

Title: Enhancing breadth of knowledge within multidisciplinary doctoral research: Reflections from the Cambridge Generic Nutrition Training course for non-nutritionist postgraduates and professionals.

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Highlights

- Doctoral students need to have breadth and depth within the understanding of their field.
- Researchers require education on how to translate findings into meaningful improvements in public health.
- The Generic Nutrition Training supports doctoral students and researchers to increase their breadth of nutrition knowledge.
- Favourable evaluation of this course has resulted in a model that other research leaders can use.

Introduction

Doctoral degrees traditionally involve a programme of research with a defined scope and research questions. Some universities require doctoral candidates to undertake coursework to obtain broad knowledge in their field. However, this requirement does not exist worldwide in all programmes. For countries/programmes without mandatory coursework, students may graduate with detailed expertise on a specific topic, yet lack general knowledge about the field. It is imperative for graduate students to understand the broader context of their field when translating their findings into practice.

This lack of knowledge regarding broader concepts is particularly evident in nutrition research, which covers a broad range of topics including biochemistry, physiology, food science, health services, and public health nutrition, among others. It is recognised that nutrition is integral in promotion and maintenance of good health¹ and nutrition research is a recognised priority in many countries because of its potential to enhance population health outcomes.² It can be challenging for graduate students to incorporate their work into this bigger picture, with only minimal understanding of the fields of nutrition or public health.²

Translating research for application to practice requires depth *and* breadth.³ Effectively communicating findings is important for contemporary scientists to have meaningful impact from their work.⁴ When doctoral training has not encompassed generic training about the field (some doctoral programmes do include this training), a comprehensive, theory-based education strategy is recommended.⁵ Innovative education strategies can increase doctoral researchers' depth and breadth of knowledge using short, interactive sessions, which cover basic concepts and supplementary resources. The aim of this paper is to present an example of a model that other universities and research institutions could consider adopting when

aiming to ensure breadth of knowledge within doctoral students who do not undertake coursework. The example is an initiative undertaken to provide nutrition education to non-nutritionists working in a nutrition research setting.

Development of the Generic Nutrition Training (GNT)

The Generic Nutrition Training (GNT) course is an initiative of the UK Need for Nutrition Education/Innovation Programme (NNEdPro) Group,⁶ which is primarily based in Cambridge, UK, at the Medical Research Council's (MRC) Elsie Widdowson Laboratory (EWL). The NNEdPro Group currently delivers a government-funded strand of nutrition training for medical students at the University of Cambridge, within the School of Clinical Medicine.⁷

The MRC hosts doctoral students/candidates at the University of Cambridge, through PhD Studentships, typically in nutrition or biology. Doctoral students conduct their research on a variety of topics from nutrition surveillance and epidemiology, though to nutritional biochemistry and molecular mechanisms. Many students studying at this nutrition research institution do not have a background in nutrition.

In 2013, the NNEdPro Group collaborated with MRC scientists to form the internal Public Health Nutrition (PHN) Forum. The Forum members included professionals from biochemistry, food science, nutrition surveillance and public health communication. Previous initiatives to increase the breadth of nutrition knowledge of doctoral researchers included 1-hour lectures on a variety of topics. Evaluations of the lectures indicated that an interactive course in nutrition may be more beneficial to increase breadth of knowledge.

The Generic Nutrition Training

The objective of the GNT was to provide comprehensive, introductory-level generic training on human nutrition and public health. The course included one teaching day every four months (each university term), totalling three days (18 hours) of professional development training each year. The format encompassed lectures and practical sessions. Supplementary material was provided to support learning. During the first year of implementation (2013/14), the GNT was free and voluntary for doctoral students and other MRC researchers, particularly in Human Nutrition Research (HNR). Favourable evaluations supported the course to become mandatory from 2014/15 for all new doctoral students. The course was opened in 2014/15 for postgraduates and professionals across Cambridge, with external participants attending from the Centre for Diet and Activity Research (CEDAR) and the Cambridge Institute for Public Health (CIPH).

Using the Dreyfus Five Stage Model of Adult Skill Acquisition, it is anticipated that participants complete the training with an Advanced Beginner or Competent level of knowledge.⁸ The course aims to introduce generic concepts and provide skills for identifying further evidence-based resources. Topics covered in the course were initially decided by the PHN Forum and then refined based on evaluation from previous courses. Resources, such as the Association for Nutrition (AfN) core competencies⁹ were consulted. Standards for short courses, including the AfN Continuing Professional Development Endorsement criteria were considered.⁹ As this course is designed for increasing breadth of knowledge, rather than a regulated qualification, these standards were only used as a guide. This GNT is in line with the Research Council UK (RCUK) Statement of Expectations for Postgraduate Training, which aims to develop highly skilled researchers and emphasizes the importance of enhancing the excellence and quality of doctoral training.¹⁰

Key topic areas and learning objectives for GNT are included in Table 1. Tutors were nutrition specialists with experience that allowed explanation of foundation concepts in their respective speciality, supported by examples of their own research.

Learning sessions included practical activities such as anthropometric assessments, reading nutrition labels, writing press releases, developing nutrition messages for the public, tours of research laboratories, and critical appraisal. All sessions were evaluated to inform decisions regarding future delivery. In 2015, GNT materials and learning outcomes were endorsed by Cambridge University Health Partners (CUHP) to allow recognition of professional development.

Evaluation

Evaluation is an important and evolving feature of any education intervention to ensure on-going quality improvement with each successive session. The evaluation of GNT had three aspects; (i) attendance records; (ii) quantitative measurement of researchers' self-perceived level of information for each learning area, measured through a pre and post teaching questionnaire; and (iii) qualitative feedback on session delivery. The key performance indicator is the self-reported change in knowledge, attitudes and self-reported practices. It was not feasible to determine actual change in practice and impact on health-related outcomes.

Attendance varied from 18-38 participants per day (mean 29 ± 8 participants). For 2013/14 and 2014/15 respectively, Day 1 attendance was $n=28$ ($n=9$ doctoral students, $n=5$ research staff, $n=13$ other) and $n=30$ ($n=5$ doctoral students, $n=10$ research staff, $n=4$ other, $n=9$ external students). On Day 2 $n=35$ ($n=6$ doctoral students, $n=8$ research staff, $n=9$ other) and $n=31$ ($n=5$ doctoral students, $n=6$ research staff, $n=5$ other, $n=6$ external students). On Day 3 $n=20$ ($n=6$ doctoral students, $n=1$ research staff, $n=9$ other) and $n=18$ ($n=1$ doctoral students,

n=4 research staff, n=2 other, n=1 external students). “Other” includes undergraduate placement students, visiting workers, etc. As attendance was based on attendance records and type of participant based on the pre-teaching questionnaire, participate type may not equate to attendance.

In 2014/15, it was mandatory for MRC HNR doctoral students to attend all three days. If a student had attended in 2013/14 they were exempt. Many staff attended in 2013/14, thus did not attend again in 2014/15. Both of these reasons account for the slight decreased attendance in 2014/15. Day 3 typically occurs in summer, and many students felt the topic, health policy, did not relate to their work, which may account for lower attendance than Day 1 or 2. By the end of Day 3, those who attended recognised why it is important for everyone in nutrition to be aware of health policy.

Participants’ self-perceived level of understanding for each learning area increased after each training day on all training days. Preliminary analysis was conducted for quality improvement within the training development. For example, in 2014/15, the proportion of participants who felt they had a good understanding of energy metabolism increased from 18% to 84% after Day 1. Based on these results, content in this session was updated each year but not modified further. Similarly, the proportion of participants who felt they had a good understanding of introductory nutritional epidemiology increased from 23% to 79% after Day 2. Feedback from researchers on the delivery of the teaching sessions was generally positive, and helpful for informing future teaching. *“A very good 3-day course, but quite intensive so glad the days were separated”*; *“The organisation of day 3 was much better with the break out sessions straight after each talk”*.

Next Steps

Interest in the GNT within Cambridge and more broadly has continued to increase. The GNT course has now expanded into a week-long Summer School in Applied Human Nutrition covering biochemistry, physiology, food science, health services and public health nutrition. This comprehensive certificate course is designed for doctoral students, health professionals and researchers from around the world. The content from the GNT forms the basis of three of the five days, with additional time allocated for deeper learning about research methods, knowledge translation and the role of nutrition in delivering safe and effective healthcare. The Summer School aims to provide foundation learning experiences about applied human nutrition and public health for researchers and non-nutrition health professionals.

Conclusion

In order to translate research findings into meaningful improvements in population health, doctoral students need breadth and depth of knowledge within their field. A research project provides the depth, and a course, such as GNT, can help doctoral students without coursework to increase their breadth of knowledge.

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Table 1: The Learning Objectives for the Generic Nutrition Training course (2014/15)

<i>Day One: Basic Concepts in Human Nutrition</i>	<i>Comments</i>
<ul style="list-style-type: none">• To provide an overview of diet and nutrition• To exemplify diet and nutrition research methods in human studies• To describe basic principles of digestion, absorption and energy metabolism underpinning human nutrition• To outline basic principles of body composition and anthropometry, in relation to human nutrition• To highlight physiological roles of macro- and micro-nutrients in the diet• To establish the applied and translational nature of nutrition science	<ul style="list-style-type: none">• definitions, classification, and demystification of concepts and conflicts providing a common denominator of language• appreciation of the limitations of current nutrition knowledge and changing paradigms due to research• core understanding of the physiological processes and consequences of dietary intake• key properties of the main nutrients in the diet
<hr/> <i>Day Two: Nutrition in Disease Prevention:</i>	
<ul style="list-style-type: none">• To provide an overview of nutritional epidemiology• To describe metabolic / endocrine disorders• To outline the role of nutrition in musculoskeletal disorders• To critically appraise a scientific article• To understand how to deal with the media• To learn how vascular function can be measured	<ul style="list-style-type: none">• appreciation of the scope of population studies in nutrition• nutritional aspects of disease aetiology and pathogenesis using a body systems approach• understanding the boundaries of breaking evidence on nutrition and disease• Preparation for the public interface
<hr/> <i>Day Three: Public Health Nutrition, Policy and Practice:</i>	
<ul style="list-style-type: none">• To provide an overview of the double burden of malnutrition• To outline the role UK National Diet and Nutrition Survey in policy and public health• To learn how food labelling is regulated• To highlight the importance of national policy frameworks	<ul style="list-style-type: none">• the extent of the problem at population and individual levels• surveillance to monitor nutrition risk• individual level approaches to nutrition risk management• policy/population level risk management

- To exemplify nutrition resources available
 - To describe international nutrition in a public health context
 - To demonstrate the impact food fortification has on public health
 - To provide an overview of the nutrition education leadership for improved clinical/public health outcomes
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