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## **Synthesising case study research – ready for the next step?**

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## **Synthesising case study research – ready for the next step?**

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## Synthesising case study research – ready for the next step?

Within the emerging field of research on education for sustainability case studies are an important if not the predominant research approach, although often criticised for its lack of internal and external validity and a tendency to draw conclusions with insufficient rigour. While basic concerns have been expressed and discussed in an early issue of this journal, main assumption still hold true after more than ten years of research in the field. Only a few approaches so far have tackled the challenge to provide cross-case comparison and the synthesis of case study results still remains a research desideratum. In this paper we argue, that developments in the field of qualitative and quantitative meta-analysis in educational science offer a framework, which can be used to overcome that shortcoming. After describing the idea of research synthesis, different types of such a meta-analysis are identified and their potential is discussed for existing case studies in higher education for sustainability. The paper concludes with recommendations for further case study research in the field.

Keywords: case study; higher education for sustainable development; research methodology; research synthesis; meta-analysis;

### Research in Education for Sustainability

It was at the Earth Summit held in Rio de Janeiro in June 1992 (Redclift 2005), nearly twenty years ago, that sustainable development was formally recognized as an international concern in the political discourse. From the very beginning, education featured prominently in it due to its role of critical enabler and promoter of the necessary paradigmatic change. This was an acknowledgement that a transition towards sustainability will involve social learning in its broadest sense. Bearing in mind that one of the crucial problems in such a process is finding ways to improve the social capacity to guide interactions between nature and society toward more sustainable trajectories (Kates et al. 2001), it is not only learning that is at issue but the exploration of the preconditions of and opportunities for learning and education in formal or informal settings.

Consequently, education for sustainability (EfS) emphasises aspects of learning that enhance the transition towards sustainability. As a vision of education that seeks to balance human and economic well-being with cultural traditions and

respect for the Earth's natural resources, it is an integrative approach to teaching and learning and thus a new educational paradigm, rather than yet another 'adjectival' education (Sterling 2001; Wals 2010). Over the years, EfS has matured into a distinctive area of educational praxis that manifests itself on the three levels, different but related, of policy (see e.g. Fien 2003, Wals 2009), pedagogies (Scott and Gough 2003, Sterling 2001) and research. That EfS has become a critical area of academic research is apparent from the growing number of scholarly articles, journals and conferences devoted to EfS. At the same time, focus areas of research on EfS are mapped out and its main areas are the subject of lively debate (Cutting and Cook 2009, McKeown 2007, Reid and Scott 2006b, Wright 2007, Wright and Pullen 2007).

A research agenda is thus being laid out both for on-going research in different fields and for the priorities of future scientific exploration. With the use of both quantitative and qualitative approaches, methodological underpinnings and empirical designs in EfS research show a great diversity. Among these approaches, case study research features prominently, witness the large number of exploratory single-case studies.

While such case studies, typical for emerging fields of research, are widely and increasingly used in the social sciences in general and in educational sciences in particular (Robson 2002; Yin 2003; Bassey 1999), we argue that, in addition and in parallel to the study of individual cases, the time has now come for a synthesis of the vast amount of existing data across cases, which means no less than taking the next step in the development of research. Similar discussions can be found in other disciplines which also have a strong tradition of case study research (Finfgeld 2003, Thorne et al. 2004).

It is the purpose of this paper to introduce and discuss such approaches of synthesis and to explore their specific potential for research in EfS. Thus we introduce a classification of different “meta”-approaches in case study research, discuss their underlying epistemological assumptions and analyse their possible contribution to research in education for sustainability.

### **The Case of Case Study Research in Education for Sustainability**

Case study research has become an increasingly used research strategy in its own right. This is especially true for educational research where case studies are used to describe context-specific educational praxis and to draw conclusions by generalising from the findings (Hartley 2004; Kyburz-Graber 2004, 53; Merriam 1998; see Stoecker 1991 for a critical overview of the development). For example, Stake (2005, 443) states that case studies have become ‘one of the most common ways to do qualitative inquiry’, even if ‘they are neither new nor essentially qualitative’. Considering the variety of methods used in case study research to gather and analyse data, Stake continues to point out that ‘[c]ase study is not a methodological choice but a choice of what is to be studied. By whatever methods, we choose to study the case’. According to Yin (2003, 2) ‘the distinctive need for case studies arises out of the desire to understand complex social phenomena’, an endeavour that has generated a range of different applications with distinct functions.

Thus, not surprisingly, the term itself has been conceptualised in very different, often conflicting ways. Even if one does not want to go as far as Dillon and Reid (2004, 28), who ‘propose that authors, editors and reviewers reject the term as representing a form of research’, one may well accept the need for a careful examination of the purpose and the methodology of the research.

What makes case studies a unique research strategy is their focus on a “bounded system” and the in-depth study of its context (Stake 2005). Accordingly, it seems to be the preferred strategy when “how” or “why” questions are being posed and the focus is on contemporary phenomena within some real-life context (Yin 2003). A broader research strategy then has to be specified with a quantitative, qualitative or mixed method approach for data collection and interpretation.

A growing use of case studies as a research strategy can be noted within the emerging field of EfS as well (Corcoran, Walker, and Wals 2004). The potential as well as the limitations of this research approach were discussed in detail in an earlier issue of that journal (Corcoran, Walker, and Wals 2004; Dillon and Reid 2004; Kyburz-Graber 2004; Stevenson 2004), a discussion we do not need to repeat here other than noting that some of the key arguments support our point: while the learning opportunities offered by case studies have been explicitly appreciated (Kyburz-Graber 2004), their “story-telling” approach has often been criticised as too limited and merely descriptive (Corcoran, Walker, and Wals 2004). Corcoran et al.’s critical view of the gap between the potential and the actual uses of case studies reiterates an earlier statement by Platt:

‘[C]ase studies can do a whole variety of things. But some case studies do not do any of them well, and this is often because no particular rationale has dictated the choice of case. It is only too easy to study a case merely because it is convenient, and hope that something of more general interest will come of it’ (Platt 1988, 20).

Discussing criteria for the general quality of research, Kyburz-Graber (2004) concludes that in many cases a lack of rigour is obvious.

Contrary to these rather general statements we agree with Dillon and Reid (2004) that criticism of existing case studies needs to be specified against the purpose of the study involved and may not hold true for all potential approaches. We are

aware of course of the limitation of a large number of existing case studies, especially when it comes to generalisations, which are seen as a crucial and again very controversial aspect of case studies. While Ruddin (2006) explores different ways to derive general findings from case studies, Bassey (1999) refers to “fuzzy generalisation” as a characteristic of many such studies. There is however a broader acknowledgment of the need for more theory-building and generalisation, as mentioned by Corcoran et al.:

‘The call for accessibility of contextual experience also brings us to the notion of inter-case-study research, as opposed to single case-study research, or the idea of a meta-analysis of multiple case studies in order to look for trends, patterns and heuristics that are shared and emerge in different contexts’ (Corcoran, Walker, and Wals 2004, 18).

Here both multiple case studies and cross-case comparison are seen as adequate methods to aggregate and to work towards more robust data (West and Oldfather 1995).

In EfS, however, this still remains a research desideratum with few researchers so far having tackled that challenge (Ferrer-Balas et al. 2008 offer one of the few examples in higher education for sustainability that deals with differences and commonalities of cases). Before we explore opportunities to aggregate case studies on given topics, a general overview of approaches to the synthesis of findings might be able to shed some light on the potential involved.

### **Synthesis of Case Study Research: Mapping Different Approaches**

The review of research is a basic part of any presentation of new research: a survey of the relevant literature in the field and a discussion of the findings and conclusions of previous studies provide the necessary contexts for one’s own primary research. Such “narrative reviews” have however been widely criticised for their merely descriptive approach and their lack of systematic and objective conclusions (Wood 2000; Littell,



Corcoran, and Pillai 2008). This is why there has developed, in different disciplines, a growing interest in the synthesis of previous work as a primary research activity (Weed 2005).

Two main arguments are usually given for such a more systematic exploration of previous findings. First, against the background of a rapidly growing body of knowledge, a single researcher is no longer able to monitor thoroughly the progress even in a very narrow field of research (Gibbons 1994). This clearly speaks to the need for an overview of existing research, especially in the case of the applied social sciences where the literature is not only voluminous but also often expresses conflicting points of view (Kulik, Kulik, and Cohen 1979). It was in fact Francis Bacon, the father of modern science, who advocated the need for synthesis when grounding the development of the sciences in the existence of two types of scientists: those who dig for new knowledge (“pioneers”) and those who hammer and refine their findings (“smiths”) (Bacon 1869). Again, Hunter, Schmidt and Jackson (1982, 27) highlighted the need in psychological research for systematic reviews of existing findings by pointing out that rather than additional empirical data what was needed was ‘making sense of the vast amounts of data that have accumulated’. That holds true more especially for case studies, where the importance of ‘integrating collective meanings [...] on a certain topic’ is urged by Berger (1982, cit. in Stall-Meadows 1998).

In addition, the two activities of collecting new data and producing systematic overviews of existing research that go beyond a mere narrative summary – these two are widely recognised as characteristic of a maturing field of research. Such a development can be reconstructed not only in psychology or education but equally well also in the younger field of sustainability science (Rudel 2008).

Research can be summarised in many different ways and a variety of approaches have been developed for different purposes (Pope 2008; Suri and Clarke 2009). To help make sense of the different approaches we suggest a mapping methodology based on a distinction of the data used as input and produced as output (see figure 1).

**Place figure 1 about here**

In this way quantitative data can be distinguished from qualitative data either as the source or as the result of the synthesis process. This yields four principal approaches and methods: quantitative synthesis of either quantitative data or qualitative data, and qualitative synthesis, again based either on quantitative or qualitative data. Such a classification is inevitably a broad conceptual framework rather than a precise determination of different methods. It clearly involves some simplification and it is a matter for debate where to draw the boundaries between the respective approaches and how sharply delineated these boundaries are. Nevertheless, in what follows some of the main approaches of synthesis will be introduced against the background of this fourfold matrix.

***Synthesising Quantitative Data***

Probably the most common approach to the formal synthesis of the results of a number of independent quantitative studies was proposed by Gene Glass in 1976, in his presidential address to the American Educational Research Association. He formulated the concept of *meta-analysis*, which refers to the statistical treatment of combined quantitative results from multiple studies, carried out to produce integrated findings on a given topic (Littell, Corcoran, and Pillai 2008; Glass 1976). Meta-analysis concerns finding out “what research says” and making sense of often conflicting results in order to advance a field and allow practical applications (Kavale

2001). As an ‘analysis of analysis’ (Glass, McGaw, and Smith 1981, 18), meta-analysis aims at giving greater power to the overall statistic by using pooled data and estimating an overall effect-size based on the individual effect sizes of a range of individual studies (Wood 2000).

The techniques used in meta-analysis have been comprehensively outlined (Glass 1976; Glass, McGaw, and Smith 1981) and further developed and extended over the years (Matarazzo and Nijkamp 1997; Rosenthal and DiMatteo 2001; Wachter and Straf 1990). Rosenthal describes six major steps that are incorporated into each meta-analysis: (1) the definition of independent and dependent variables of interest; (2) the collection of all available studies; (3) the examination of the variability among the effect sizes obtained; (4) the combination of the effects using several measures of their central tendency, (5) the examination of the significance level of the indices of central tendency, and (6) the evaluation of the importance of the effect size obtained.

An increasing number of applications of meta-analysis are to be found not only in education and psychology but also in other social sciences and in medicine (Rosenthal and DiMatteo 2001). As the body of studies available in sustainability science is growing, first attempts to make use of meta-analysis can be reported here as well (Matarazzo and Nijkamp 1997). As the main advantage of such an approach has been seen the opportunity to address the challenge of multiple, often contradictory answers to a given research question and to identify moderating and mediating variables (Rosenthal and DiMatteo 2001; van den Bergh and Button 1997). Criticism refers both to the potential misuse of rather sophisticated research steps and the uncritical acceptance of research apparently characterised by “objectivity”, “precision”, and “scientism” (Cook and Leviton 1980).

Other approaches to summarise and synthesise quantitative findings encompass the *best evidence approach* (Cook and Leviton 1980) and quantitative overviews of *systematic reviews*. The latter is also widely used as the main approach to the qualitative presentation of quantitative data (upper left corner fig. 1). Systematic reviews have been established in contrast to “traditional literature reviews”, as a form of criticism of those narrative, descriptive and unstructured presentation lacking a systematic evaluation (Littell, Corcoran, and Pillai 2008). Instead, the approach of a systematic review is seen as objective, replicable, systematic and comprehensive as it follows a rigid methodology in its search for, and evaluation and synthesis of relevant studies (Petticrew and Roberts 2009). ‘A systematic review aims to comprehensively locate and synthesise research that bears on a particular question, using organized, transparent, and replicable procedures at each step in the process’ (Littell, Corcoran, and Pillai 2008, 1). Accordingly, Klassen et al. (1998) describe three main steps of such a review: (1) the comprehensive search for studies, (2) the evaluation of studies according to explicit methods, and (3) the pre-determination of those methods. All steps and decisions made during the review are carefully documented so that readers can evaluate the reviewers’ methods (Sutton et al. 1999).

Systematic reviews allow for a structured overview of a given research topic and are closely related to the movement toward evidence-based practice, often used in tandem with meta-analysis to summarise evidence from previous studies. Criticism focuses mainly on the selection of studies to be integrated and the inflexibility of the selection criteria which may cause bias in the studies to be included (Mays et al. 2005).

### *Synthesising Qualitative Data*

Since the conception of meta-analysis, different attempts have been undertaken to include qualitative data in diverse types of meta-analysis, acknowledging the large and growing number of qualitative studies that can no longer be excluded from reviews (Suri and Clarke 2009). In line with the positivistic approach of meta-analysis, quantitative procedures have been developed that try to combine the benefits of the quantitative analysis of a few variables across large samples with the in-depth study of one or a few cases. This is done in an attempt to preserve the richness of the qualitative data while at the same time aggregating qualitative data for further (quantitative) analysis.

First attempts were undertaken in the field of policy studies, where case study research is a dominating methodology and a large number of existing (qualitative) case reports can serve as a basis for aggregating data. Yin and Heald (1975) proposed the use of closed-ended questionnaires for the content analysis of case studies to aggregate findings and to assess the quality of each case study in a reliable and replicable manner. The resulting *case survey method* offers ways of statistically testing patterns across studies and can be replicated since both the coding schemes and the case study reports are available to other researchers (Lucas 1974). The basic case survey procedure consists of (1) the selection of relevant cases; (2) the design of a coding scheme to convert the case report's qualitative data into quantified variables; (3) the coding of the cases through independent coders, which measures their intercoder reliability; and (4) the statistical analysis of the coded data (Larsson 1993).

The main advantage of that approach seems to lie in the opportunity to examine patterns and generalise to larger populations, a benefit that helps to overcome one of the major drawbacks of single case studies. Furthermore, in contrast

to systematic reviews, the exclusion of studies based on a priori judgements can be avoided, which offers ways to compile a more comprehensive data set (Larsson 1993). Limitations, on the other hand, can be seen in the number of available case studies and the restriction of information available in case reports.

Similar approaches have since been developed, such as *qualitative comparative analysis* (QCA) (Ragin 1994, 2004; Rihoux 2006) and derived methods like *fuzzy set QCA* (Ragin 2009) or *multi-value QCA* (Vink and van Vliet 2009) in which the causal inference of phenomena in terms of their necessary conditions and combinations is examined. These approaches all have in common the fact that they are particularly suitable for “medium N” (approximately up to 100 cases) qualitative case comparisons.

The last area of the proposed fourfold table (upper right corner fig. 1) consists of approaches to the qualitative synthesis of qualitative data. Again, a number of different approaches have been developed over the years, often summarised as *meta-synthesis* approaches (Fingeld 2003; Thorne et al. 2004). The synthesis of qualitative findings is of an interpretive rather than aggregative character, as it involves the ‘bringing together and breaking down of findings, examining them, discovering the essential features, and, in some way, combining phenomena into a transformed whole’ (Schreiber 1997, 314). The common goal of such approaches is to explore a new and more integrative interpretation of findings that goes beyond the results of the individual studies.

One of the first attempts in the field was introduced as *meta-ethnography* (Noblit and Hare, 1988), a research methodology aimed at interpreting given results as a process of giving meaning:

‘when we synthesize, we give meaning to the set of studies under consideration. We interpret them in a fashion similar to the ethnographer interpreting a culture’ (Noblit and Hare 1988, 7).

In their procedure, they not only refer to overall generalisations, but also to

“translations” of qualitative studies into one another:

‘our approach starts from the premise that all interpretative explanation is essentially translation and argues that a meta-ethnographic synthesis is itself a reciprocal translation of studies’ (ibid).

In that way the importance of exploring the meaning of data in the respective context is recognised (van Mannen et al. 1988).

The proposed translations are meant not only to maintain the uniqueness of individual interpretations but also to reveal the differences between various accounts while at the same time enabling researchers to discover underlying themes and metaphors (Keng Siau and Yuan Long 2005). Meta-synthesis then, rather than generating an aggregative summary of the findings, produces a new, interpretive meaning.

To operationalize their approach, Noblit and Hare (1988) describe seven distinctive steps of a meta-ethnography, which are getting started, deciding what is relevant to the initial interest, reading the studies, determining how the studies are related, translating the studies into one another, synthesising translations and expressing the synthesis.

Examples of meta-ethnography can be found in in medical and healthcare areas (e.g. Schumm et al. 2010; Elmir et al. 2010) and more and more in social science and here especially in the educational area (e.g. Pielstick 1998; Rice 2002; Savin-Baden and Major 2007). While the method is not free of shortcomings, especially associated with the reduction in synthesis, meta-ethno is particularly valued for the opportunity it affords to systematically compare case-studies and to draw cross-case conclusions (Doyle 2003).

**A meta-perspective: exploring the potential of research syntheses in EfS**

The mapping of different research methods introduces and systematizes a broad variety of approaches to the synthesis of data, which offer opportunities both for the aggregation of findings from case studies and their integration with an interpretative goal and thus the elaboration of a meta-perspective across single cases.

In the application of such a meta-approach, it is however important to be aware of the potential tension between the different epistemological assumptions, those of the original research and those of the synthesis. A first distinction needs to be made between positivistic approaches that aggregate data by means of the reduction of qualitative findings to a statistical measure of probability, on the one hand, and the interpretative goal of qualitatively oriented approaches which are underpinned by an interpretivist epistemology on the other. Both approaches are often presented as two fundamentally different paradigms which guide the study of the social world and come with specific benefits as well as limitations that need to be considered. While positivistic approaches will offer statistically proven findings for evidence-based conclusions, such evidence is limited to a small number of the factors of the case so that the richness of the individual case and its context are lost. Interpretative synthesis, on the other hand, offers less general conclusions but presents a broader understanding of the different cases. The specific context of the respective case might however be lost as well in such interpretative approaches, especially in the re-analysis of secondary data where this data is likely to be understood differently from the original context (Rantala and Wellstrom 2001). However, even while we acknowledge the existence of these different paradigms and the need to consider them carefully, we still believe in the complementarity diversity thesis that sees these paradigms as serving complementary purposes in educational research, as is shown by



a growing number of mixed method approaches (Brannen 2005, Walker & Evers, 1999).

When we now turn to case study research in EfS, it becomes obvious that such synthesis approaches are still largely absent in comparison with the on-going development in other educational fields as well as in sustainability science. At the same time, a call for evidence-informed research and more use of existing knowledge has been made (Palmer 1999, Rickinson 2006) and one of the first attempts to systematically review research of learners and learning in environmental education has been conducted and widely discussed (Rickinson 2001, Marcinkowski 2003, Reid & Nickel 2003, Sauv e & Berryman 2003). While at this point we do not (yet) want to add another review (here on case studies for EfS) to this discussion, we rather want to discuss the merit of such an undertaking from a methodological point of view and to add a broader picture of potential approaches to the discussion.

Two aspects seem to be crucial in the evaluation of a particular method: first, it is important to be clear about what we are looking for. Clearly, what needs to be carefully selected in any research situation is the methodology that is best suited to the given objective needs. For example, while the qualitative approach of integrating different findings from case study material in an integrative manner may shed light on processes and situations, quantitative aggregation is more likely to be appropriate when we are trying to determine relations, differences and commonalities. Second, the case universe as well as the sample to be used need to be closely examined, as research synthesis relies on a satisfying number of empirical studies as well as on the existence of meaningful data to work with. Here, what is particularly important is the process of quality assurance to select suitable cases.

It is beyond the scope of this paper to define questions that are suitable for the synthesis of case study research in EfS and to demonstrate what such an aggregation of data would look like. Our hope is to contribute to an on-going methodological discussion and to broaden the perspective on potential approaches rather than advocating “superior” ones. However, to support our argument we want at least to illustrate some potential applications in our area of research, i.e. higher education for sustainable development. We have chosen two research questions that have been found to be crucial in a number of different case studies: first, how is sustainability implemented in the curriculum and, second, how and under what circumstances do students develop the necessary capabilities to contribute to a more sustainable future?

Research on the first question is concerned with drivers of and barriers to implementation as well as with different ways of implementations, as evidenced by a number of case studies that explore these aspects and deliver findings on relevant factors (e.g. Barth 2012, Jones et al. 2008, La Harpe and Thomas 2009, Martin et al. 2006). Thus, a case universe can be found with numerous published empirical case studies that form at least a “medium N” of around 50 cases. This offers the opportunity to quantify the qualitative data of the individual cases so as to come up with an indication of the relation between drivers and barriers which might help to prioritise them. A case survey as outlined by Yin (1975) could help to aggregate the case study findings and to assess the quality of each case study in a reliable and replicable manner.

The second question emphasises the investigation of the underlying processes. A number of studies deal with different pedagogical approaches, such as experiential, problem-based or self-directed learning and how they impact learning outcomes (Barth and Rieckmann 200, Buchbinder et al. 2005, Holden 2008, Thomas 2010).

While all of these studies offer valuable insights into the learning process, a qualitative synthesis could offer a meta-view of shared principles and enablers and promote a better understanding of the underlying processes.

### **Conclusion: the future of case study research in EfS**

Case studies have played an important role in EfS in the past and will do so in the future. They offer meaningful insights and rich data and specify their circumstances and situations. Given the complexity involved in teaching and learning for sustainable development, there is and will be an on-going need for well-documented case studies, whose results promise to be a valuable addition to research in the field.

With EfS as an established area of research, however, we feel that there is a necessity to employ comparative approaches and to synthesise data. As a stage on the way to the meta-analysis of EfS, we provided an overview of appropriate approaches to research synthesis and introduced some well-established methods, considering especially its usefulness for case study research. As rich qualitative data is a key characteristic of case studies, what appeared particularly interesting was how it is dealt with by these approaches. The hope for more general findings that go beyond the individual case seems to be the main driver to conduct such synthesis. We isolated two relevant approaches to this with different epistemological assumptions: positivistic approaches that quantify findings across individual cases and interpretative approaches that try to come up with qualitative findings across cases that are more than the sum of its parts. As opposed to single case-study research, these approaches address the need for meta-analysis with the purpose of identifying and understanding trends, patterns and heuristics that emerge in different contexts (c.f. Corcoran et al. 2004). To clarify our approach we also illustrated its potential for EfS with two exemplary research questions in higher education for sustainability.

We are of course aware that the synthesis of data in one of the four ways introduced above will not be suitable for all possible research questions. Often the choice of method will be limited by external influences that do not allow drawing on other cases. Hence, we did not provide an over-simplistic “solution”, e.g. by proposing any specific research approach to these very complex issues. The way forward will be to use the contributions of many researchers to this “solution” by taking the ideas presented here and then assembling appropriate data sets, identifying a clear objective, and testing the approaches to meta-analysis described in this article. Drawing on their work, we will be able to assess which are the productive directions in which future research should be heading.

However, as research in EfS is further developing, we hope to see more examples of such meta-analysis to broaden research perspectives and offer more robust and sound findings across different individual cases – in short, a procedure that promises to add substantially to the body of existing knowledge. Thus, we hope this article will stimulate a debate about the next step in case-study research, a type of research that corresponds with what Reid and Scott identified as the need to be ‘open to new or unfamiliar ways of doing [...] research, whilst constructively engaging with work already archived’ (Reid and Scott 2006a, 244).

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Figure 1. Mapping research synthesis: a fourfold typology

