Integrating Research and Practice through Collaboration on Practitioner-Generated Models
Project Summary

The Evidence-Based Program (EBP) movement has become a dominant perspective in contemporary educational research, including the STEM educational context. As the ordering of its constituent terms suggests, it gives precedence to scientifically rigorous evidence over evolved experience-based practice. The flow of knowledge is from research to practice, with practice seldom informing the research base. EBP emphasizes methodologies like randomized experimental designs that focus on control and internal validity but often fail to address the complexity of real life practice and external validity issues. EBP is perceived by many practitioners as arrogant, intrusive, and naively insensitive to the complexities of modern educational contexts. Increasingly, practitioners are mandated to apply EBPs solely or predominantly and are required to follow the exact processes with fidelity and without adaptation to local contexts or needs, leaving little room for practitioners to practice. This evolution of the EBP movement potentially damages the integration of research and practice, strains the relationships between these two communities and minimizes the degree to which research is informed by the evolved experience of practitioners.

This project directly challenges that dominant approach to EBP. It starts from the premise that practitioner perspectives are essential to improving research understanding. Practitioner models of and evaluation plans for their own programs, created using a methodology and web-based cyberinfrastructure developed over seven years of NSF-funded research, are the basis for engaging researchers in identifying and sharing relevant evidence. The project will involve four central activities: (1) Identifying the target STEM education programs and related local researchers and assessing researcher and practitioner incentives, motivations and barriers to engaging in technology-based model-mediated dialogue; (2) Engaging researchers and practitioners in a technology-based model-mediated dialogue about program logic and pathway models and their connections to research; (3) Evaluating research-practice connections that result from the dialogue and the effects of the dialogue on the models and evaluation approaches; and (4) Revising the protocol and cyberinfrastructure as feasible and evaluate researcher and practitioner reactions to the proposed changes. The sample will consist of 20 intensive case studies of programs selected from the existing database of over 400 programs and will include from each program at least two practitioner staff and two researchers who are experts in program-relevant research. Several new measures and protocols for engaging researchers and practitioners will be developed.

The EAGER mechanism is essential for several reasons: this is exploratory research in the early stage of examining a practitioner-driven approach to the integration of practice and research; the use of the web-based cyberinfrastructure is a potentially transformative tool for the field of educational research; the project is “high-risk” because it is a challenge to engage the researcher community in a new approach to connecting research to practice; and, the project is potentially “high-payoff” in that even a modest level of success could help transform the debate about EBPs and offer a methodology for integrating research and practice that could be widely adopted. Consequently, the EAGER mechanism is ideally suited for this proposal and would provide critical funding that could have a broad effect on both STEM education evaluations specifically and the evaluation field globally.

This project has **intellectual merit** in that: it is based on a solid foundation of previously-funded NSF research on evaluation methodology; it uses practitioner-developed program models and evaluation plans that were carefully developed and assessed; it takes a novel approach to the major challenge of research-practice integration; it provides the basis for development of a new line of research investigating a broad range of potential approaches for engaging researchers in the evolved experience of practitioners; and, it has the potential to significantly affect one of the most important movements of this era and encourage it to evolve toward a more co-equal integration of research and practice;

This project will have **broader impacts** for several reasons: it will increase the engagement of the public with STEM education program planning and evaluation by bringing practitioners into direct dialogue with researchers; it will enhance the technology for conceptualizing and managing STEM education and its evaluation; it will help to develop a more diverse, globally competitive STEM workforce that includes STEM education practitioners with direct experience interacting with researchers; it will introduce a unique and widely disseminable methodology for partnerships between academia and communities of practice; and it will enhance the infrastructure for research and education both in terms of improved technologies and methodologies for researcher-practitioner engagement.

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"The challenge is that most of the evidence is not very practice-based. The evidence given greatest credence and therefore the most play in evidence-based guidelines comes from highly controlled trials, ideally controlled by random assignment, but in fact made more artificial or unrepresentative by whatever methods of control are used."

Green [1], p. 406

A. Introduction

There's a reason it's called Evidence-Based Practice (EBP) rather than Practice-Driven Evidence (PDE) or even something more equitable like Evidence-Practice Integration (EPI): the established voices in the EBP movement are primarily researchers who tend, reflexively and by training, to privilege evidence over practice [2]. Despite the relatively rare voices calling for a more balanced view of the relationship between these two domains [1, 3-5], the recently emergent paradigm of EBP has held steadfastly to its perspective. But even something as seemingly innocuous as the name of the movement can be symptomatic of an inherent challenge: How can we get practitioners to base their work on evidence when it likely appears to them that it is being forced upon them from "outside"?

We propose to build on seven years of NSF funding to develop a transformative and novel STEM education evaluation methodology for bringing researchers to practitioner-generated thinking about programs as the basis for integrating research and practice more effectively. In our prior research, we developed and tested a systems-based approach to evaluation that included the creation of a specific protocol for practitioners to follow in planning, implementing and utilizing evaluation and an accompanying web-based cyberinfrastructure to encourage practitioners to interact and learn from each other's evaluation models and plans. In this project, we propose using the results of this protocol and web-based architecture to engage researchers in a way that would be sensitive to their motivations and would encourage them to have a dialogue with practitioners about research that can inform their thinking. This has the potential to dramatically transform the integration of research and practice by explicitly recognizing the experience-driven and evolved thought of practitioners and by providing an environment where researchers can connect their work to that thinking.

Because the emerging dominant perspective emphasizes a one-directional view of evidence-to-practice, a proposal of this nature would not likely get a fair hearing under traditional NSF funding mechanisms for evaluation (e.g., REESE; PRIME). The EAGER mechanism is especially appropriate because the proposed project is an exploratory one in the early stage of examining a practitioner-driven approach to the integration of practice and research, and because the use of the cyberinfrastructure that we have developed is a potentially transformative tool for the field. This project is "high-risk" in that it is always challenging to engage the researcher community in a new approach to anything, and especially to connecting research to practice. We intend to minimize this risk by building in a major activity designed to investigate the motivations and incentives of researchers and the barriers to collaboration and address these issues in subsequent activities with researchers. But this project is also potentially "high-payoff" in that even a modest level of success would potentially be able to be made accessible to the worldwide community of researchers and practitioners. The approach we are taking is a radical shift in emphasis from the currently dominant researcher-driven one to practice-driven approaches, applies the newly developed protocol and cyberinfrastructure from our current NSF work, and would enable new ways for researcher and practitioner communities to engage more effectively through that mediating methodology and technology. Consequently, the EAGER mechanism is ideally suited for this proposal and would provide critical funding that could have a broad effect on both STEM education evaluations specifically and the evaluation field globally.

The worlds of STEM research and practice are largely unconnected. The researcher is typically disconnected from day-to-day STEM education practice and works in an insulated community of scholars interested in theoretical traditions and methodologies that practitioners find foreign. Practicing educators are necessarily concerned more with the immediate context of program delivery and the needs of the learners with whom they interact. How can we use evaluation to better integrate the worlds of research and practice so that day-to-day practice informs research more directly and the research evidence base reaches the practitioner more effectively?

We propose conducting innovative field research to help address this challenge. Our approach in this exploratory project is straightforward: (1) Identify target programs and related local researchers and assess researcher and practitioner incentives, motivations and barriers to engaging in dialogue; (2) Engage researchers and practitioners in a technologically mediated dialogue about program logic and

pathway models and their connections to research; (3) Evaluate research-practice connections that result from the dialogue and the effects of the dialogue on the models and evaluation approaches. (4) Revise the protocol and cyberinfrastructure as feasible and evaluate researcher and practitioner reactions to the proposed changes.

B. Background Research

The Challenge: Integrating Research and Practice

The call for better integration of research and practice is a broad and critically important one. NSF and other funders of STEM are interested in practical application of the research they fund, leading to the requirement to address "broader impact" in all proposals. Educators and others interested in training the next generation of scientists and critical thinkers are facing increasing pressure to provide "evidence-based programs" but struggle with the shortage of relevant EBPs in their particular topic area and the frustration that the EBPs that are available to them do not always fit the context they work in.

There is an enormous literature addressing the relationship between research and practice including research on a variety of methods and approaches to dissemination and implementation [6-8] and capacity building for evidence-based approaches [9]. Evidence-based practice (EBP) is a general attempt at unifying the worlds of research and practice [10-16] based on the idea that programs that have a strong evidence base in support of their effectiveness should be disseminated and implemented. However, EBP tends to be framed from a researcher, rather than a practitioner perspective [4]. A more recent response to this emphasis has been the promotion of practice-based evidence (PBE) [17-19] in which research agendas are derived from and responsive to the needs identified in practice. Both of these approaches have failed to unite research and practice because they lack a bidirectional process for connecting researchers and practitioners. Like both EBP and PBE, translational research [18, 20-23] attempts to bridge the gap from bench to bedside or from research to practice, but thus far it has been unsuccessful in creating a context where researchers and practitioners could meet on relatively even ground. We contend that the primary challenge in research-practice integration is a failure to frame the effort from a systems perspective [24-27] and create the systemic conditions that would incentivize and enable practitioners and researchers to work together effectively.

Evaluation is uniquely situated to address the research-practice integration challenge because evaluators have a connection to both the practice and research realms especially through their role in facilitating the development of causal diagrams [26]. In evaluation, such diagrams are based on work done in theory-driven evaluation [28] and logic modeling [29-31]. A logic model presents expected program performance in addressing targeted problems under specific conditions [30-32]. Similar to logic models, (causal) pathway models provide a conceptual framework for describing programs. However, while logic models typically rely on columnar representations that most often link whole sets of activities to sets of outcomes, pathway models make these connections more explicit and precise by graphically depicting the network of causal linkages, primary pathways and nodes and identifying the connections from short-and medium-term outcomes to long-term ones. A pathway model enables the practitioner's story about the effectiveness of a program to connect with the researcher's story about the scientific evidence, enabling a continuous through-line that explains how a local program can have a long-term impact.

Ultimately, the goal of this project is to link the pathway models of a "local" evaluation of a practitioner-developed program with the more "global" evidence that is generated by research, to identify places where local evaluation efforts and the research literature meet; in other words, to find what we have referred to as the "golden spike" [26]. This research proposes to develop and test a methodology for linking the research evidence base to locally-developed program logic and pathway models as a means of addressing the research-practice divide.

C. Results from Prior NSF Support

Building Evaluation System Capacity for STEM Programs: Enhancing Capability and Advancing Practice, NSF Grant #0535492; 10/1/2005 – 8/31/2008; William Trochim, P.I., $746,133.

Summary: This project was a Phase I Study that involved the development and testing of a Systems Evaluation Protocol (SEP) and supporting cyberinfrastructure (the Netway) that were based on both evolutionary systems theories and evaluation theories, and together are designed to provide a simple approach to developing a high-quality program model and evaluation plan.

Results/Impact: The project worked with 49 Cornell Cooperative Extension (CCE) and NSF Materials Research Science Education Center (MRSEC) programs across 10 organizations and assisted them to

develop comprehensive program models and evaluation plans that they could implement subsequently. The project supported 2 graduate students, a postdoc, and also received an REU supplement that involved 10 undergraduate students.

Products and Publications: Major products included version 1.0 of the Netway cyberinfrastructure [33], The Facilitators' Guide to Systems Evaluation Protocol [34], and a number of important national and state presentations.

A Phase II Trial of the Systems Evaluation Protocol (SEP) for Assessing & Improving STEM Education Evaluation; NSF award 0814364; 8/15/08-7/31/13; William Trochim, P.I., $2,528,216.
Summary: This nearly completed Phase II Study was designed to assess the efficacy of the SEP and Netway cyberinfrastructure in building evaluation capacity and developing high-quality evaluation plans. This project extended the SEP developed in the Phase I project from its year of evaluation planning to additional years of implementation and utilization support. Participating programs are drawn from organizations in two STEM education contexts (CCE and NSF MRSEC).

Research questions include: (1) How is the SEP being delivered? (2) What are the outcomes for participants? (3) Are outcome differences associated with program variations, dose or context? (4) Is there evidence of spontaneous independent contagion from participating programs to non-participating programs? (5) To what degree do participants utilize the SEP's cyberinfrastructure (i.e., the Netway)? And, (6) What differences occur in outcomes when the SEP is administered as a self-paced online resource rather than as a facilitated one?

Measures of organizational evaluation capacity, program evaluation capacity, and individual evaluation skills and attitudes were developed and administered as pre-measures, and annually thereafter. Rubrics for logic model quality, pathway model quality, and evaluation plan quality were developed and completed for each program during their initial planning year. Other data include project documentation, post-training feedback surveys, an annual post-only phone survey, and extensive Netway usage logs and statistics.

Results/Impact: To date, we have 441 separate programs in the Netway, associated with 107 distinct organizations. Of these, 109 programs at 49 organizations participated in the SEP training since 2006, with 103 of these at 47 organizations successfully completing the initial year-long process to develop detailed program logic and pathway models and an evaluation plan. Feedback from participants and their supervisors, and qualitative and quantitative evidence on the impact of the process, indicate that the training is valued and is having a positive impact on program modeling skills, staff understanding of programs, and staff capacity for and attitudes toward evaluation.

Thirteen undergraduate students and nine graduate students, as well as three American Evaluation Association's Graduate Education Diversity Interns, have been involved in the work across two sites (Cornell University and Montclair State University).

Products and Publications: This research has led to a number of state and national presentations (including four invited addresses and 19 presentations), version 2 of the Netway cyberinfrastructure [35], and several publications (including Guide to: Systems Evaluation Protocol [36], a major article in the leading journal in the field of evaluation [26], and a major monograph on evaluation policy that directly relates to the proposed research) [37-40].

Challenges Identified as a Result of Prior Research: Successful engagement with the above projects resulted in the identification of several major challenges: (1) How to manage portfolios of programs and their evaluations rather than just individual program evaluations; (2) How to sustain evaluation capacity building efforts through more successful integration into the organizational system; (3) How to build and enhance evaluative thinking and an evaluation culture in organizational systems; and, (4) How to integrate research and practice through the evaluation process. This last challenge is the focus of the current proposal.

D. Research Aim

The specific aim of this project is to conduct exploratory research to extend both methodological and substantive knowledge that will enhance the integration of research and practice by using the SEP protocol and Netway cyberinfrastructure as a mediating mechanism for more effective engagement of and communication between practitioners and researchers. Practitioners are increasingly expected to implement "research-based" programming, while researchers are increasingly expected to have a "broader impact." Yet, despite these apparently complementary needs, effective connections between researchers and practitioners are difficult to create and maintain. To address this challenge, this project is

designed to develop and field test a protocol for research-practice integration based on the "golden spike" concept that we developed in our current NSF grant [41] and, where feasible, to modify our Netway cyberinfrastructure to encourage researcher involvement with practitioner efforts there.

E. Project Design

This project is a two-year exploratory study that will involve intensive systematic evaluation of researcher-practitioner engagement for twenty identified STEM education projects and approximately 40 practitioners and researchers. We will use the existing Netway database to identify projects according to criteria outlined below. Four interrelated activities will be conducted over the course of the project:

- **Sample Programs and Assess Participant Motivations.** Identify target programs and related local researchers and assess researcher and practitioner incentives, motivations and barriers to engaging in dialogue.
- **Assess Research Mapping Dialogue Process.** Engage researchers and practitioners in a research mapping process about program logic and pathway models and their connections to research and assess the process.
- **Assess Effects of Researcher-Practitioner Dialogue on Evaluation Models and Plans.** Evaluate research-practice connections that result from the research mapping dialogue and the effects of the dialogue on the models and evaluation approaches.
- **Assess Researcher and Practitioner Reactions to Proposed Protocol and Cyberinfrastructure Changes.** Revise the protocol and cyberinfrastructure as feasible and evaluate researcher and practitioner reactions to the proposed changes.

Each activity will involve systematic data collection and mixed methods analysis and is designed to generate one or more publishable papers.

Proposed Activities

Activity 1 – Sample Programs and Assess Participant Motivations.

Description. One of the major challenges in this project is to select target projects and practitioners who are willing to participate and to identify researchers who would be able to provide input on relevant research. We currently have 441 programs in the Netway, 109 of which have participated fully in the SEP since 2006 with 103 who have completed at least the planning phase (logic and pathway modeling and evaluation plan development). For project selection we will begin by identifying a set of criteria that will result in the selection of twenty projects out of the 441 in the Netway that helps assure that the program logic and pathway models are sufficiently developed to be appropriate for researchers to look at. Only programs that have completed the evaluation modeling and plan development stages will be considered. We know that 103 of these have formally been through the SEP, and we will identify others at this stage that did not formally go through the SEP (these will predominantly be programs that SEP "graduates" have initiated, effectively constituting "spillover" or "contagion" effects from our initial training). Programs will be ordered from highest to lowest total rubric score for the logic model, pathway model, and evaluation plan (where available) and by any other criteria we develop, and the twenty highest scoring programs will be initially selected. For each identified program, the relevant program staff will be identified and the two most centrally involved and familiar with the project (as determined by Netway use logs) will be contacted to determine whether they are willing to participate in the project and, if so, asked to provide informed consent. If they are willing, they will be asked to complete the Incentives, Motivations and Barriers Survey (Program Staff Version) on the web. If any of the top twenty are not willing or able to take part we will continue to move down the ordered list of programs until that target number has been achieved. A sample of twenty programs was selected for this pilot because it is feasible to do this many within the parameters of this grant and it is reasonable to expect that we have this many already in our database. Although it is always desirable to have a larger sample (assuming sufficient resources) it is important to keep in mind that each of these twenty programs will involve rich and thoroughly articulated logic and pathway model, a detailed evaluation plan and a unique research context. We are confident that this size sample can provide a sufficient basis for a pilot of this approach to researcher-practitioner integration.

Prior to the identification of researcher participants we will work with a team of librarians and information scientists at Cornell's Mann Library and interns from the Syracuse University's graduate program in Library and Information Science. We have worked with these specialists in several past research studies. They will be asked to take the program models (including the program mission, description, logic and pathway models) and evaluation plans (including sampling, measurement, design

and analysis) and use the contents as the basis for conducting a preliminary targeted literature search designed to identify the most relevant research publications including studies of similar programs, potential measures for constructs (outcomes) in the models, and correlational or causal studies that assessed links or partial pathways in the models. We see this step as a critically important preparation for subsequently involving researchers. The burden of participating will be lower for our sample of researchers and they will be more effective if they can react to some preliminary research literature rather than having them try to start with a blank slate only from the program information.

For each of the twenty programs, two researchers (research faculty, postdocs, graduate students, research professionals) will be identified with relevant substantive expertise. To accomplish this, project staff will go through each program description and logic model and identify key terms or phrases which will be used in queries of the university-wide Vivo database of faculty and staff at Cornell. We will also compile a list of authors of publications identified in the literature searches described above and identify which are from Cornell. Ideally we would like to identify a total of 40 researchers at Cornell who have relevant expertise, two for each program, with none of them duplicated across programs. If we are not able to find all of the researchers for the sample at Cornell, we will use the list compiled from the research literature to identify researchers at other institutions who have relevant expertise. As in sampling programs and practitioners, we will begin sampling from a prioritized list of researcher candidates and continue sampling until the quotas of two for each program and 40 overall are achieved. The two most appropriate researchers will be contacted first to see if they are willing to participate; if either is not, the next person on the list will be contacted. They will be provided informed consent and administered the Incentives, Motivations and Barriers Survey (Researcher Version).

Research Questions

The research questions for this activity are:

- What are the distributions and characteristics of programs in the Netway population as a whole and for the selected sample of programs?
- How effectively are librarians and information scientists and interns able to identify relevant research given the program models and evaluation plans?
- What are the primary challenges in identifying and getting the consent of researchers to participate?
- What are the incentives, motivations and barriers for both practitioners and researchers to engaging in a dialogue about the relationship between research and practice around specific practitioner-generated programs?

Activity 2 – Conduct Research Mapping and Assess the Process.

Description. The Research Mapping Meeting will be the major point of intersection between researchers and practitioners in this pilot study. It will be a structured session of between 90 and 120 minutes conducted face-to-face where feasible and using Cisco's Webex video teleconferencing system for participants who are not local and cannot attend in person. The Webex sessions will be recorded and, because they provide both the audio of the meeting and the video recording of the computer screen, these recordings will provide a complete record of the sessions that can be downloaded, coded and analyzed. In advance of the research mapping meeting each researcher will be sent the complete information for their target program and instructions for how to review the materials. The materials (from the Netway) will include: program description; program logic model; program pathway model; the complete evaluation plan; and a list of all research publications identified through the literature search, along with a description of how each publication relates to the logic/pathway models (e.g., connected to one or more activities, to an outcome or to a link). In addition, researchers will be asked to think of other research that might be relevant and to plan to bring that to the research mapping meeting. Researchers will be told that the time expected for them to conduct their pre-review is approximately an hour and that they should see it as an activity analogous in scope to their conducting a peer review of a publication. Practitioners associated with each program will also be sent the pre-meeting materials so they can know in advance what the researchers will be seeing.

There will be a total of 20 research mapping meetings, one per sampled program. Each meeting will be facilitated by CORE staff and will begin with a brief review of the pre-meeting materials to help assure that everyone is familiar with the basic content. All of the program materials, including the logic and pathway models and evaluation plan will be available on the main computer that will be displayed in the meeting room and over Webex; any changes made to these materials in the course of the meeting will be visible to all the participants. CORE staff will describe that the purpose of the meeting is to identify

research that might help inform the program, as a way of examining a new approach for integrating research and practice. They will be shown how we will capture researcher suggestions and comments and visually connect research to the logic/pathway models. The facilitators will guide the researchers in identifying and attaching evidence from the published literature that is relevant to 1) specific activities or outcomes (nodes), 2) specific activity-outcome or outcome-outcome linkages (linkages), or the program in general (e.g., other similar programs or research that pertains to the context or assumptions of the program). The facilitators will encourage the researchers and practitioners to interact around this process, including asking for more details from each other. The facilitators will begin by asking the researchers to offer any ideas of relevant research that they brought with them based on their advance review of materials, a type of free-form research mapping. The facilitators will review where the discussion is at and proceed systematically through the logic and pathway models to probe whether the researchers have any additional thoughts or practitioners have any reactions to what is being suggested.

We have had some very preliminary experience of bringing researchers and practitioners together in this type of way. In March of 2013 we had a two-day meeting of the newest cohort of SEP trainees (four separate program groups) and toward the end of the second day we invited Cornell researchers who do relevant work to join the meeting and discuss how research might inform the emerging models. From this formative experience we were able to verify that the idea of a research mapping meeting of the type proposed here would be feasible, that researchers and practitioners were able to engage in a productive dialogue, and that relevant research could be related to the programs. We have also done some preliminary work to test the feasibility of using program model information from the Netway as the basis for conducting a literature search. While this early work used undergraduate assistants who were not professionally trained in library or information science, it yielded a considerable number of research publications that informed the small sample of programs we tested.

Within two weeks of the research mapping meeting the participants will be contacted and asked to complete a structured web-based survey designed to assess their experience.

Research Questions

- What is the nature of the research mapping meeting? How many ideas do researchers bring from their pre-review of materials? How many are identified through the facilitated systematic review of models?
- How well do the practitioners and researchers interact? Are they able to have a discussion that connects the program's reality to the research literature? What evidence is there that there is confusion or defensiveness on the part of participants?

Activity 3 – Evaluate Effects of Researcher-Practitioner Dialogue on Evaluation Models and Plans.

Description. The primary analysis of this pilot project will constitute the third major activity. In this phase, all of the data from Activities 1 and 2 will be brought together to answer the questions posed for this activity. Participants will have the pre-meeting version of the program model and evaluation plan. These models are a pre-test for assessing any changes based on the research mapping meeting. We will code the pre and post state of the models and be able to determine the degree and types of changes made. Changes in scope, boundaries, and additions/subtractions to program models will be assessed qualitatively. Quality of models will be assessed quantitatively using the Pathway Model Rubric which is a measure of pathway model quality that was developed and assessed for reliability and validity as part of prior NSF research. Pre-test quality scores will be compared to post-test quality scores. Given the small sample size and lack of power, quality will also be assessed qualitatively using the same rubrics.

Descriptive analyses will assess the overall number of research articles that are attached to nodes and linkages between nodes. To determine whether more evidence is found on the left versus the right side of the model, each node on the pathway model will be ordered sequentially based on the number of incoming and outgoing causal links and their proximity to activities. Lower valued nodes will be those to the left of the model and tend to reflect shorter-term outcomes while higher valued ones will be to the right and reflect longer-term outcomes. This will make it possible to estimate the relationship between number of linked research articles (evidence) and position along the outcome spectrum across all of the models. We intend to conduct regression analyses that regress node sequence (left to right, operationalized as a cognitive map "reachability" index [42]) onto numbers and types of research publications identified. A key hypothesis (based on the "golden spike" paper) is that there will be a significant positive regression coefficient (relationship) indicating that the research tends to be more associated with longer-term outcomes in models. Qualitative analyses will also be conducted to assess whether there are differences

in the numbers of attached research articles as a function of the specific content contained within a given pathway model.

In the Research Mapping Assessment Survey, practitioners will be asked specifically about any changes that were made to their model and whether the changes were the result of insights gained as part of the research mapping activities. The survey data will be analyzed qualitatively and results will be used to inform the development of the formalized protocol for linking research evidence to program pathway models.

Research Questions

- How much research was connected with the programs (as reflected in numbers of research publications)?
- How does engaging in evidence mapping activities change pathway models in terms of scope, quality, additions/subtractions, and boundary changes?
- What is the pattern of research mapped onto the program models? How do identified publications distribute over the potential parts of the program materials (program description, logic model components, pathway model elements, evaluation plan sections)?
- Does research tend to map more onto the left or right hand side of the pathway model (a question of relevance to the "golden spike" hypothesis described earlier)?

Activity 4 – Evaluate Researcher and Practitioner Reactions to Proposed Protocol and Cyberinfrastructure Changes.

Description. The results and feedback received from participating researchers and practitioners as part of activities 1-3 will be used to develop a draft protocol for subsequent research mapping meetings of this type. This will be integrated into the current Systems Evaluation Protocol and the accompanying Netway support materials. It is expected that most such changes will go into a more detailed description of the Program-System Links step of the current SEP. In addition, we will examine the results for any implications regarding potential revisions to the Netway cyberinfrastructure that would encourage researcher participation or likely lead to more effective integration of research and practice. The revised protocol will be shared with the researchers and practitioners who participated in this project for their feedback. For this purpose, the highlights of the proposed protocol changes will be summarized and feedback solicited through a brief Qualtrics web-based survey conducted approximately 3-4 months after the research mapping meeting that will systematically ask for researcher and practitioner reactions to each proposed change. We will also ask several questions about whether the researchers and practitioners had any post-meeting follow-up interactions and, if so, ask for a brief description of what happened and what the implications were.

Research Questions

- Is the proposed revised protocol for research mapping meetings perceived to be effective and useful according to the participants?
- What other changes are recommended by participants?
- Were there any interactions between researchers and practitioners subsequent to the research mapping meeting and, if so, what was the nature of the interactions and what effects if any did they have?
- Going forward, what do the participants think would best advance the integration of research and practice in these contexts?

Measures and Data

Activity 1:

- Incentives, Motivations and Barriers Survey. There will be two versions of this survey, one each for program staff and researchers. The survey will consist of both closed and open-ended questions organized into scales designed to ascertain what the respondent's motivation to link research the program model is, what features of the engagement might incentivize them most, and what barriers they perceive to engaging in the dialogue.
- Records of researcher and practitioner recruitment efforts, including annotations about challenges in recruitment.
- Records of the results of structured literature searches including numbers and types of research publications identified, time needed to conduct the searches, most productive search databases (e.g., Web of Science, PsychInfo, PubMed, etc.)

- Data from Netway Logs about program staff involvement in model and evaluation plan development.

Activity 2:

- Research Mapping Meeting Post Assessment Web Survey. The Post Assessment Survey will be sent to both researchers and practitioners within two weeks of the research mapping meeting. It will consist of both open and closed-ended questions that address: assessment of meeting process; assessment of interactions with the "other" group (researchers/ practitioners); the degree of satisfaction with the meeting; description of perceived accomplishments; major barriers or challenges; and, suggestions for future meetings.
- Systematic analysis of the Webex recordings of the meetings. We will have 20 Webex recordings of the audio and computer screen video for the research mapping meetings. We will unitize these recordings by dividing the stream of the meeting into definable content chunks and code these at least for: the amount of time per speaker (researcher; practitioner); the content of the communication (research mapping task; question or clarification; etc.); and, the affect of the communication (negative; neutral; positive). These codes will be used in the overall analysis.

Activity 3:

- Netway Data on Changes to Program Models and Evaluation Plans. The data will include both baseline (pre) and post snapshots of the Netway data for the twenty programs. From this we will be able to identify the numbers of activities and short, medium and long-term outcomes, the number of pathways and the numbers of incoming and outgoing arrows to each node. These data will be used in assessing changes in the logic or pathway models that result from the research mapping meeting.

Activity 4:

- Protocol Revisions Reaction Survey. This brief survey will be sent to participants (researchers and practitioners) 3-4 months after the research mapping meeting and will assess specific reactions to the proposed changes in the protocol, elicit recommendations regarding any changes in the Netway, describe and assess and post meeting interactions between participants, and elicit general recommendations regarding next steps in encouraging better integration of research and practice in the context of practitioner-generated program models and evaluation plans.

Results and Dissemination

Based on the structured research literature searches, a protocol will be developed for conducting such searches in the future. Especially exciting is the possibility that some or all of this protocol could be automated and built into future versions of the Netway, enabling program participants the opportunity to use the content of their models as the basis of conducting an initial research literature review. Based on the results of the activities, a formal protocol for research mapping will be developed for broader dissemination. It is expected that this will be able to be directly integrated primarily into the Program-System Links step of the SEP. Based on the results of this pilot we will develop a list of prioritized changes to the Netway cyberinfrastructure that have the potential to encourage and support future researcher-practitioner interactions around program models and evaluation plans. It is expected that each of the research activities will provide sufficient data to make it possible to develop a research publication on the central topic/question of that the activity. Because we envision the Netway and integrated SEP to be released worldwide during the course of this pilot grant, any changes that result from this work are likely to have immediate and broad implications for practice.

F. Human Subjects

The research does not pose any dangers or safety risks for participants and does not involve deception. All participants will be employees of the system of program delivery. Participants will in all cases be assured confidentiality and for much of the data collection will be anonymous. They have extensive prior disclosure and informed consent through the Memorandum of Understanding process integrated into this approach. This research involves the use of human subjects and the proposal will be reviewed by the Cornell Institutional Review Board (IRB).

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