by the principal investigators). Publications from such projects have the secondary benefit of feeding into REF since key players in the field, which includes Williams and Blackburn, are publishing four-star papers on such research.

Existing tools to measure the impact of learning interventions (e.g. the Chemical Concept Inventory (CCI)) tend to be focused on pre-university level chemistry and are of very limited relevance to learning experience in a typical chemistry degree programme in England or Wales. The aim of this project is to break ground in higher education (HE) and investigate the effectiveness of the diverse range of approaches used to measure the impact of teaching and learning innovations in HE and to work towards the development of a robust and reproducible set of measures that can be used to quantify the impact of curriculum interventions and pedagogical innovations in the chemical sciences.
The initial phases of the project will require a dedicated worker at postgraduate student to research existing methodologies (e.g. the use of the Chemical Concept Inventory (CCI) (Mulford and Robinson, 2002)) and to investigate the validity of these approaches when used to evaluate curriculum developments at the University and partner institutions across the UK. These initial phases will identify the strengths and weaknesses of existing approaches and consider what steps can be taken to develop a new strategy to measure the impact of new teaching and learning approaches on student skills, understanding and attitude in the chemical sciences.

The subsequent phases of the project will see this researcher lead the development of a new set of metrics that can be used to measure the impact of innovative teaching and learning practice on student knowledge, skills development and attitudes towards the subject. This will be achieved by measuring the impact of an intervention on students’ conceptual understanding of chemical topics (Holme, et al., 2015; Nakleh, 1993). This new approach will be used to measure the impact of several (existing) innovations at Leicester and at partner institutions who will be identified in the initial phases of the project. Towards the end of the project we hope to be able to make informed choices of which innovations should be made and to prioritise those with the highest chances of success as measured by student satisfaction, employability and prospects of contributing to a successful TEF submission. During these stages, publication and dissemination of our work will be frequent as a means to attracting more partners and preparing the community for our final output.

The final outputs of this project will be a series of research papers and/or books that will detail the a consistent strategic approach to measuring the impact of curriculum innovations in the chemical sciences. Based on current demand, it is anticipated that this strategic approach could be very widely adopted.

The postgraduate researcher will develop the wide range of quantitative and qualitative research skills necessary to undertake this project. The researcher will gain significant experience of the relevant teaching and learning theories used in undergraduate chemistry degree programmes and the procedures and quality control standards used to ensure chemistry degree programmes meet the expectations of all key stakeholders (i.e. current and future students, the learned societies (particularly the RSC), the employers of chemical science graduates and academics at Leicester and other institutions (e.g. external examiners)). This will set-up them up, should they wish, to join a US research group with one of the many chemical education researchers leading the field globally.
Broader Context

This project will cement chemical educational research at Leicester and provide an evidence base that will directly inform undergraduate and postgraduate taught teaching practice at the institution (and beyond). It will also validate the college’s six research theme with formal and financial support for a group that has produced five papers in the leading chemistry education journal since 2017.

The project will span three key chemistry educational research areas (Problem based learning, flipped learning and blended learning) by developing a framework that can be used to research projects that fall into any of these categories. Although the specific aims are to develop research tools that can be used in the chemical sciences, it is anticipated that many aspects of the approach will easily transferable to pedagogical research in a number of other disciplines (especially physics and engineering).

The outputs of the project will be of interest to schools/departments preparing for the TEF as this can provide a consistent framework which allow different innovation projects to be researched and compared. Additionally, a large number of the researchers of these educational innovations are teaching fellows who have been recruited from discipline-focused PhDs or established academics who have transferred from research focused roles. As a consequence of this, there is a demand for resources and mechanisms that will help these relatively inexperienced educators conduct research on their innovative activities.

Further Reading


Application Instructions

When applying, please ensure we have received all of the following required documents by Tuesday 4th February 2020:

Please submit your PhD application using the Apply Button at the bottom of the funding page.

Include with your application:

- 2 academic references - if you have reference letters please upload in the space provided. If not please enter the contact details, including email address, of your referees in the text boxes provided. Please advise your referees of the application closing date.
- CV
- Personal statement explaining why you want to be considered
- Undergraduate transcripts
- If you have completed your undergraduate degree, we will also require your undergraduate degree certificate
- If you have completed a postgraduate degree, we will also require your transcripts and degree certificate
- Evidence of English proficiency if applicable and available.
In the **funding** section of the application please select **Studentship** and in the drop down menu select **GTA**.

In the **Proposal** section please enter the **supervisor’s name and project title** you are applying for. If you want to be considered for more than one project enter details of both projects - you do not need to submit more than one online application.

If we do not have the required documents by the closing date, your application may not be considered for the studentship.