

Review

Master thesis projects in the field of education: who says we need more basic research?

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Abstract

A minority of students graduating from university will pursue a research career and will highly benefit from having the knowledge and skills to conduct basic research. The majority, however, will start a career in practice. These students are in need of a particular set of skills that enables them to develop accurate search strategies to find relevant studies, to critically appraise and to interpret the results from the studies retrieved. The importance of systematically reviewing scientific literature has been widely acknowledged in the field of education. It follows that the growth potential for systematic reviews conducted as a master thesis project in educational sciences is considerable.

Keywords: Systematic reviews, education, university curricula.

INTRODUCTION

The majority of the students that graduates from university with a master degree in educational sciences will most likely find a way to professional practice. In a best case scenario their daily decision making processes will be supported by scientific evidence, generated by the small percentage of alumni who will make a profession out of asking and solving research questions, either as a researcher at a university or at research and development departments of private or governmental institutes. Yet, in the massive overload of sometimes even conflicting scientific evidence it is difficult to keep up-to-date with current debates in one's professional discipline. Therefore, educators who wish to take into account recent scientific insights are in need of a particular set of knowledge and skills that enables them to develop accurate search strategies to find relevant literature, to critically appraise existing research papers and to interpret the results or findings from these studies. Most likely, they would wish for accurate summaries of evidence that provide a short-cut for busy practitioners. It is therefore very important that students in the field of education are made sensitive to the idea that knowledge

is always in transition and that a considerable part of theory and its applications taught at university will probably be outdated within few years of graduation. Conceptual models are permanently refined, new theories are developed and some interventions that have strongly been promoted tend to disappear or be replaced by other, more effective or more appropriate strategies, tools and methods. No-one is able to predict which part of the knowledge generated will be replaced or will change over time. It is most important that we stress the importance of acquiring a scientific attitude to enable our students to provide the best possible education, including the best possible care for children and adults with special educational needs, at all points in their professional career.

The Merit of Systematic Reviews

One way of keeping up-to-date with the current state of the art in educational and other human science disciplines is to consult systematic reviews. Systematic reviews are literature reviews that aim to provide an exhaustive summary of literature relevant to a particular research question by identifying, appraising, selecting and synthesizing results or findings from original studies with particular attention to methodological quality (Montori

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et al., 2003). A systematic review uses an objective and transparent approach to research synthesis, with the aim of minimizing bias. It can be quantitative, qualitative or mixed. In a quantitative review the results from individual studies are typically summarized using a measure of effect, and these effect sizes are combined and compared over studies in what is often referred to as a meta-analysis (figure 1). This type of review has been highly promoted by -amongst other review collaborations- the Campbell Collaboration. This international non-profit collaboration seeks to develop, update and disseminate systematic reviews for the field of education, social welfare, criminology and international development. A qualitative evidence synthesis aggregates or integrates findings from basic research studies into categories or metaphors in order to generate new theory or to advice professional practice or policy (figure 2). The popularity of the latter type of review is growing, e.g. in the field of health care (Dixon-Woods et al., 2007), and will most likely enter the field of education as well. In a mixed-methods review both strands are used in parallel or sequentially. Conducting a systematic review is, in theory, not so much different from trying to maintain a historical archive or from working in a herbarium to sort plants and assign these to a particular family. All these methods aim to create order in an otherwise chaotic field of science and through acquiring a degree of order facilitate intra-, inter-, or multi-disciplinary communication. They remove the need to search for evidence from individual studies in the current information overload and provide the basis for discussions with colleagues, superiors, clients, policy makers or other target groups based on all available evidence rather than on partial, biased and/or less reliable information. Equally important, professional educational practice can be discussed based on rational rather than emotional arguments. It is therefore highly important that master students become familiar with the concept of systematic reviews. Based on the principle of learning by doing, we advocate that students in education are offered an opportunity to conduct a review, as a researcher, which will contribute to their understanding of the possibilities, limitations and interpretation of systematic reviews that can inform their future educational practice.

Systematic reviews as a master thesis project

For the past two years, at the start of the new curriculum, staff members of the department of education in K.U.Leuven have offered students systematic review topics for master thesis projects that allow them to gain the knowledge and skills related to searching, critically appraising or summarizing result of existing evidence. A second outcome aimed for is that the very act of learning to review would feed into an attitude of life-long-learning. Although the idea of systematically reviewing literature is

not new, the number of systematic reviews added to the thesis collection of K.U.Leuven is very modest, both in the department of education and in other faculties. We searched the K.U.Leuven master thesis records up till September 2011 aiming to identify the number of systematic reviews produced as a master thesis at K.U.Leuven, Belgium. With this search, we identified only seven systematic review projects in a time span of ten years, all of them conducted in the faculty of physical education and physiotherapy. Medical and health care disciplines were early adopters of the evidence-based practice movement, launched in the early nineties (Evidence-Based Practice Working Group, 1992). As a consequence, many of the academics working in these fields have developed the necessary tools to put evidence into practice, amongst these tools the concept of systematic reviews.

The first master thesis projects in which meta-analyses -the statistical part of a systematic review- were produced in K.U.Leuven can be traced back to the year 1985. Meta-analytic techniques have a longer tradition in disciplines such as psychology and education. Seventeen meta-analyses have been produced since then, three of them addressing methodological topics. Most of the meta-analytic projects have been conducted in the faculty of psychology and education (n=11), two in the science department and one in respectively the faculty of medicine, engineering, the math department and the department of statistics. Despite a growing interest for synthesis of qualitative evidence in international literature, we found only one master thesis project conducting such a synthesis.

In general, it could be argued that systematic review projects seem to lack the appeal of e.g. being able to interview members of a certain target group, conduct an experiment or observe in a real life social-cultural setting. Most master thesis projects include a narrative, non-systematic review to introduce a research topic. A considerable amount of students has conducted a review, however in a non-systematic fashion. In many cases a systematic review could have been a better or a more interesting option. It should be stated, however, that the intellectual effort related to the conduct of a systematic review is comparable to the effort needed to complete a basic research study. Students that have completed a systematic review within the department of education in K.U.Leuven in the last year are very positive about the skills they have acquired.

'Knowing what I know now, I would have searched differently and I would have chosen a different set of articles to write my papers linked to other courses. I wish these insights would have come earlier in my training...' (Master student in Educational Sciences, 2011).

Except for the field of public health and nursing, the methodology of systematically reviewing literature is not yet fully embedded in all relevant university curricula. Medical schools were among the first to offer courses in

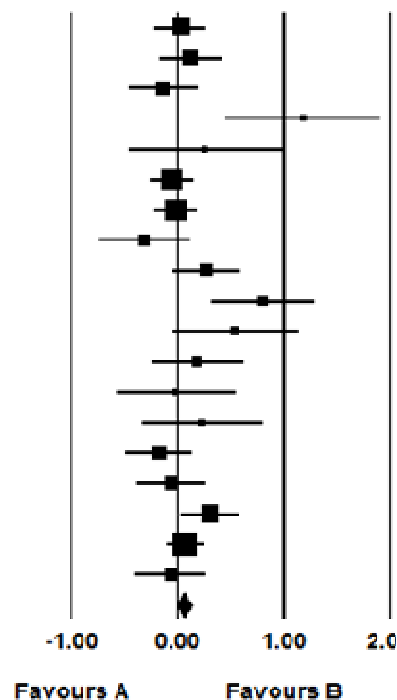


Figure 1. Forest plot, showing 95% confidence intervals for 19 individual study effect sizes, and the combined effect size estimate

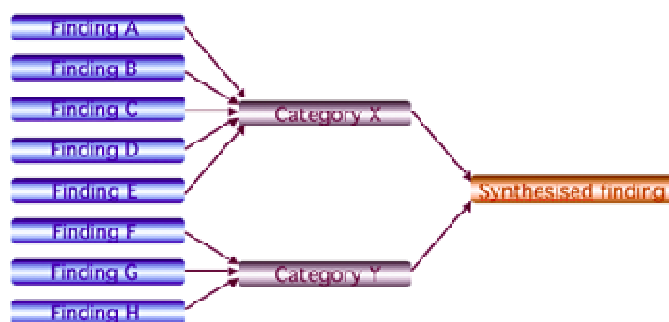


Figure 2. Process of a meta-synthesis, showing an aggregative approach to analysis in which findings are reduced to categories to produce an overall synthesis

systematically reviewing literature. With over 5000 effectiveness reviews already produced by the Cochrane Collaboration health care practitioners are increasingly using synthesized evidence to inform decisions, although there is still a gap between the younger and older generation of practitioners. The success of the Cochrane Collaboration, an international, non-profit organization aiming to assist practitioners and policy makers by producing and disseminating systematic reviews in the field of health care has resulted in the launch of the Campbell Collaboration. To date, this relatively young

review collaboration only contains nine finished systematic reviews in the educational review group, all of them effectiveness reviews. The first qualitative evidence synthesis protocols have been published in the 2011 issue of the Cochrane library, indicating that the scope of systematic reviews has broadened from the inclusion of (quasi) randomized controlled trials in systematic to the inclusion of other types of evidence e.g. observational studies and evidence from qualitative research projects. Due to this evolution it is more likely that the number of master students conducting a systematic review will

increase. RCT's have long been the standard ingredient of systematic reviews. There are good examples of experimental research addressing educational topics e.g. the evaluation of peer tutoring to change students' attainment and attitudes in schools in reform across a whole district (Thyms et al., 2011), the assessment of the numerical stroop effect in primary school children (Heine et al., 2010), individualized training for general practitioners to improve their teaching competence (Schol et al., 2005) or effects of educational interventions on intercultural communication (Harmsen et al., 2005). Evidence of effectiveness is best provided through experimental research, bearing in mind that the field of education cannot be reduced to the pragmatics of efficiency and effectiveness. Experimentation in the field of education takes place in very open conditions and both the inputs and outcomes might be very complex (Clegg, 2005). Experimental research can only answer a fairly limited range of questions and is not always sensitive to broad questions of values and ethics (Evans and Benefield, 2001). Stating that experimental research could not be owned by educational researchers would not do justice to the potential benefits that derive from conducting such research and from producing high quality reviews. However, alternative approaches to reviewing focusing on mechanisms that span educational and pedagogical interventions in different areas of practice -instead of well defined programme interventions- should also be considered and offered as food for thought to master thesis students.

There are good examples of universities integrating the meta-level of research into the course components of graduate and master students and we are confident that others will start to integrate systematic review methodology in their curricula in nearby future. It follows that the growth potential for systematic reviews conducted as a master thesis project is considerable. This does not imply that conducting basic research studies needs to be discouraged. If answers to a particular question cannot be found by means of existing evidence students should be stimulated to fill in this gap in knowledge and collect new empirical data. We see no harm, however, in spicing up our methodology courses with some review ingredients and focus a bit more on learning to read and interpret research. Students entering the professional field will benefit from knowing and being able to understand systematic reviews for use in daily practice. The least we could do is learning our students to distinguish between systematic reviews and more traditional literature reviews that are generally less transparent about the methods they used and as such introduce a potential for considerable bias. Systematic reviews account for literature bias, provide the reader with information on the search strategy used, provide information on inclusion criteria used and include a critical appraisal exercise to evaluate the methodological quality of the studies included. They are in strong con-

trast with reviews that tend to use a narrative synthesis technique on a selected sample of papers that possibly defends the author's personal opinion (not to be confused with qualitative evidence synthesis that use the same rigorous procedures as quantitative reviews to develop their argument). We could encourage master students to adopt the principles of systematically reviewing literature in constructing the content of the background sections of their master thesis. However, the best understanding of the value, quality and process of a systematic review will grow from conducting a full systematic review.

CONCLUSION

To improve the chance that students will engage with the concept of a systematic review, the principles of reviewing literature should be integrated in the educational programs, preferably as a topic in existing methodology courses that may induce a more systematic approach in the development of topical papers for a variety of different course components as well. For the field of education, this implies addressing a range of different systematic review options that allows for a broad variety of study designs to be included. An important aspect in teaching students how to systematically review evidence and how to interpret results from reviews is to stress the importance of systematic reviews to evaluate or re-evaluate interventions, identify gaps in knowledge and verify or reject what we routinely apply in daily practice. Students should be stimulated to question their own actions on a regular basis by consulting high quality evidence, where and when available in a summarized format. If we fail to teach them such an attitude, we risk to end up with alumni doing either the wrong things or less effective, appropriate or meaningful things.

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