

# Faculty online learning communities to support physics teaching

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In conjunction with the Physics and Astronomy New Faculty Workshops (NFW), we are investigating mechanisms to further support faculty to improve their teaching. Previous work indicates that many faculty return from the NFW eager to integrate new ideas in their classrooms, but many struggle due to lack of ongoing support, and subsequently revert back to traditional instruction. We are investigating ways to provide such support by offering Faculty Online Learning Communities (FOLCs) to a subset of the NFW participants. The goal of the FOLC is to develop a community of self-reflective teachers who can support each other’s long-term growth as educators. We base the design of the FOLC on a set of principles that emerge from several areas of literature, and we use these principles as a framework to understand the experience of the participants of the pilot FOLC.

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## I. INTRODUCTION

The physics education research community has developed numerous research-based instructional strategies (RBISs) and has shown them to improve student learning in a variety of contexts. The traditional method of spreading educational reforms is the development and dissemination (D&D) model, in which researchers who develop reforms disseminate them through papers, workshops, or seminars. The D&D model has been effective at creating awareness of RBISs and motivating faculty to try them; in a survey of 722 physics faculty, about 70% had tried an RBIS [1, 2]. However, the D&D model has not brought about large-scale, sustained change; of faculty who tried an RBIS, one third discontinued its use. Thus, RBISs are not widely used in physics classrooms.

Physics faculty report barriers and constraints that significantly impede their ability to implement RBISs and ultimately encourage them to resume traditional instruction [3]. The D&D reform model does not adequately address these barriers nor does it support faculty through implementation difficulties; instead, it assumes that once faculty are exposed to new methods and are motivated to try them, the reform process is complete.

The Physics and Astronomy New Faculty Workshop [4, NFW] is designed to encourage recently-hired faculty members to adopt RBISs. Attendance is a strong predictor of faculty trying an RBIS, but it is a poor predictor of faculty sticking with the RBIS [2]. Implementation barriers are discussed at the NFW, but overcoming them requires ongoing support that is not part of the workshop. To address this, we developed Faculty Online Learning Communities (FOLCs) to provide the support needed by participants of the NFW in sustaining their use of RBISs. We report on the principles that informed the design of our pilot FOLC and preliminary findings on the FOLC’s effectiveness.

## II. FOLC DESIGN PRINCIPLES AND PILOT IMPLEMENTATION

A Faculty Learning Community (FLC) is a faculty group that engages in an active, collaborative, year-long program consisting of frequent seminars and activities designed to enhance the faculty members’ teaching [5]. An FLC provides professional development in the scholarship of teaching and learning (SoTL) while building community among its participants. Evidence shows that FLCs increase faculty interest in SoTL and provide them with support to change their instructional practices [6].

FLCs are traditionally conducted in a face-to-face setting. In this project, we created FOLCs, which are FLCs in a virtual environment with participants from multiple institutions who have all attended the NFW together. The pilot FOLC took place in the spring of 2015 and consisted of nine faculty members drawn from the November 2014 NFW who were selected based on their interest and availability to attend meetings. The FOLC participants met for eight 90-minute “synchronous” (i.e., real-time) meetings between January 15 and April 30. In between meetings, they communicated “asynchronously” via a Facebook-like platform.

The design of the FOLC is based on several principles drawn from the literatures on FLCs [5, 7], organizational change [8–10], and the authors’ previous work [1–3]:

- P1 A focus on distributed expertise and group learning
- P2 Development of a strong community
- P3 Support for implementing RBISs
- P4 Respect for the time of participants
- P5 Transformation of participants into leaders
- P6 Infrastructure that is scalable and sustainable

We hypothesize that aligning the FOLC with these principles will lead to the success of the participants and the sustainability of the FOLCs in the long term. However, the value of these principles is still an open ques-

tion that we will be investigating over the 5 years of this project. Our goal here is to present the principles and possible ways that they may be related to the success of the FOLC, along with related research questions that we intend to address over the course of our study. This is necessarily a limited discussion of these principles that will be expanded upon in future publications.

**P1. A focus on distributed expertise and group learning** Traditional D&D efforts are often unidirectional, from an expert to a novice. In contrast, FLCs support collaborative relationships that allow faculty to help one another to develop, modify, and implement RBISs.

Because effective collaboration takes time to develop, FOLCs meet every other week for two semesters. In the first, the group learns more deeply about RBISs, and in the second, each participant chooses a reform to implement in their classroom and conducts a project to assess its effectiveness. This process allows participants to engage in group learning and then leverage each others experiences to better understand and implement RBISs.

The pilot FOLC only ran for a semester, so its participants did not formally engage in implementing a reform. However, the participants did request that a few meetings be dedicated for them to share their own teaching concerns and successes. Each participant shared for five minutes followed by a 25-minute facilitated discussion. This allowed the participants to use the collective expertise of the group to help them grow as teachers.

*Research questions:* What structures help FOLC participants in seeing each other as experts and are most effective at encouraging group learning?

**P2. Development of a strong community** FOLC participants must feel a sense of community, trust, and mutual responsibility in order for group learning to be possible. They begin to do so through in-person interactions at a dedicated FOLC session at the NFW. However, it is difficult to grow this community with participants scattered around the country. Thus, the FOLC communication technology has been carefully chosen to support community-building.

For synchronous FOLC meetings, the WebEx platform provides an interface that has both a “conversation” mode that features a large image of whomever is speaking and a “presentation” mode that allows for screen sharing. The conversation mode is the default used for FOLC interactions, unless the presentation mode is needed for content delivery (i.e., slides). Because participants can easily see each other’s faces, the conversation mode allows for smooth discussion and nonverbal communication that helps participants build relationships with each other.

For asynchronous FOLC communication, the SocialCast platform provides a familiar interface that is similar to Facebook and emphasizes people, conversations, and relationship-building. The participants use SocialCast to continue discussions from meetings, ask for help on their teaching, and share resources. Participants can “like”

each other’s posts, which encourages them to interact even if they are pressed for time.

*Research questions:* Can a FOLC build a robust community that lasts beyond the synchronous meetings, and what features make this outcome likely?

**P3. Support for implementing RBISs** D&D strategies often ignore the difficulties associated with implementing reforms. To navigate these difficulties, faculty need ongoing support from RBIS experts as well as from peers in a similar stage of implementation.

The FOLC is structured so that participants will implement RBISs in the second semester, but our pilot did not last that long. However, the FOLC does lay the groundwork for implementation in the first semester through presentations by experts and peer discussions on RBISs. In choosing experts, the participants decide whether they want to hear from an inventor, a practitioner, or a researcher of an RBIS (in our pilot, they almost always chose a practitioner). Each expert is allocated 30 minutes that is divided between a presentation and a facilitated discussion; participants reported a preference for sessions with more time allocated to discussion than presentation.

*Research questions:* What balance between discussions and presentations best supports participants in implementing RBISs? What activities in the second semester can help participants to implement and sustain RBISs?

**P4. Respect for the time of participants** Faculty are busy people, so teaching support programs must be a valuable investment that can help them use their teaching time more effectively in the long term.

FOLCs are moderated by a facilitator who ensures that the FOLC’s activities reflect the needs of the participants. Initially, Andy Rundquist will serve as facilitator; he has experience in a similar role as the moderator of the Global Physics Department [11]. Additional facilitators will be drawn from former FOLC participants, who know first-hand what activities would be valuable for the new FOLC cohorts.

*Research questions:* What FOLC activities do participants perceive as valuable uses of their time? Does the FOLC reduce the time required for faculty to adopt new teaching methods in the long term?

**P5. Transformation of participants into leaders** In order for the initial FOLC cohorts to develop into a cohesive large-scale community, FOLC participants must take on leadership roles. That process must be actively encouraged by the design of the FOLC.

FOLC participants are expected to share their experiences and answer each others questions; this helps them to view themselves as capable of supporting others through teaching difficulties. Participants who are particularly good at this will be asked to facilitate future FOLCs while being mentored in that role by experienced facilitators. This structure builds capacity for running

multiple FOLCs in parallel and teaches faculty how to lead others to enact educational change. Ideally, FOLC participants would also become leaders in their own departments by spreading RBISs to their colleagues.

*Research questions:* How can the FOLC support participants in becoming FOLC facilitators and educational leaders? To what extent can the positive impacts on participants transfer to colleagues at their home institution?

**P6. Infrastructure that is scalable and sustainable** Sustaining a growing FOLC community requires both the creation of new facilitators (as discussed above) and infrastructure that allows participants to continue their asynchronous communication indefinitely and that can link different FOLC cohorts together. SocialCast has the ability to handle thousands of users and to provide both intra- and inter-cohort communication. By their strong request, the pilot FOLC participants have been active on SocialCast since their final meeting, and we plan to allow future FOLC participants to do the same.

*Research questions:* What structures are necessary to achieve sustainability of the FOLC? How can we encourage participants to identify with their FOLC cohort while feeling connected to the larger FOLC community?

### III. PRELIMINARY FINDINGS

Data collected on the first FOLC includes pre-participation surveys (8 of 9 participants), mid-semester interviews (9 of 9 participants), synchronous meeting recordings (7 of 8 meetings), and asynchronous communication via SocialCast. In his role as facilitator, Andy Rundquest kept a reflective journal of the FOLC's progress. Finally, the entire research team met regularly to reflect on and refine FOLC structures; most meetings are recorded. Major themes (in **bold**) that emerged from a preliminary analysis of the interviews are described below; the related principle is noted in parenthesis.

#### A. Benefits Identified by Participants

The participants strongly enjoyed the FOLC; all of them spoke favorably of the experience. The group intends to continue to communicate regularly on the SocialCast platform. Additionally, participants who missed a synchronous meeting reported that they watched the meeting recording. These are indications that the participants **found value in the FOLC activities** (P4).

Several participants mentioned that they appreciated **discussing their teaching with others who were not from their home institutions** (P1, P2) and did not hold power over them. Their peers' experiences helped to normalize their own as new faculty members and provided perspectives different from those of their colleagues. As one participant stated, "*People seem to*

*be reasonably candid about what is going on in their departments which seems like a nice advantage of an online but private community . . . It's a way of saying what is going on in another department without having to be super political and polite and not piss anybody off."* Another stated, "*I wanted an outside pool of people that I could talk to that were more at my career stage and that had perspectives from outside this institute."*

Participants also mentioned valuing the FOLC because it helped them **learn more about RBISs** (P3). As one participant put it, "*I do have questions about different pedagogical strategies, and the idea that I can talk to somebody who is utilizing them is a nice idea."* Another participant described the FOLC as "*an extension of the [NFW that allows] us to focus on the topics that we're most interested in or maybe have the most concerns about."* Thus, participants viewed the FOLC as a way to continue the learning process that began at the NFW, but with more direct control.

Many participants were happy that the FOLC provided a **community of mutually supportive peers** (P2). One participant stated, "*Although we are from different kinds of schools, we are all new faculty members teaching all kinds of courses, and I think we have a lot of common languages to talk to each other."* Another highlighted the reciprocal nature of the FOLC community: "*I feel like I'm able to go to the group when I have a question or when I have a need and they might be able to give back, but I also feel like there's an opportunity to give back to them as well."* This same participant pointed out that feeling uncomfortable with asking for help can be mitigated by a strong sense of community: "*It takes a certain amount of willingness to be vulnerable to ask questions . . . and to say, 'I have no idea what's happening. Can you explain this?'* . . . *The fact that [the FOLC is] informal makes it more comfortable for me because it makes me feel like I'm with peers."*

Participants also reported that the FOLC **helped them to stick with changes in their classroom** (P3) that they might have given up on otherwise. One stated that, "*It made me more confident about pushing through some of the changes that I was trying to make . . . I feel more confident putting things into [my syllabi] that I might not have otherwise because I know I can go back to FOLCs and say, 'I'm trying to do this. It didn't work. What do you suggest?'* . . . *I come from a department where not a lot of people read [PER] . . . [The FOLC] gives me support that I might not have otherwise for staying with it and figuring it out."*

Finally, participants appreciated technology that allowed for **quick, low-effort feedback** (P4). One participant said, "*It takes good advantage of using the social media and internet available tools to help communication."* Another liked the low barrier to entry of SocialCast: "*I like having the online SocialCast system because I don't feel like I'm bothering anyone when I ask questions that way . . . I'd be a lot more hesitant to pick up the phone and call somebody."*

Taken together, these data suggest that the participants perceived the FOLC to be a good use of time and that the FOLC has provided them with a community that they can rely on to learn about teaching and other aspects of their role as junior faculty. Hence, we observed positive outcomes regarding our implementation of design principles P1-P4, though with many open questions remaining. Further time is necessary to determine the sustainability and impact of this community in the long term (i.e., the effectiveness of principles P5 and P6).

## B. Challenges Experienced by Research Team

The biggest challenge we found in running the FOLC was **building a sense of community** (P2) with only limited in-person interactions at the NFW. While many of the participants formed bonds that extended outside of the FOLC (e.g., a handful are now Facebook friends), there were some participants who did not feel strongly embedded in the community. Factors that led participants to feel disconnected from each other included their teaching situation being a poor match with that of the majority of participants (“*Sometimes I am interested in one specific problem and maybe I am the only person that [is] interested in that . . . not all the others face the same problem or they’re from different school scales*”) and not being comfortable interacting in an online environment (“*I’m not really an online person . . . I don’t have a habit of going to those types of media . . . I’m not used to typing out my thoughts and feelings*”). The first factor suggests that FOLCs should form around a particular topic or course type (e.g., introductory courses or Peer Instruction), which is logistically possible only if there are multiple FOLCs running simultaneously. This was not possible for our pilot FOLC, so we have not yet investigated the benefit of topic- or course-based cohorts.

We also noticed that participants joined the FOLC with **different expectations about the source of teaching expertise and the value of community** (P1, P2). Some participants strongly valued community and wanted to gain knowledge about teaching from

each other, while others were more interested in gaining knowledge from (perceived) experts. This created a struggle in balancing the FOLC’s use of external experts with the development of participants as reflective teachers capable of supporting each other’s learning. While participants varied widely along this continuum, they agreed that they wanted to find a way to support both kinds of learning. While it would be easier in terms of facilitation to choose one or the other, we also recognize the need to support both.

Most logistical difficulties were related to **scheduling** (P4). Despite making an effort to choose a meeting time that fit everyone’s schedule, some participants sporadically missed meetings. Moreover, participants’ schedules change at different times of year (e.g., due to semester versus quarter systems), which makes it difficult to accommodate the same group for an entire academic year. While they could not contribute to the conversation, missing participants in the pilot FOLC could at least watch the recording of the meeting they missed.

## IV. CONCLUSION

Our pilot FOLC demonstrates that an online version of an FLC holds great potential for supporting new faculty through the inevitable struggles and setbacks that come with reforming their teaching practices. Early evidence suggests that we have developed structures that achieve some of our design principles, although more study is needed to fully refine these structures. Our study of the FOLCs will help us understand how to provide ongoing support after a workshop experience for the creation of sustainable instructional change on the national level. This work will be relevant not only for physics, but also for any similar field trying to create such change.

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