Using gamification for developing clinical reasoning and decision-making capability in real or virtual worlds

Section 1 – Project Details:

Rationale:

Approximately 12,000 patients die each year due to the "preventable deaths" defined as deaths caused by a failure of diagnosing or treating a condition and deaths caused by treatments that should never have been considered due to safety reasons. Nearly three quarters of these preventable deaths involved failure to act upon test results, inadequate clinical enquiry and inappropriate drug or fluid management. Traditionally these skills were learnt through long and close observation of expert performance in the workplace. Less time to teach by consultants due to the pressure of delivering clinical service, and less time permitted in the workplace due to the European Working Time Directive, meaning novel and innovative educational approaches are urgently needed.

Gamification is an approach to teaching and learning where we design more motivational learning experiences by using methods from game design that engage the psychology of human play. Gamification refers to an approach to education-related problems that embraces, rather than dismisses, the persuasive power of play. Gamification may allow the delivery of effective medical education so that individuals develop the necessary skills without the need for direct one-to-one supervision and learn them in a 'safe space' where errors can be made by learners, yet no harm is suffered by patients.

The purpose of this research programme is to investigate the effectiveness of gamification as a complementary educational approach for developing clinical diagnostic decision-making skills among novices in the workplace.

Aims and methodology:

The aim of this research programme is to (i) characterise a conceptual model through the lens of gamification for designing educational activities to develop effective clinical diagnostic decision-making skills over time (ii) measure the impact of a complex multifaceted educational intervention for developing clinical diagnostic decision-making skills among novices in real- or virtual VUCA worlds.

By completing the objectives below, the aim for this research programme will be achieved:

- undertake a (systematic) literature review to identify the key elements across game-based play interventions for developing problem-solving or decision-making skills across a variety of domains;
- design the next phase of software development for a case-based learning platform using a gamification approach as part of an ongoing iterative review process;
- identify appropriate methodologies for investigating clinical diagnostic decision-making demonstrated during case-based learning activities;
- identify measures and metrics for assessing clinical diagnostic decision-making performance during case-based learning activities;
- evaluate the impact of a complex multifaceted educational intervention for developing clinical diagnostic decision-making skills among novices in the real- or a virtual VUCA world.
The research question for the overall programme of work is: ‘To what extent can a complex multifaceted educational intervention based on game-design develop clinical diagnostic decision-making skills in real or virtual environments?’

The research will be conducted through the lens of pragmatism since the phenomenon (clinical diagnostic decision-making) will be investigated through the lens of situativity theory and gamification as a learning design approach is used to developing educational activities in real- or virtual workplace context.

The programme of research begins with a literature review to identify the key elements across game-based play interventions for developing problem-solving or decision-making skills across a variety of domains. The findings from the review will inform the characterisation of a conceptual model through the lens of gamification for designing educational activities to develop effective clinical diagnostic decision-making skills over time.

The conceptual model will also form the framework upon which the design of software for a case-based learning platform will take place as part of an interactive and ongoing software development process. The final phase of the research involves the development of a complex multifaceted educational intervention and subsequent investigation into the impact of any gamification approach on learner outcomes, motivation and engagement in the teaching process.

**Benefits and suitability as a PhD project:**

The benefits and suitability of this programme of research as a PhD project include:

- an opportunity to re-conceptualise the way in which clinical diagnostic decision-making is taught in medical education by drawing insights from other disciplines and shape the future directions of research for others;
- findings that will underpin the design of a clinical diagnostic decision-making vertical theme in the new BM BS curriculum at Nottingham and change the way in which existing educators support novices to learn these skills through new and innovative ways based on game-based design;
- inform policy for developing clinical diagnostic decision-making expertise across the continuum of medical education including postgraduate and continuing medical practice contexts.

The supervision team for this PhD project possess a national profile as experts in clinical reasoning and clinical diagnostic decision-making within the UK.

**Key References:**

Section 2 – Training Provision:

The training provision within this PhD studentship include:

- Local training opportunities to better understand the discipline of medical education include attendance on the taught course modules within the newly reformed MMedSci in Medical Education course such as:
  - Problem-Based Learning, Case-Based Learning and Clinical Diagnostic Decision-Making;
  - Technology-Enhanced Education;
  - Learning in Complex and Uncertain Clinical Environments;
  - Medical Education Research, Methods and Dissertation.

- Local and national training opportunities to better understand and master research methodologies and methods within medical education include:
  - Cognitive mapping;
  - Interpretative phenomenological analysis;
  - Realist synthesis;
  - Applied linguistics;
  - Systematic review;
  - Ethnography

- Local training opportunities to better understand and master research methodologies and methods within medicine include:
  - Nottingham’s nTRANS and MRes generic research training programmes