Documenting the Sustainability of Innovations in Schools:
Collaboration to Disseminate our Challenges and Successes

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Abstract

An e-community of participants is being established to collaborate on a design to study and document the sustainability of innovative practices in educational technology. Such a community can recognize the unique areas of interest that each member brings to the effort. This paper reviews models that have been used successfully in the past and proposes a model that is collaboratively constructed and tested in the coming year by members with intent to report on lessons learned. The rationale, design, and theoretical framework of these multiple studies or design projects would be the common elements to connect the community of researchers within this project of determining how to document and evaluate the sustainability of innovative practices in educational technology. While each researcher's context remains unique and identifying traits remain intact, this collaborative research can facilitate the development of a dynamic and practice-defined model to document and assess the benefits and challenges of technology integration or innovation adoption, which remains an ongoing need in the research community. This paper provides a framework for research and suggestions for establishing a springboard to develop and maintain this research community.

Proposing Collaborative Research on Innovation

"Numerous studies have documented that it is difficult to scale up promising innovations from the fertile, greenhouse environments in which they were conceived to the often barren contexts that exist in public schools..." (Dede, Honan & Peters, 2005)

"Adapting a locally successful innovation to a wide variety of settings--while maintaining its effectiveness, affordability, and sustainability—is very challenging." (Clarke & Dede, 2009, p. 353)

Educational leadership research describes the need for decentralized decision-making and institutional flexibility to encourage innovative practices (Ellison, 2009, Goodwin, Lefkowits, Woempner, & Hubbell, 2011, Knight, 2011, Lezotte & Snyder, 2011). Teachers and administrators can benefit from supports to implement such changes, supports that document the manner in which innovative practices are implemented and also evaluate the outcome of these efforts. Ellis and Goodyear (2010) describe the concept of ecological management, an ongoing oversight by all members of an educational community “to develop and articulate self-awareness” (p. 111) of individual action and group procedures to achieve the goals and mission of the educational institution. They argue that sustainability of new initiatives can be achieved through ecological management, an understanding of “[institutional] planning [and structures] in a context of uncertainty brought about by rapid and challenging changes in ways of encountering and working with knowledge” (p. 111).

Sustaining new initiatives in educational settings is not a new goal. Rogers (1995) formulated a theory called "the diffusion of innovations" to explain the variances in the adoption of new strategies and technologies in various kinds of communities. While his early research focused on farming and third world communities, his theory has been applied to other areas such as educational and business communities. When desktop computers started penetrating businesses, researchers investigated initial resistance. Davis (1989) explained the Technology Acceptance Model (TAM) to identify specific factors such as perceived ease of use and perceived usefulness
Innovative practices live and die in classrooms. Dede (2011) suggests that transformation of educational practices and settings can occur when educators engage in the developmental process of scaling up and investigating (documenting and evaluating) innovative strategies and interventions under varied challenging conditions and factors. He describes a developmental process of scaling up and a transforming model of technology integration. He also suggests revising how we look at the integration of technology to better meet the needs of users. As he states, "...large-scale educational improvement requires more than innovations that work only in unusual circumstances and advances in theory; we must design and validate interventions that work at scale under a variety of adverse circumstances. Only this type of innovation will result in widespread usage of technology to empower learning and teaching." (p. 11)

Bell, Schrum, Thompson and Bull (2008) emphasized the need for rigorous research design and studies that investigate the use of technology, considering the interaction of technology with content and pedagogy, within a defined understanding of student learning. This collaborative research study seeks to create a supportive network of parallel studies, unified through a rigorous research design, to investigate how specific, technology-based innovative strategies and innovations impact teachers and students. Such knowledge building (Scardamalia & Bereiter, 2006) efforts have been recognized in the literature as an effective means of solving problems and benefiting society. Much like prior research established ongoing communities of practice (Wenger, 1999) to document transformative changes in teachers’ methods and perspectives on technology’s impact on teaching and learning (Cranton, 2006; King, 2002; Schifter, 2008), this proposed supportive network of parallel studies intends to enact a developmental process to investigate, document and analyze diverse technology-based innovative practices and strategies. This conference session aims to formulate and create a research team that provides the support for documenting and evaluating innovative practices as they are implemented in classrooms. Our research goal is to ascertain characteristics and contextual factors that supported the implementation of a range of innovative practices, in varied educational settings (geographic, age/grade level, content area), identify constraints and determine future research directions and modifications to the research design, framework and model used for analyses.

During a conference session, participants in this community of practice will brainstorm ideas for creating a model and research design to use in studying their particular implementation of a technology-based instructional innovation. Each participant will have a voice in this research model and study design. By sharing our voices, we can initiate this line of collaborative research and pilot or test this model to extend the recent work described by Dede, Honan and Peters (2005) and apply the developmental process to study and nurture the sustainability of educational technology innovations (Dede, 2011). If we experience success or overcome some preliminary challenges, we may seek to invite others to join this community of researchers.

The only commonality across these parallel research projects will be the collaborative study design that is arrived at through researcher consensus. Each researcher’s context and focus of the study will remain unique and its identifying traits remain intact. The rationale, design, and theoretical framework of these multiple studies or design projects (Bruce, 2007) will be the common elements to connect the community of researchers within this project of determining how to document and evaluate the sustainability of innovative practices in educational technology. This paper provides a foundation, a springboard to develop and maintain this research community.

Review of Theories and Models

A few theories for the development of sustainable practices integrating technology in classrooms exist and appear to need further development or testing by practitioner-researcher teams. Researchers investigating the sustainability of innovative interventions and strategies note that variances in their contexts and other environmental factors have often undermined success once they are transferred to other settings (Clark & Dede, 2009). Jacobson and Reimann (2010) suggest that iterative evolution of the design and the continuous revision of relevant decisions (such as how to use resources, technologies and pedagogies to meet students’ instructional needs) are critical to...
sustained innovations. Such innovations yearn to be documented, investigated and evaluated in a rigorous manner so their benefits for students and teachers can be fine-tuned, extended over time, and expanded to other locations.

This section reviews research models that have been or could be used to describe the sustainability of innovative practices, with the goal of defining a more unifying research design and model. So many of the underlying factors in these models have become variables for analysis that the design and underlying theories should serve as the source for rigor in this proposed sequence of parallel studies.

Clark (1968) proposed four models for institutionalizing innovations (defined here as new knowledge that produces structural change) in higher education:

- The organic growth model reflects the stages and processes of higher levels of institutionalization, professional functions & activities, and defines the status of innovation & intellectual boundaries, emphasizing the need to create institutions to learn innovation
- The differentiation model reflects the need to specialize in tasks due to increasing knowledge and demands for accomplishing much in large institutions
- The diffusion model reflects five consecutive stages: knowledge, information collection, evaluation, trial, adoption. In this model, some individuals become agents who distribute the innovative practices to others within and outside of the institution; unstratified
- The combined-process model reflects the idea that innovation develops inside and outside of the institution, organically yielding disciplines. It acknowledges the hierarchical structure of institutions, and illustrates that organic growth and hierarchical structure feed one another to yield institutional change that institutionalizes the innovation

In more recent literature, other models have been proposed, based on theories and on analyses of specific studies of technology integration efforts in classrooms around the world (Kopcha, 2010; Owston, 2007; Zhao, Li, & Frank, 2006). These proposed models can offer us a common perspective and method for engaging in parallel analyses of technology-based interventions or technology-supported pedagogical strategies whose implementation is long-term, and merit consideration as sustainable practices. Clark's four models appear to serve as the foundation for specific aspects of these more recently developed models to analyze technology integration practices within educational settings. Clark recognized the need to define the institutionalization of innovative practices, the reality that context or setting will encourage variation in implementation and design of innovative practices, and that sustaining innovation will evolve over time.

Owston (2007) proposed an explanatory model based on his analyses of SITES-2 International studies of innovative uses of technology in K-12 settings. He provided an operational definition of sustainability of the innovation (implemented for more than two years without extra fiscal resources) and of transferability (innovation adopted in its essential form by another grade in that school or district). He also identified contributing and essential factors impacting the sustainability of the innovations described in these selected SITES-2 studies. Like Clark, Owston recognized the need to define sustainability and that institutional traits impact ongoing implementation of innovative practices where technology becomes a key aspect of educational settings and instructional practices.

Zhao, Li, and Frank (2006) proposed an ecological analysis model to identify and understand what happens as innovative practices and uses of technology are introduced in classrooms. Like Owston, Zhao, Li and Frank recognized the impact of specific factors and mindsets that encourage technology integration and innovative practices in K-12 classrooms. Identifying these factors and mindsets, while nurturing and documenting the evolution of the ongoing, multi-directional interactions within classrooms, are necessary to understand and evaluate the impact of these innovative uses of technology and pedagogy to benefit students. Like Clark, Zhao, Li and Frank recognize the need to study the dynamics and interactions that encourage and support innovative practices within (and adjacent to) educational settings, or how the innovation is diffused (experienced, embraced, adopted, rejected) among all members of the educational community. It is through this complex process of analysis that researchers can determine the impact, viability and sustainability of technological and pedagogically innovative practices.
Kopcha (2010) proposed a systems-based model to describe how mentors have key roles to support teachers in their use of technology as they evolve their pedagogy and vision of effective instruction. He anticipates that researchers can pinpoint tasks, processes and cultural underpinnings which nurture professional development where teachers become increasingly comfortable with and gain expertise to incorporate innovative practices and uses of technology with minimal disruption to classroom cultures. Implementing Kopcha's model (to ascertain its value) appears to be the next step. Like Clark, Kopcha recognized the need to identify the gradual evolution of processes to address the cultural and social/behavioral aspects of how people learn and adopt new ways of learning and communicating. A desire to document sustainable instructional and pedagogical practices supported through effective technology integration continues to be explored and emphasized in more recent research (Bruce, 2007; Dede, 2011; Greenhow, Robelia, & Hughes, 2008).

Greenhow, Robelia, & Hughes (2009) suggested that research on “bridging youth’s formal and informal learning with participatory media” (p. 248) is needed and identified potential questions or areas to be addressed. However, it was their focus on “changing the way academics engage in scholarship” (p. 252) that lays the foundation for this paper and this proposed collaborative research project. Such projects can refine and develop the research skills and methods that we use as a scholarly community to capture descriptions or evidence of these novel approaches which students use as they access technology inside and outside classrooms to communicate, investigate and share their understanding of content and document their new knowledge, as recommended by Scardamalia and Bereiter (2006).

The theories and models we review in this paper can serve as the basis for a collaboratively constructed model that we can use for our professional growth, our particular specialization or focused purpose, and stages or processes. These models also include our current awareness of the interaction of many factors, within and outside of classrooms, that impact the students and teachers, and the learning or developmental growth, whether cognitive, interpersonal or behavioral. Moreover, these models and theories potentially facilitate the sustainability of innovative practices and strategies in classrooms and transformative educational settings.

Proposed Research Plan

The proposed plan is to gather over the next 11 months the collective experiences of researchers acting independently to implement an innovation in their unique settings. These experiences should include:

1. Enablers encountered during the year
2. Constraints
3. Which aspects of the research model worked well and which ones need modification for sustainability
4. Characteristics and contextual factors that supported the implementation of the innovation
5. The evaluation process of the implementation of the innovative practice(s) and/or strategies

The evaluations should include those data collected throughout the implementation process, and should focus on the impact, value and merit of the innovative practices and strategies under investigation during these parallel research studies. These data will support the rigor of this group of parallel studies linked by a common research design and theoretical framework.

Proposed Methodology

A wiki has been established for the exclusive use of participants in the research discussion. Each participant will be able to access the wiki and document their own work, contribute documents as attachments, recommend other references, and leave comments on all pages of the wiki. It is hoped that this community of participants agree to collaborate on a design of how to study and document the sustainability of innovative practices in educational technology, while recognizing the unique areas of interest that each member of this community brings to this forum/discussion.

The methodology for documenting our group's collaborative work after the conference will need to be negotiated around the following questions:

1. What will be each participant's commitment to implement innovation in their unique environment?
2. What should be posted, and should each participant have his or her own page?
3. How often will participants commit to posting progress and outcomes to the wiki?
4. Who will review the research progress, or what will be our commitment to reviewing each other's work?
5. What is the projected timeline and some milestones for conducting this research?

Proposed Evaluation Methods

To maintain and increase rigor of any research project, the role of evaluation of the studied technology-supported innovative practices and strategies will inform the study design. A clear statement of research goals and questions lays the groundwork for designing the study and aligning the purpose of the evaluation with its study design. Employing a systematic approach and investment of time to explain the findings can yield evaluations of projects, which are viewed as well-designed and beneficial. It is equally useful to ascertain how members of the research team will measure (1) the process for studying the impact and investment in technology-based innovative practices or interventions, and (2) the indicators to determine if and how the technology-based innovative practices or interventions yielded benefit and value within the studied educational settings (Frechtling, 2002; McCawley, n.d.).

Additionally, Davidson (2005) urged evaluation team members to (1) define relative merit, practical significance, and benchmarking, as well as (2) recruit resources that support effective evaluation of projects and programs. Of greatest interest in this proposed research study, would be the determination of: (1) the expertise-based values that inform the evaluative conclusions and (2) the list of truly good criteria to evaluate outcomes and actions during implementation of the technology-based innovative practices and strategies. Most importantly, Davidson suggested that the process of evaluation is viewed as feasible and accepted as a necessary aspect of implementing innovative practices in educational settings.

Anticipated Results

As researchers, we can determine which aspects of these proposed models resonate to design a study to measure and describe the capacity of an innovative use of technology in educational settings to be sustained over time. How can we define sustained use of an innovation? What criteria would we use to measure and describe its sustainability? How can we determine an innovation’s benefit or impact over time? Evaluating the outcome of using a specific innovation with students is an equally important aspect of this proposed study. Finally, the study should attempt to isolate (1) factors promoted the innovation’s implementation and (2) the realities that challenge the viability of the innovation in its educational setting.

During a collegial discussion in 2002 of approaches and practices surrounding managing knowledge within educational institutions, Petrides and Nodine (2003) noted that it takes time for educators to develop the skills and processes that guide effective data collection, sharing and analysis that impact decisions. This discussion provided seven practical suggestions, as summarized below:

1. Build on the vocabulary and practices of the organizational culture.
2. Focus on organizational members and their needs, pinpointing and following the energy sources within the organization.
3. Make explicit the processes and patterns for exchanging information and knowledge building.
4. Technology supports this process; it does not guide the process.
5. Fine-tuning procedures is the path to improvement of student learning and outcomes, the desirable goal of such efforts.
6. This is an iterative process that requires time, documentation, and reflection.
7. The larger picture should influence the process and strategies taken to get there.

Petrides and Nodine also emphasized that for effective knowledge management of educational initiatives, collaboration must be balanced among three elements: (1) practices for building relationships, (2) strategies for sharing knowledge, and (3) the processes or systematic approach needed to implement the innovation. The practices should actively engage a range of individuals to build relationships, which can yield communities of practice. The strategies need to document and exchange data, methods and ideas needed to reflect the strengths of the people in
the collaboration and goals of the innovation. Finally, processes need to be developed for implementing innovative practices using supportive technologies. The achieved balance is recalibrated as the process matures over time. Ongoing use of supportive technologies to connect the participants or researchers so useful information is accessible, exchanged and tracked is equally vital for implementation success. A major goal of this research is to determine such guidelines, and to establish the format of our supportive technologies so our idea and data exchange is accessible and facilitates the tracking and exchange of ideas as we create knowledge about specific interventions' implementation and sustainability within a specific context.

This proposed collaboration of innovative implementations holds the promise of creating a strong support for those who seek a solid theoretical foundation and model for doing so. Through a common research design, rigorous evaluation and faithful reporting of enablers and constraints encountered during implementation and sustaining efforts, this community can enjoy the kind of knowledge building it takes to solve "wicked" problems and to positively impact students. By combining our strengths and sharing lessons learned with the larger community, we can test our collaborative model and provide a foundation for additional transformations needed to create an ecology of learning that incorporates sustained innovative practices that work.

References


