Insights into the Nature of Change and Sustainability in an Ongoing Faculty Development Effort

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Introduction and Background

This panel paper focuses on the study of faculty teaching development with a goal of effecting change toward broader adoption of evidence-based interactive teaching strategies. In particular, we are interested in understanding how change takes place in the context of an ongoing faculty development group. We aim to understand instructors' familiarity with and interest in interactive teaching strategies when they choose to participate and how their adoption of such strategies progresses during the lifespan of the faculty development group.

Much research has shown that student-centered, interactive teaching methods improve learning and retention in STEM with particular impact on underrepresented groups [1]. However, despite advances in classroom design for interactive teaching and pockets of enthusiastic adopters, the challenge to bridge the gap from research results to common classroom practice remains. Workshops to introduce evidence-based teaching practices are prevalent, but one-time efforts rarely result in sustained change, and hence ongoing support is needed [2], [3].

The study presented in this paper takes place in the context of the SIMPLE Design model for faculty development, which was studied in implementation over a two-year period [4]. As described in more detail in the next section, the SIMPLE Design model employs ongoing discipline-based faculty development groups. Group members learn about evidence-based strategies and are asked to select a strategy to implement based on needs they have identified in their courses. The content and structure of SIMPLE groups are largely open to determination by the group itself to allow flexibility and to be responsive to the needs of participants.

In what follows, we describe insights gained from studying the change process for six faculty development groups over two years. Results are drawn from analysis of participant interviews at the end of each year of group participation. Participants' path toward adoption of interactive teaching strategies is analyzed using the five stages of the adoption process in Rogers' Diffusion of Innovations (DOI) as a framework [5]. The five stages of adoption of an innovation as defined Rogers' DOI are:
1. Knowledge – The individual is aware of the innovation but knows little about it.
2. Persuasion – The individual is interested in the innovation and in learning more about it.
3. Decision – The individual decides whether or not to adopt the innovation.
4. Implementation – The individual implements the innovation and assesses its value.
5. Confirmation – The individual confirms the value of the innovation and continues using it.

Using the five stages above as a framework, we describe participants' interest in interactive teaching practices when they joined the teaching development group and how their participation influenced their choices around interactive teaching in future courses. Rogers' DOI was chosen because it provides a way of analyzing the stages through which individuals progress when deciding whether or not to adopt an innovation, making it well suited to studying instructors' decisions about the adoption of evidence-based interactive strategies. The framework helps

capture more nuance in the decision to adopt an innovation and the progress toward change in teaching.

SIMPLE Teaching Development Groups

This NSF-funded project implemented and studied a network of ongoing STEM faculty teaching development groups within a single university. The discipline-based groups were created in six departments: mathematics, global and community health, computer science, biology, physics/astronomy, and civil engineering. Groups typically included 4-8 participants and met on a regular basis – anywhere from once every two weeks to once a month. The purpose of the group was to familiarize participants recent research in STEM teaching and learning and to provide them with the knowledge and support to implement new evidence-based strategies in their classrooms. The guidance given to each group by the project leadership was that participants were expected to implement a new strategy in their course(s) and document the change in a design memo. These memos include why they chose a particular strategy, how they implemented it, what they learned and how they would adjust it for future use, and any tips or potential pitfalls others should be aware of when implementing the chosen strategy. Design memos were originally conceived as an artifact for dissemination to other instructors interested in adopting new practices, but they also served as useful reflection tool for the writer. Beyond this guidance, groups had significant freedom and flexibility to operate in the way they felt was most valuable to their members.

Each group was facilitated by a group leader who either received a semester of training prior to leading the group or had been a member of a group before assuming the leadership role. Group leaders were identified and recruited by the project research team and were known to have prior experience with active learning and other evidence-based teaching methods. The leader was responsible for recruiting group participants, coordinating meeting times, and identifying content/agendas for meetings.

The purpose of the teaching development group was to help participants learn about interactive teaching practices and share their experiences, as well as to provide support and accountability for group members in trying new teaching techniques. Meeting structure and content varied significantly across groups but generally included a combination of learning about existing strategies through books, articles, etc. (most commonly used were [6], [7]), and discussion participants' teaching challenges/needs and strategies they might use (or had used) to address them. This is similar to a professional learning community model used in other projects [2], [3] where members develop understanding together and are working with common interests for their teaching even if they are teaching different classes.

Faculty development groups were designed to follow the SIMPLE principles, which had been developed and refined during a prior project that studied a network of ongoing faculty learning communities in a single discipline but across multiple institutions [8]. The SIMPLE principles are: Sustainable – groups are small, ongoing, relevant to participants; Incremental change – participants identify and implement small, manageable changes that can require only modest time and are not overwhelming; Mentoring – participants receive mentoring from the group leader, as well as peer mentoring form other members of the group; People-driven – participants

select strategies to implement based on their own classroom needs, and group meeting content/structure is determined based on the collective needs of the group; Learning Environments – groups are focused on implementing changes toward interactive teaching and student-centered learning. The Design in the SIMPLE Design model refers to the fact that changing teaching is an iterative process in which implementation is followed by assessment, reflection, and revision [9]. Both design memos and interaction with group members are intended to support the iterative teaching design process.

Methodology

The SIMPLE project was conducted at a large, public, research extensive university. Teaching development groups in the six disciplines listed above were implemented with an intended active period of at least one year. Monthly group leader meetings and annual interviews with participants were continued for two years. One of the groups was not formed until the second year and hence was monitored for only a single year. Two of the groups made significant changes between the first and second year, one in terms of the disciplines represented and another in terms of the focus and participation. In several cases, group leadership changed from year one to year two, though group focus remained the same. Instructors participating in the teaching development groups had a variety of roles, including tenure-line, term (teaching only), and occasionally graduate student instructors. While all taught STEM courses, class size ranged from 10 to 300, and class level ranged from introductory (freshman) to graduate-level. Class format also varied, from traditional lecture hall to active/collaborative learning spaces to hybrid or fully online offerings.

The insights we share in this paper are drawn from data collected through one-on-one interviews with group participants. (Group leaders were also interviewed, but the content of their interviews focused more on their leadership roles and less on their individual trajectories of change, so we chose not to include them in this analysis.) Interviews with group members were conducted at the end of the first year of the study (teaching development groups had been active for approximately one academic year) and at the end of the second year of the study. Sixteen group members were interviewed at the end of you year one, and 25 group members were interviewed at the end of year two. In most cases, group participation changed fairly significantly from year one to year two, often due to instructors joining/leaving the university or to changes in scheduled that affected instructors' ability to participate. As evidence of this flux, of the 25 group members interviewed at the end of the second year, only five were also interviewed at the end of the first year. Hence, the interviews analyzed represent 36 distinct individuals.

Interviews were conducted using a semi-structured protocol [10]. A set of questions to be asked to each interview participant was established in advance. These questions were asked, and when needed, the interviewer included further probes or follow-up questions to elicit more information about the interview participant's response. The interview included questions about motivations for participating in a SIMPLE group, their degree of participation in the group, their approach to teaching (teaching philosophy), new techniques they had tried or planned to try, and feedback they had about what was most useful and how to make the groups more valuable to participants. In a first round of coding, interview transcripts were coded using the five stages of adoption from Rogers' DOI framework. Responses to questions about current teaching practices and new

strategies considered and/or adopted were analyzed for stages of adoption using a theoretical coding process [11]. Based on the first round of coding, it was determined that the interview responses did not provide information that allowed for identification of the Decision stage. Hence, in a second round, responses were coded according to stages 1, 2, 4, and 5 of the adoption process.

Results

Participation in a SIMPLE teaching development group was entirely voluntary. Group leaders recruited members and encouraged participation, but participation was not mandated by department chairs or any other individuals in positions of authority. As such, instructors who chose to participate typically had at least some interest in evidence-based interactive teaching practices. In interviews, participants were asked to describe their current teaching style, and their response was used to understand their stage in the DOI process with respect to adopting interactive teaching practices. Not surprisingly due to the voluntary nature of participation, all but five of the participants interviewed had reached at least the persuasion stage. In fact, 18 of the 36 distinct individuals had reached implementation or confirmation with some set of active learning strategies in their courses. Participants at the persuasion stage were still teaching via a standard lecture format, but all recognized the need for more engagement in their courses, and some had begun to try to introduce it by, e.g., pausing more often for questions. They were motivated to participate in the teaching development group in order to become familiar with possible strategies for student engagement and to learn from fellow instructors.

Since the vast majority of participants were interested in pursuing evidence-based interactive techniques when they joined the group, we focus our analysis on studying their process of adopting a new interactive strategy in their course(s). Of the 36 first-time interviews, 33 provided responses about whether they had implemented a new strategy in their course and/or whether they were considering any new strategies as a result of participating in the faculty teaching development group. Of the 33 participants who discussed adoption of new strategies, 13 had reached the implementation stage. They had implemented, or were in the process of implementing, a new strategy in one or more of their courses. Some participants had gained ideas from resources studied the group, while others learned of new strategies from fellow group members. Nearly all respondents in the implementation stage indicated that they planned to use their chosen strategy again in future teaching and that they had identified ways to revise the strategy to improve its effectiveness in the context of their course.

Thirteen participants fell in the persuasion stage of DOI. The participants in this group had identified strategies of interest for addressing needs in their classes but had not yet implemented them or committed to implementing them. They expressed an interest in learning more about how to implement the technique and indicated that they didn't yet understand it well enough to implement it. For example, when asked what interactive strategies they might consider, one participant responded, "The only strategy I'm kind of very interested in right now is flipped classroom, but I can't make it work in my head entirely for the lecture yet, so I think I just have to think about that more." Many pointed out that, since they were in the middle of a semester when they learned about new strategies, they could not implement them immediately and had

time to think more about how to best introduce the new approaches before their next teaching term.

Five participants remained in the knowledge stage. These participants indicated that they did not gain any ideas for implementing interactive teaching strategies from their participation in the teaching development group. In one case, a participant shared that they were already familiar with the strategies discussed and learned nothing new from the group, noting that having an expert in STEM education in the group would have been valuable to provide deeper insights. Another participant indicated that while they didn't identify any new teaching strategies, they did form valuable community with other people in their department who were interested in teaching.

Finally, based on their interview responses, two participants reached the confirmation stage. One had implemented a video review and lecture supplement with great success and was committed to continuing it in future course offerings. The other participant integrated demos and group problem solving into what had been a traditional lecture. They had taught the course in both the spring and summer terms prior to the interview and had refined the new class components to their satisfaction.

Of the five participants who were interviewed twice, four discussed changes to their teaching in the second interview. Two had reached the implementation stage; one had not discussed teaching changes in the first interview as admin duties had kept them from teaching, and the other had reached the implementation stage in year one but was implementing a new technique in a new course in year two. One participant, who had not discussed teaching changes in the first interview, had reached the persuasion stage by the second interview. Finally, one participant who was at the implementation stage for the first interview had reached the confirmation stage with the originally adopted strategy and was helping others use it but had not adopted any new strategies in the second year of the group.

Discussion

In drawing insights from the results described above, it should be noted that the 36 first-time interview participants had been part of a teaching development group for no more than one year. Those who reached implementation stage with a new teaching strategy integrated that strategy into their course during their second semester of group participation. Given that learning about evidence-based strategies, identifying those that might work to address needs within a particular course, and adapting/specializing a strategy to match course structure and content take time, implementation after only a few months of teaching group participation is quite rapid. It is reasonable to expect that most participants would be in the process of identifying and learning more about strategies but not yet implementing them in courses.

The aim of the teaching development is for participants to engage in sustained implementation, and hence they must move beyond considering strategies. This leads to natural questions about the necessary lifespan of a teaching development group. Would most participants move from persuasion to implementation if they participated in a second year of the group? Given that many participants in year one did not continue in year two, questions arise about what motivates participants who do continue and how the teaching development group model and structure

could be modified to encourage longer-term participation. The model is designed to be flexible and accommodate different group aims and schedules, so formal deadlines were not imposed on (or suggested to) the group leaders. It would be worthwhile to study whether a more structured model with a syllabus and suggested deadlines would encourage longer-term participation and/or more rapid progression to implementation.

It is also worth noting that the degree of adoption of interactive strategies varied quite significantly across participants. Some implemented low-effort, low-risk techniques such as introducing index cards for students to write questions and concerns; others engaged in a full flip of their classroom. Also, many of the participants indicated that they are comfortable employing interactive strategies in small, higher level courses or laboratories but continue to use primarily lecture when teaching large, entry-level courses. How can SIMPLE groups be adapted to address the challenge of translating these strategies to large courses? Would it be valuable to create SIMPLE groups that focus on this challenge, perhaps across disciplines?

Many of the teaching development group participants had begun using interactive teaching strategies recently (1-2 years) before joining the group. It is likely that because interactive teaching was relatively new to them, they were motivated to find ways to increase their knowledge of evidence-based strategies and develop a community of like-minded colleagues. Ongoing work could consider the role of long-term users of interactive techniques in SIMPLE groups, particularly with respect to the mentoring principle.

An additional area for future study is the involvement of instructors still at the knowledge stage, or even before. In the current structure, nearly all voluntary participants are interested in learning and potentially adopting interactive teaching strategies, and hence a large swath of the teaching population is not reached by this effort. What elements could be introduced to recruit instructors not yet motivated to learn about these techniques? Future work could consider informal talks from participants who have implemented new strategies or workshops that precede the start of new SIMPLE teaching development groups to introduce instructors to the goals of the group and invite them to participate.

Acknowledgements

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