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# CENTER FOR ELEMENTARY MATHEMATICS AND SCIENCE EDUCATION

## ACCUMULATING KNOWLEDGE ON SCALING AND SUSTAINING REFORM: A FOUNDATION FOR FUTURE RESEARCH

### TECHNICAL REPORT 2: ABSTRACT CODING FOR INCLUSION

#### PROJECT OVERVIEW

The Center for Elementary Mathematics and Science Education (CEMSE) in the Physical Sciences Division of the University of Chicago is engaged in a project funded by the National Science Foundation's Research and Evaluation on Engineering and Science Education (REESE) Program. This project, "Accumulating Knowledge on Scaling and Sustaining Reform: A Foundation for Future Research," focuses on three goals:

1. *to provide a foundation for accumulating knowledge about scaling and sustainability of innovations in education with an emphasis on science education;*
2. *to identify knowledge about scaling and sustainability of innovations from other disciplines that can inform researchers', reformers' and policy makers' improvement efforts in education; and*
3. *to establish a forum for cross-discipline collaboration and sharing knowledge on scaling and sustainability of innovations.*

The project has two strands of work: (1) literature review, analysis, and conceptual framework development; and (2) communication and dissemination.

The first strand of work has three iterative phases: Phase 1—Report Collection; Phase 2—Report Coding; and Phase 3—Report Analysis. Phase 1 entailed conducting comprehensive literature reviews on scaling and sustainability of innovations beginning with science education and then expanding to other areas of education and in turn, other fields that have developed knowledge on these topics, including business, marketing, health, and economics. Upon completion of the searches, the CEMSE team began a two-part analysis focused on identifying common themes and findings in the literature and on using a concept development process to identify the similarities and differences in the constructs that underlie the overlapping vocabulary used to describe scaling and sustainability in education and other fields. Building on this analysis, the team is creating a conceptual framework that can support the development of shared language, yet is rich enough to capture the range of ways scaling and sustainability of innovations in education have been described and understood. This conceptual framework with its clear, shared language can thus provide a foundation for accumulation of knowledge.

In Phase 1, the team conducted comprehensive searches for sources that met a set of criteria outlined in Technical Report 1. Phase 2 began with a process of coding abstracts of the sources identified in Phase 1 to determine their suitability for full coding. That is the subject of this technical report. Then, those sources determined to be suitable for inclusion went through a full text coding process. That is described in technical report 3. During Phase 3, which was concurrent and iterative with Phase 2 until Phase 2 was completed, the team has been analyzing and compiling the results of the coding to develop a summary of the literature and a conceptual framework for facilitating clear description and accumulation of knowledge on scaling and sustainability of reform.

The second strand of work consists of the communication of the ongoing project work (including this technical report) and the creation of a collaborative research environment to share the literature summary and further develop the conceptual framework and other findings.

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## TECHNICAL REPORT INTRODUCTION

This technical report, *Abstract Coding for Inclusion*, describes the first part of Phase 2 that began as the report collection was completed. It describes the inclusion criteria, the process of reviewing the collected abstracts, and a summary of the numbers of abstracts that met each of the criteria.

## ABSTRACT COLLECTION AND COMPILATION

Abstracts were taken from the Social Science Citation Index searched using EndNoteX. Abstracts were compiled into pdfs according to the third degree search terms (e.g. science education, business, health) so that team members could review them in subject matter groups.

## INCLUSION CRITERIA

In order to be included in the full review, a source abstract had to provide evidence that the full source would meet at least one of the following criteria:

- 1) the source provides a conceptual or operational definition of one of the first degree search terms (see Technical Report 1);
- 2) the source identifies a factor that influences one of the first degree terms; and/or
- 3) the source describes an approach, methodology, or instrument for studying or measuring sustainability.

As the process proceeded, the team decided to also include sources with abstracts that suggested the source had some information about dissemination, diffusion, and/or implementation that might be relevant to sustainability. There was also a provision for inclusion of abstracts that didn't meet the other criteria but appeared to still be of interest for an unanticipated reason. A limitation of this approach stems from the fact that abstracts reviewed may not have provided sufficient information about the full report to support its inclusion in the full review.

## ABSTRACT REVIEW PROCESS

As described above, all of the abstracts identified through the document identification process had been compiled into pdfs by subject area search term (e.g. science education, mathematics education, marketing, etc.). Each member of the team was assigned to one of these fields (or a portion of a field for the larger abstract sets) and coded their assigned abstracts using a pdf tagging or "stamping" process. The tags used for inclusion included:

- 1) operational definition (the abstract suggested the source contained an operational definition of one of our terms of interest);
- 2) conceptual definition (the abstract suggested the source contained a conceptual definition of one of our terms of interest);
- 3) influential factor (the abstract suggested the source identified a factor that contributed to or inhibited sustainability or another first degree search term);
- 4) methodology (the abstract suggested the source contained a description of a methodology for studying "sustainability");
- 5) diffusion and scale-up review (the abstract suggested that the source contained relevant information about diffusion and scale up);
- 6) implementation review (the abstract suggested the source contained relevant information about implementation);
- 7) sustainability review (the abstract suggested the source contained other relevant information about sustainability); and
- 8) alternative inclusion (the abstract suggested the source should be included for a reason other than the others described).

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A ninth tag, “not useful,” was used to identify abstracts that had been reviewed and established to be of no relevance to our work.

Initially, each abstract was tagged with as many tags as were appropriate. Later, however, in order to streamline the process, it was decided that coders could stop tagging as soon as one tag was identified since that single tag was sufficient to warrant inclusion in the full text coding process.

#### SUMMARY OF ABSTRACT REVIEW

The abstract review took place from May, 2007 until April, 2008. Over 69,000 abstracts were reviewed and a total of 657 sources were identified for the full text coding process. Table 1 shows the total numbers of each tag. There is not a 1:1 correspondence of tags to sources because as noted above, the team began the process by tagging with all relevant tags but for later abstracts stopped tagging after a single tag was identified for an abstract.

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**Table 1.**  
*Total Numbers of Tags*

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Operational Definition	9
Conceptual Definition	25
Methodology	44
Influential Factor	147
Sustainability Review	421
Implementation Review	219
Diffusion and Scale-Up Review	178
Alternative Inclusion	1

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