Interactive Session- Developing Engineering Education Research Questions: What Do They Look Like? How Do I Get One?

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Abstract - A critical skill in engineering education research is the ability to formulate “good” research questions. As David Hilbert states, “he who seeks for methods without having a definite problem in mind seeks for the most part in vain”. Issues researchers need to consider in formulating research questions include: what is the nature of the phenomenon, will this study have implications for theory or practice, and who is the audience for this research. A good research question will be timely, focused, generative, and align with disciplinary research design principles.

Index Terms – research questions, engineering education research.

EducatioNal Research Design

Questions frame and control a study. They define the scope of a study. They determine the significance of a study. A research question must be answerable [1].

Education research design shares many attributes of engineering design. Problems may be open-ended, the process is often iterative, and at the beginning of the process problems (questions) may be difficult to articulate. Developing knowledge and skills in “design” abilities has less to do with accessing textbook knowledge and more to do with learning-by-doing in a community of peers (this may be particularly true for novices): so it is in educational research.

Disciplinary researchers who want to undertake educational research often find it difficult to formulate research questions of appropriate scale and scope. While researchers are well-skilled in developing questions within their own discipline, these skills may not translate well to developing questions in other disciplines. This is not in itself surprising - research principles have disciplinary perspectives [2] and crossing boundaries between disciplines can be challenging.

EducatioNal Research Questions

Effective education is dependent on an intersection of opportunity and constraint. The intersection is created between the institution, the discipline taught, the curriculum followed, and the abilities of (and interactions between) students and staff. Teaching is a highly nuanced and contextualised activity. Educators are often interested in examining their practice, and so educational research questions often derive from particular contexts or in response to specific situations. The reality of educational practice means that questions are almost always framed by “orienting decisions” [3] “Orienting decisions are those will set the boundaries or parameters of constraints on the research” (p.74). In education research, the character of these orientations are time (perhaps a course if offered only once a year), time available (staff have many demands on their time) and cost. All these affect the kind of questions that can be asked – and answered.

Other important areas concern issues of scale, scope, audience, feasibility, utility, and impact. A number of these questions center around what we call the “so what?” test: why is this question important, who else might be interested and why, what might an adequate answer look like, how could this question be challenged or falsified, and what might the research design and analysis look like?

In this special session we draw from existing resources to provide an active peer learning experience focused on enhancing skills in research question formulation. During this session participants will (a) discuss practical ways to address research question formulation, (b) formulate a draft research question (or set of questions), (c) examine what experienced researchers do “naturally”, (d) utilize a structured diagnostic tool to evaluate emergent research questions, (e) receive feedback from peers and other experts, and (f) leave the session with a next iteration of their research question. As a result of the session participants will gain abilities in (a) critically evaluating research questions for scale, scope, audience, feasibility, utility, and impact, (b) identifying areas for improving research question quality, (c) providing constructive feedback to their peers, and (d) using ideas about research design to enhance research question formulation

REFERENCES


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October 20 – 23, 2004, Savannah, GA

34th ASEE/IEEE Frontiers in Education Conference

F3A-1