Faculty Development as Process: Perils in Evaluation

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Abstract

Interactive teaching strategies have become increasingly important within undergraduate STEM education. Even when faculty have the will to change, barriers can impede the adoption process. Examining how faculty change is important. This paper examined implementation of a faculty development project. The project hypotheses were that faculty who participate in a supportive teaching network will make initial small changes in their teaching. Small changes will lead to increasingly larger changes over time. The purpose for this paper was to discuss the results of a formative evaluation and challenges associated with a process-focused grant. Results indicated that aligning the evaluation methods to the grant intention is important.

Keywords

Program Evaluation, Faculty Development, Change Processes, Interactive Teaching, Undergraduate STEM Education

Introduction

Interactive teaching strategies to engage students in active learning have become increasingly important within undergraduate STEM education. However, barriers can impede designing or implementing interactive teaching strategies within STEM even when faculty have the will to change. Intentional study of how faculty change is nascent. Therefore, it is important to examine faculty change processes[1]. In this study, I discuss the evaluation of an NSF-supported grant examining faculty development. The purpose for the grant was to support faculty as they implemented research-based interactive teaching practices. The grant hypotheses were that faculty who participate in a supportive teaching network will make initial small changes in their teaching. Small changes will lead to increasingly larger changes over time. The purpose for this paper was to discuss formative evaluation results and the evaluation challenges when examining a process-focused grant customizing implementation practices.

The grant was developed as an implementation grant of a previous study focused on engineering faculty's instructional changes[2]. Faculty development in the grant was grounded in Laurillard's (2012)[3] conceptions of teaching as a design science. Laurillard contended that teachers should be encouraged to examine and improve their teaching. Teachers should also be provided with a risk-free environment within the context of a community in order to articulate and share their pedagogical designs. Pedagogical articulation provides the means for faculty to adopt or build on others' designs, without having to "recreate the wheel." The community context provides an opportunity for risk-taking within instructional design and to receive non-judgmental feedback.

Hjalmarson and Nelson (2014) developed design principles for faculty development across other STEM fields[4]. The principles were grounded within Laurillard's conceptual framework and based on results of the pilot study. (See Figure 1.)[4] The principles addressed Sustainability, focused on Incremental change, Mentoring faculty, was driven by the needs of the People participating in the grant, and addressed the Learning Environment for faculty (SIMPLE). Faculty were encouraged to document their process in design memos, which could be shared with other faculty. (Design memos can be found on http://simple.onmason.com/category/design-memos/).

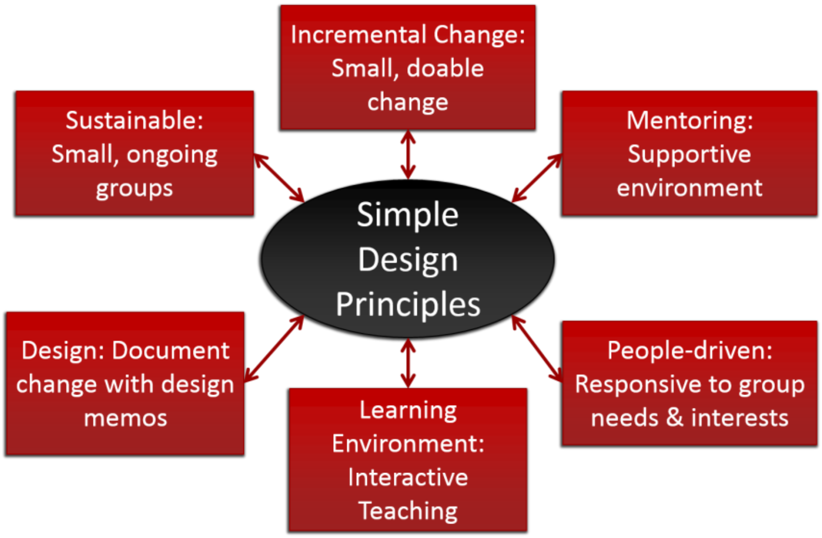

Figure 1. SIMPLE Design Principles[4].

The purpose for the evaluation for this paper was to examine grant implementation. This stage of the evaluation was formative, focusing on implementation and progress[5].

Methods

I used a qualitative evaluation design[6]. For this paper, I focused on the first year of GL and TDG implementation. I examined fidelity of implementation (FOI)[7]. FOI is the degree to which a program was implemented as intended[7]. I examined FOI in relation to the SIMPLE principles.

Participants. The units of analysis were GL meetings and GLs and TDG reflections about the program based on their participation in year one. There were seven GLs for six TDGs. Three white males and four white females led departmentally-based TDGs. Disciplines included astronomy and physics, biology, civil engineering, electrical engineering, forensic science, and mathematics. There were two group leaders for biology due to the size of the group. There were 31 participants in the TDGs, 16 females and 15 males, 24 faculty and seven graduate teaching assistants (GTAs).

Data Collection. Eight GL meetings were conducted during year one and recorded. The transcripts were analyzed. The evaluator also observed the meetings. Thirty-eight GL implementation logs or "check-ins" were collected during the eight group leader meetings. Sample protocol from the implementation logs included: (a) "What progress have you made so far with your TDGs, such as meetings held?"; (b) "Share one thing that is working well in your facilitation of your TDG."; (c) "Share one thing that you are struggling with in your facilitation of your TDG."

Interviews with six group leaders were conducted. One group leader dropped out of the project due to personal concerns. Twenty-two interviews were analyzed out of the 26 conducted with TDG participants. Four interviews have not yet been transcribed. The five participants did not participate in the interviews. Sample interview protocol included: (a) "What were your leadership challenges?" (for GLs); (b) "How did your experience with the group change your own teaching (for GLs and TDGs)? (c) What suggestions do you have for next year (for GLs and TDGs)?

Design memos submitted by faculty were analyzed (N=10). Two tenured professors, four teaching faculty, and four graduate teaching assistants submitted memos. Memos were submitted across a range of STEM content including astronomy (N=1), biology (N=7), environmental science and policy (N=1), and hydraulics (N=1). Design memo prompts were geared to elicit directions that faculty might give to other faculty in order to implement the interactive teaching strategy. Samples of the prompts on the design memos included: (a) "What is the strategy?"; (b) "How is it useful for students?"; (c) "What do I need to explain to my students about this new classroom activity?"

Data were coded using emic and etic analyses[8]. The emic perspective provides a method for the evaluator to understand how program participants or the stakeholders involved with a program perceived the program. Open-ended questions provide participants to describe their thoughts about how the program worked. By allowing the individual to frame their experience and elaborate on it, the evaluator understands that individual's cognitive model of the program. Emic coding uses the language of the participants to generate the codes[8]. Sample thematic codes for emic analysis included "solving problems" and "assessment". The etic perspective provides a method for the evaluator to explain the participants' cognitive models within the context of educational or social sciences applicable to the program. Thus, the evaluator provides an external framework to understand the multiple points of view or variability in actions. I used the SIMPLE principles to generate etic codes for discussion of TDG group adherence to the principles to examine FOI[7,8]. Only the etic codes related to incremental teaching changes (I), mentoring (M), and people-driven (P) are reported here as related to evaluation challenges.

Findings

Incremental Change. During year one, ten participants completed design memos, including three group leaders, three faculty TDG participants, and four graduate students. Of the faculty completing design memos, four were term faculty with primarily teaching assignments. The other two faculty were tenured. Documented teaching strategies included asking students to develop presentations about a research topic (N=3) to support research skills; formative, in-class assessments to practice problem solving (N=3); partial classroom flipping (N=1) to provide in-class time for lab activities; and mini-projects (N=1), Socratic questioning (N=1), and hands-on modeling activities (N=1) to support development conceptual understanding.

Mentoring. The principal investigators (PIs) provided a foundation for faculty development by engaging discipline-based group leaders (GLs) to lead teaching development groups (TDGs). For example, the PIs formed a GL group to model the TDG structure the semester prior to the start of the TDGs, and continued with monthly GL meetings during year one of TDG implementation. The monthly meetings allowed the PIs to provide a supportive network for GLs to discuss their own teaching, modeling a risk-free environment. One GL indicated, "…a support network is what you're building – that's what I enjoyed most about it." Another GL stated, "…it's been good to have that group and those connections." Other GL participants discussed that the PIs created a supportive environment to exchange ideas, share experiences, and discuss and reflect on teaching. The PIs also provided a scaffolded structure to assist the GLs in their role. GLs made consistent statements in the group meetings indicating that they appreciated the mentoring provided by the group leaders. For example, one GL stated, "…their [the TDG group] assignment now is to pick some sort of teaching innovation. And that was actually really helpful – the list that you [PI] e-mailed me."

Implementation of the TDGs varied for the mentoring principle. For example, two TDGs included graduate students with teaching assignments. While the entire group met monthly, the graduate students met every two weeks with the GL as a faculty teaching mentor. This department intentionally designed the TDG to include the graduate students who were teaching or assisting in introductory courses. All of the graduate students were guided in trying interactive teaching methods using group strategy discussion, article reading, and journaling and discussion related to the strategies in the articles. One graduate student addressed the general mentoring that occurred within the meetings related to faculty positions, "[In] one of our journal club meetings, [there] was a discussion about an article that we reviewed and what faculty expectations were during tenure-track faculty interviews, which we all will be doing hopefully soon." Another group also included graduate students. However, the graduate students were involved with supporting faculty teaching work in a traditional faculty mentoring process.

People-driven. Implementation of TDGs varied based on the P (people-driven) of the SIMPLE principles. A facet of variation was the TDG meeting structure. The groups with only faculty members met monthly. Meeting frequency was based on faculty time and need. Two meeting structures emerged structured meetings and free-form meetings[17]. In the structured meetings, GLs applied various strategies to involve faculty in meetings, such as readings, videos or web resources, or guest speakers. The structured meetings had two variations. One variation was that the themes discussed in a given meeting were determined at the time of the meeting by the participants able to attend. The GL and other group members supported the discussions. This variation was aligned with the people-driven principle. The other variation occurred in one TDG. In this TDG, the meetings were topic-driven over the year of implementation. However, the topic was decided by the GL. This adaptation violated the people-driven principle in that it was decided upon by one person, rather than group consensus. One group led a free-form meeting. The free-form meeting topics were changed from meeting to meeting but were driven by the GL.

Discussion

The current grant acted as an incubator for faculty to adopt or adapt evidence-based teaching strategies, try the strategies, and reflect on implementation. The incremental change principle was observed in the production of design memos as an outcome for at least one member for three of the TDGs. One group produced eight of the ten design memos. One of the groups that did not produce any design memos was reconstituted for year two with a new leader emerging in the group. The other two groups did not sustain into year two. Further, the two non-sustaining groups also had variations in the mentoring and people-driven principles which violated the intention of the principles. Two group leaders decided the topic for the group, violating the people-driven principle. In addition, one of these two group leaders also violated the mentorship principle. This group leaders used the graduate students in support of her teaching development, rather than supporting teaching development with her students. Thus, these group leaders did not support the interests of the group members. Based on year one implementation findings, it appears that two process principles, mentoring and people-driven, were essential for sustainability in year two. The two groups that did not sustain also did not produce any design memos. However, another group that did not produce design memos sustained into year two.

Perils in Evaluating a Process Grant

Aligning Evaluation to Grant Vision. A challenge for this grant was to evaluate FOI while ensuring that the grant principles were supported. Common processes across TDGs were intentionally not required, which posed a challenge to identify the characteristics of successful versus unsuccessful implementation of the SIMPLE principles. Faculty change was grounded in interview data, which was self-report. Observations of meetings or classrooms could have been a data source. However, faculty were uncomfortable with observation due to its high stakes for renewal and tenure. Thus, requiring observations for the evaluation would have violated one of the key tenets of the grant, though one that was not overtly stated in the principles: a risk-free environment. The development of a teaching community occurs within a safe environment to discuss and practice new strategies, including both successes and failures[9]. Thus, one evaluation peril was examining implementation processes in a manner that aligned with the grant vision. For this grant, conducting observations would have acted as an unacceptable variation in implementation.

Examining Appropriate Outcomes. The design memo was examined as a faculty change product. However, less than a third of the participants produced a design memo during this first year of the study. Most of the design memos were from the group that included GTAs. The nature of the mentoring relationship, faculty-student, may have contributed to completion. The second outcome discussed was group sustainability into year two. Implementation of the mentoring and people-driven principles seemed to be two necessary conditions for sustainability. Production of the design memo was not a key factor as one of the groups that did not produce any memos in year one sustained. This group *did* engage in much discussion related to the incremental changes that they were implementing, specifically related to problem-solving and assessments. Interest and support for incremental change, but not its documentation, was important for sustainability into year two. Thus, discussion and structural support processes about incremental change, and adherence to the mentoring, and people-driven principles as practiced contributed to sustainability. The evaluation peril was focusing on evidence of a product, the design memo, as outcome evidence.

Conclusion

This paper examined fidelity of implementation of the SIMPLE grant principles. Variation across principles was encouraged in the grant to identify the key variations that contributed to sustainability and faculty teaching change. The principles, people-driven and mentorship played key roles in supporting change processes and sustainability. Including graduate students in TDGs was an effective variation. Time was a key barrier for faculty production of design memos. Support within a safe environment encouraged instructional change. Documentation of teaching change may take longer for faculty than for graduate students.

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Biographical Data

Lori C. Bland, Ph.D., is an associate professor focusing on assessment, program evaluation, data-driven decision-making, and research methods at George Mason University. I am currently conducting research, as co-PI on a NSF EEC grant, to develop and validate of measures of technical and professional skills acquired in informal learning environments in engineering education. I am also examining the data derived from online STEM maker communities to assess learner-driven constructs, those constructs in which learners are agentive in informal environments. I am an evaluator on a NSF WIDER grant investigating faculty use of interactive teaching strategies in STEM graduate and undergraduate education.