Work in Progress: In their own words - how “changemakers” talk about change

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*Abstract* – This paper is a tale of two stories about transformation in engineering education. We present preliminary work on (1) “change knowledge” through a study that investigates what exemplar “changemakers” understand about how transformation occurs, and (2) “radically transparent research” as a developmental and translational change initiative.

*Index Terms* – transforming STEM education, change knowledge, change agents, radically transparent research

I. Introduction

Numerous studies indicate that investments into STEM education transformation have met with only modest success and little widespread change [1-5]. Fullan [6] argues that a missing ingredient in understanding why good ideas or policies fail to get implemented or that are successful in one situation but not in another is “change knowledge”: assumptions, beliefs, and values about the process of change (both incremental and transformational) and key drivers for success. This parallels the concept of “pedagogical content knowledge” [7] because it refers to the explicit, tacit dimensions of contextualized knowledge that informs individual actions to effect change.

Research also indicates that traditional dissemination approaches such as peer-reviewed and archival publications are not effective mechanisms for transforming educational practice [8-10]. Some argue that these focus on the “telling” and not the “doing” making it difficult for intended users to develop a rich understanding of research that may be transfered to their own contexts [11]. An alternative model of transformative action research is “radically transparent research”, an idea that emerged from work in open source communities [12]. This involves going public - making research data and the collaborative research process (e.g., discourse on research design, developing conclusions, and identifying implications) transparent and accessible to the research subjects and the broader community – to discuss, reveal, examine, and challenge assumptions about education research and change knowledge as a collaborative sensemaking process. As such, radically transparent research is consistent with action research methods [13], participatory research methods [14], and legitimate peripheral participation frameworks [15]. It may support transformative learning [16], self-authorship [17], high-leverage and potentially transformative system interventions [18], and iterative cycles linking research and practice through critical reflection [19].

In this paper we share preliminary findings along two interconnected storylines: one is about investigating change knowledge, the other involves investigating a change initiative of radically transparent research.

II. Background & Procedures

Between 2008-2009, Vanasupa and Herter interviewed eight “changemakers”, STEM change agents whose impact exceeded institutional, regional, and national boundaries. The goal was to investigate how individuals with a record of change talk about socially beneficial change: their motivations and inspirations, assumptions about how transformational change occurs, and experiences as changemakers. The semi-structured interview protocol had four questions: (1) *what do you see as your greatest accomplishment?* (2) *what caused you to come to that point of view?* (3) *what caused or inspired you to pursue this [presumed change]?* And (4) *what do you think of this diagram* (a causal loop diagram as an artifact to elicit personal theories of change), *what causal links look relevant, and what do you think is missing*?

 The research team grew as the original researcher, seeking expertise in qualitative research, invited a colleague who had shared interests in change and a desire for relatedness and growth. Later, graduate students with similar interests and goals were invited onto the team. As the team engaged in a grounded theory analysis of the interview data, we realized that the inspirational nature of the interviews and difficulties with protecting anonymity (each participant is a prominent figure that can be quickly identified using Internet search engines) provided an opportunity to pilot a radically transparent research process. This involved (1) asking interviewees if they would voluntarily agree to make an identifiable version of the transcript available using a Creative Commons license [20], (2) creating a public web-based forum with mechanisms for people (the researchers, study participants, and public) to participate in, observe, or document the discourse analysis process, (3) releasing the public dataset, and (4) establishing policies for producing and disseminating scholarly products that address the special needs of a publicly identifiable dataset. It also involved extensive discussions with our human subjects review board.

 At this time we have re-contacted participants and all have voluntarily agreed to make an identifiable version of their interview transcripts publicly available with a Creative Commons license. All are in various stages of releasing their transcript to an open license system and making minor modifications to the transcript to correct errors and deal with sensitive information that may be risky when publicly shared. Also, a pilot web-based system is in place that supports threaded data capture of discussions and documenting multiple perspectives.

III. Preliminary Findings: Change Knowledge

Five of the eight transcripts have been analyzed and coded using grounded theory methods [21]. The following examples illustrate the kinds of change knowledge emerging from the data.

 *Changemakers appear to be strongly motivated by a belief that change is necessary and this is connected to personal, often emotional, life experiences of observing others struggle or practices that negatively impact society or the environment*. For example, Mr. An’s change initiative was a philosophy of sustainable chemistry to minimize the use and generation of hazardous substances, Mr. S’s was a philosophy of engineering education for preparing holistic learners who are self-directed learners, and Ms. Z’s involves minimizing the gap between academic preparation and practical industry experience.

 *Changemakers seem to have a comprehensive vision regarding the system they seek to change and specifically identify transforming the way people think, as compared to what people do, as critical for success*. Through their experiences with thinking and working across perspectives they have developed an awareness that: (a) people fear change and that change involves dealing with emotions about letting go of practices that have worked well in the past, (b) a change involves helping others connect to and make sense of the guiding principles behind a change initiative, and (c) the process of bringing others into a change initiative involves framing the change vision as a trajectory that new participants are already on (i.e., giving their current way of thinking a name that is linked to the change initiative), rather than framing it as letting go of prior ways of thinking.

 *Changemakers often describe their accomplishments with humility, placing greater recognition and emphasis on how change is a collaborative and shared process and not the result of a single leader*.

IV: Preliminary Findings: Radically Transparent Research

In this section we summarize early insights from our experiences with radically transparent research.

 *Living the tension of having shared goals while honoring individual goals*. Our team came together over time and each member had specific goals in mind. Some wanted to understand the process of educational change and characteristics of STEM change agents, and others wanted to analyze qualitative data in a team context. While some described the first months of the project as having a “messy start” because of the diverse expectations for the project, we currently believe that a shared purpose is taking shape in which each member is still able to pursue a personal goal.

 *A flexible and open participation structure is both possible and beneficial*. As our team evolved with some members joining and others leaving due to other priorities, the extensive documentation required for radically transparent research appears to support new members with catching up quickly and old members staying up to date remotely. One interviewee provided feedback that he is finding the process of watching us analyze the transcripts fascinating, and others are interested in observing our process or even participating.

 *Both traditional and radically transparent research approaches involve minor modifications to the raw data*. Traditional research often involves de-identifying the raw data, which may result in losing useful information. Similarly, this research approach involves allowing interviewees to make minor modifications to the raw data to minimize the risk of publicly sharing identifiable data, which may also result in losing useful information.

 *There is little precedent for radically transparent research in terms of policies for conducting research with human subjects*. There are many issues to consider about minimizing risk and protecting the privacy of research subjects. However, our Internal Review Board (IRB) has experience with creating a public and identifiable dataset OR using public datasets for research, but not BOTH scenarios together. The only process we have available is to first obtain approval for collecting the data, which includes obtaining letters of voluntary consent, and then obtain a second approval for opening up the dataset, which also includes signing consent forms. We anticipate that our experiences can inform policies for research that sits at the boundary of research and practice.

V. Future Work

We are still analyzing the data and working through the challenges of a radically transparent approach to collaborative research. We anticipate there are many lessons to be learned through this process, and plan to continue documenting our experiences and inviting others into our public workspace.

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VII. References

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