Relevance and rigour – towards evidence-based practice in education

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The topic of my brief input will be relevance and rigor towards evidence-based practice in education. I would like to briefly talk about or address three questions that are important, from my point of view. The first question would be: what constitutes rigorous scientific research? What is the relevance of educational research? Then: How do we provide objective evidence to inform practice?

First, why is research important? I think it is important for mobilising knowledge. In the ideal case, we start or we encounter a problem in practice, and then we would carry out research in order to provide evidence and in order to inform practice and to shape our practice. I would like to give you one example of that. Can you name any important research result that has affected your online teaching practice? I would like to share one personal example. When I did a review for the journal *Computers and Education*, I came across this study here by Korving, Hernández, and De Groot, and they published a study about the relation between the visibility and attention in web lectures. They looked at three different presentation modes: a large lecturer image and a small image of the PowerPoint slide. The second condition was a smaller lecturer and a large PowerPoint slides, and the third condition was a large PowerPoint slide and no image of the lecturer at all. The students only heard the voice of the lecturer.

The evidence of this study was that the students reported most attention for web lectures longer than 15 minutes with a large lecturer image. But you see here this ETA value is only 0.08, so only 8% of the variance of attention is explained by lecturer visibility. So I thought how could I use this evidence to improve my own practice and improve my own web lectures? Therefore, I tried and decided to have a bit bigger image of myself, and some smaller PowerPoint slides. What happened? The students did not really like it. They said, "The PowerPoints are too small; we can't read it." I come back to this problem again at the end. Just one nice example.

So first question, what constitutes rigorous scientific research? I think this has six aspects here that are important. The first thing is, of course, we start with posing significant questions that can be investigated empirically, of course. Therefore, science always proceeds by asking important questions about the real world that lead to a hypothesis that we can test.

Second thing is of course the link between research and the relevant theory. Most research is concerned with developing and testing theories and the theories guide the research, and based on the research the research results lead to a revision of theory, so both theory and research is interconnected. Then of course, we have to use methods that permit direct investigation of the question. The research methods must be derived from the research question and not vice versa.

Fourth point; provide a coherent, explicit chain of reasoning. With regards to reasoning, I mean the logical links between empirical observations, the underlying theory and the questions or problems that are in the focus of our investigation.

Then I think we should do more replication of research and generalize across studies. It is of course challenging in education to provide evidence of replicability and generalizability. However, I think we should do more replication studies to provide more evidence in different contexts and in order to generate data for more second-order research.

Finally I would say be an open scholar. Share your data, share your instruments. Disclose your research to anchorage, professional scrutiny and critique.

I think those are, from my point of view, elements of rigorous research.

Then what is relevant research? What is the relevance of educational research? Does educational research have to be relevant at all? We can debate this. Of course, we can do pure research and we do not have to care about if it is relevant or not. I always say research is the most glorious form of play. It does not have to be relevant. But I think in the context of education it would be nice if the research we do would be relevant.

What constitutes relevant research, and what is relevant? Relevance is context-bound. What might be relevant for one group, the students or faculty members, might be irrelevant for another group, like policy makers or politicians. I think, in general, path breaking, ground-breaking research is always a consequence of two interacting factors: the quest for fundamental understanding (theory building) and consideration of use and its practical application. I think one example of such path breaking research is for example the work by Terry Anderson, Archer, and Garrison about the Community of Inquiry model and what it means for the facilitation of learning processes in online learning environments. All the empirical studies that followed after they developed their theoretical model. Therefore, relevance falls at the interaction of theory building and application in practice.

Then of course how do we provide objective evidence to inform practice? There is a clear trend; some people say it is a paradigm shift, towards evidence-based practice and policy. I do not know if this is really the case. But in general, I think that we can distinguish between primary empirical research that looks at reality and collects data about the reality. Then of course, we can do secondary research. Secondary research takes the form of published data in the journals and the publications. That would be meta research or systematic reviews. And the aim of secondary research is to show systematically that existing primary research results contain arguments to shape and inform practice. And this is an important point, I think, made by… I found this quote by Borenstein: “Rather than looking at any study in isolation, we need to look at the body of evidence.” I would like to make a case here for doing more second-order research. Some scholars do not consider secondary research as real research. When it is not primary research, it is not real research. I think it is important not only to do research in isolation on a tiny thing, but rather looking at the whole body of evidence that we have

on a certain topic.

In my research group and in my institution, we also do a systematic review at the moment. And the systematic review is a review of research literature using systematic and explicit accountable methods that are transparent to create a search protocol. And you can replicate this and it comes from the medical sciences and health sciences but it is also now more widely used in the social sciences. Gough, Oliver, and Thomas wrote a book about the implementation of systematic reviews in the social sciences. And in our project, we always start with the review question or research question and our project deals with the question: Under which conditions does educational technology support student engagement in higher education? And you start with research and databases and then you evaluate these documents and finally you write a synthesis of the evidence, of the quantitative evidence. You can do a meta-analysis, as we saw yesterday. And you write a narrative synthesis about the qualitative data. So qualitative data is here also taken as evidence.

Okay, I am almost finished. Just I would like to share this pyramid of the hierarchy of scientific evidence that also supports my claim that meta studies and systematic reviews provide a strong evidence. And coming back to my personal experience with the lecturer images and web lectures, I need not to look only at this one study published in *Computers and Education*. Maybe I have to do a systematic review on that topic in order to make a final decision about how I will present myself in my web lectures.