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Growing Lemon Trees from Lemons: Lessons Reaped from a SoTL Faculty Learning Community's Research "Failures"

Linh Dich
Miami University
dichll@miamioh.edu

Karen M. Brown
Miami University

Jeff H. Kuznekoff
Miami University

Theresa Conover
Miami University

John P Forren
Miami University

Janet Marshall
Miami University

Abstract: Failure can be central to faculty research; however, failure produces a vehicle for learning. Through an interdisciplinary faculty community, the authors supported each other in facing, learning from, and overcoming "failed" aspects of research projects. This article reports obstacles encountered in conducting Scholarship of Teaching and Learning research and the role of a faculty learning community in overcoming these challenges. Research pitfalls included lack of student participants, non-significant findings, expectations for understanding related course content, technology issues, use of deception, determining the research question, and managing bias. Ultimately, the faculty learning community engendered a foundation for successful research projects by shared inquiry into these research "failures."

Key words: faculty learning communities, Scholarship of Teaching and Learning, failure, success, interdisciplinary communities, action research

Researchers understand that unanticipated difficulty is part of the process in human-based studies, such as interrupted interviews or technology issues. Indeed, most researchers will agree that a well-designed project will result in useful outcomes, even if unexpected obstacles can prevent optimum data collection. Clearly, outright "failure" is a result that researchers try to avoid. But if we accept that all research is an imperfect and uneven process, then "failures" ought to be treated as part of the research landscape, pointing us to different considerations of our research design, context, and data. As the adage goes, we learn from our failures, but there exists

very little scholarship within The Scholarship on Teaching and Learning that interrogates *failure* as central to a faculty's research process and, ultimately, publication. Indeed, as instructors we may apply failure-as-learning philosophies to teaching, but if we take learning as a lifelong endeavor, ought we not consider "failure" in our own work (see Tawfick & Jonaseen, 2013)? Ultimately, what does it mean to embrace obstacles and failures as part of our work as researchers and to treat it as central to our scholarship?

Through an interdisciplinary lens, this article addresses how research "failure" can be a remarkable learning experience for new and experienced faculty within the context of Faculty Learning Communities (FLC). FLCs have been shown to function as a rich, generative space for breaking down disciplinary silos and placing faculty who are, as McMahon-Klosterman (2015) notes, "relatively knowledgeable and relatively ignorant" (p. 92). By positioning faculty as learners, the FLC can function to break apart competitive posturing--something that faculty may need to unlearn--and foster learning from the commonality of *not* knowing. Indeed, it may be in the very moment of conflict or the incoherence between disciplinary silos that can call attention to alternative research possibilities. The authors of this article contend that failed research can be productive because it places us in the space of the unknown, where we are compelled to draw on other perspectives, knowledge, and experts that can help us progress our own learning experiences, even as we attempt to study students' learning outcomes. As Halberstam (2011) noted, the logic of success can obscure our ability to see the potential in "the unexpected, the improvised, and the surprising" (p. 16).

Indeed, if "failed" research results can *tell us something useful about teaching and learning*, then "failed" or "failure" may not be the best terms to use. However, we start with this terminology and premise because one significant argument we make is that this failure can be a very real and felt experience for researchers, causing some researchers to abandon their projects. In highlighting this experience as exigence, we also want to offer principles from action research as an approach that can be helpful in addressing research failures. Action research, as Bradbury and Reason (2003) defined, is a "*family* of approaches and practices" that emphasizes "doing research *with*, rather than *on* people" (p. 156, emphasis in original). While Bradbury and Reason (2003) directed this principle of collaboration to the researched object/population (p. 157), this FLC applied the collaborative principle between researchers, highlighting the ways that cross-disciplinary sharing can lead to what Sagor (2000) describes as research that helps improve or refine the "actor's" action. In this case, sharing and collaborating on our different research projects, from start to finish, helped us improve and refine not only our research, but it provided us opportunities to improve our own teaching as well.

This article will draw on multiple faculty and disciplinary perspectives to focus on how researchers addressed different kinds of "failures" in their projects and to highlight failures as the central premise of learning even for seasoned researchers. The projects mentioned in this article emerged during the 2014-15 school year through the support from a Faculty Learning Community based on the Scholarship on Learning and Teaching, and led by Beth Dietz and Catherine Bishop-Clark. The authors are from the various disciplines: English, Communication, Nursing, Chemistry, Criminal Justice, and Political Science.

Seeking New Directions in Failure

Linh Dich is an assistant professor at Miami University. Dich teaches Asian-American Literature, digital writing, and technical writing. Dich's research focuses on difference and identity formation, public spheres, and language practices in digital contexts. Dich has two works in press. "Community Enclaves and Public Imaginaries" (Dich, 2016) is an article that examines Asian American identity formation through community and public writing. Her other essay, "The Impact of Asian and Asian American Scholarship as a Productive, Contested Site," (Dich, 2016) argues that conflicting, contested historical accounts can engender a space of continuing disciplinary and organizational growth.

What happens when potential participants are not willing to participate in your project? One of the most difficult outcomes of any research project is the lack of participation, especially after careful researching, designing, and planning. In many respects, such outcomes mean scrapping the whole project and starting over again.

As an instructor who teaches online courses regularly, it was important to me to understand if students learn how to develop writing strategies from my videos, ultimately improving their writing on major assignments and their grade for the course. Therefore, I designed a project that would test for this learning outcome. With the rapid increase of online classes in higher education, I found problematic the assumptions that more technology equates to better learning, especially given the existing teaching obligations instructors are negotiating on a regular basis (see Moran, 2003). As Porter (2002) argues, we know that technology matters to writing, but how and why is less clear. Yet, if there is evidence that video feedback can help students learn and write more critically and effectively, teachers may feel more invested in incorporating such approaches in their courses, whether online or offline. At the very least, I wanted to have data that can help instructors better comprehend students' perspectives on video forms of feedback to writing.

For data collection, I had hoped to receive student responses from two online courses (about 40 students). I asked participants to complete a short survey and for permission to use their range of writing submissions in order to observe any changes in the quality of students' writing before and after video feedback. But after multiple emails and reminders sent by a colleague, I received zero responses from students for participation. Pushing the restart button was the first reaction I had to what I considered a "failed" project. As with many researchers, I was immediately filled with self-doubt about my research design: Did I do enough to appeal to participants? Should I have asked students to participate earlier in the semester? Did I miss something in my project design? It is a rather devastating fact to accept that not even one student was willing to take a short survey and provide anonymous permission for their writing. Granted, lack of participation is a likelihood for any participant-based research, but one that is not often discussed in scholarship.

These were the issues and questions that I brought to my FLC as I attempted to salvage my project. With the help of the FLC, reflecting on this "failed" research allowed me to think about issues that may be more immediate to courses than video feedback. In comparing this study to my previous research success with student participants in traditional classroom settings, I begin to think about how an online course may impact the ways students engage with non-obligatory activities. In a traditional classroom, the parameters of time and bodies impact how students may feel about completing something like an "optional" survey. Surrounded by peers and with the teacher's gaze, are students more compelled to submit responses to a study? This

"failed" project also prompted me to ask what sort of obligations may develop for students' online classes that may be different than traditional ones. If students experience different obligations in their online courses than their traditional ones, what are these obligations and how do obligations function to impact learning outcomes? What does this mean about the design of educational "spaces"? Such questions were prompted by a faculty colleague who was also struggling with her own project, particularly with how to remain ethical in regards to research deception and disclosure (see "Truth, Lies, and Murphy's Law"). That is, a fellow FLC member's project provided me a different lens through which to reconsider my project not as a failure but as one that may require a different methodology given the digital context of the research "site." Ultimately, I am suggesting that the lack of participants raised other important questions about teaching that my colleagues and I may have never thought about examining for teaching and research.

What to do When You Have Non-Significant Findings?

Jeff Kuznekoff's teaching and research background is in communication. His primary focus is how new communication technology impacts the communication process; however, one of his research interests is the use of technology in the classroom. He has two published research articles (Kuznekoff & Titsworth, 2013; Kuznekoff, Munz, & Titsworth, 2015) examining student texting in class, and how this behavior impacts learning and note taking. The SoTL research Kuznekoff describes is adapted from these past studies; however, this particular study ran into problems during the analysis phase.

One of my lines of research involves studying note-taking behaviors of students and the impact that technology has on this important student behavior. For example, one of my past studies (Kuznekoff & Titsworth, 2013) examined the impact of student texting in class and how using a mobile device impacts student learning and note-taking. We found that students who abstained from texting (i.e., did not use their mobile device during a simulated lecture) scored roughly a letter grade and a half (13% points) higher on a multiple-choice test of lecture material than those students actively engaged in responding to messages. A follow-up to that study (Kuznekoff et al., 2015) added in the notion of message relevance and message creation to the mix. Our more recent study found that students who were responding to messages related to the simulated lecture scored roughly on par with the control group, yet students sending or receiving messages unrelated to lecture content continued to demonstrate diminished learning. In both studies, we used an experimental design to compare several groups against a control group.

More recently, I modified the design, which has been found to be effective in two different studies, and compared student learning and note-taking between students taking notes on an iPad and students taking notes by hand. Although I had a comparable number of students in each group, when compared to the past studies, I was not able to find statistically significant results and the study suffered from relatively lower power. Not only did the study fail to find statistical significance, but even if a statistically significant effect were present, I would have been unable to detect it with the power level I achieved.

Part of the issue likely has to do with a particular student skill level, present across all groups, and that skill level is note-taking. In college, we typically expect and assume that students have already mastered, or are at least experienced with, taking notes in class. However, other studies have generally found that students are typically bad at taking notes and miss up to 40% of important information (Kiewra, 1985; Titsworth & Kiewra, 2004). In this case, it very

well could be that the effect I was looking for, ability to take notes and how this might be influenced by technology, was not well developed in the control group or even in the experimental group. If that is the case, it would make sense that I would be unable to detect a difference or even have enough power to detect results. If students are already poor note takers, it really would not matter what group or manipulation they were assigned to in my study, their notes would all be of relatively low quality.

In the case of the present study, I could have increased my sample size; however, after doing a power analysis to determine the sample size needed to achieve acceptable power (.80), I would need several hundred participants, which I would not realistically be able to achieve at present. Although this research project ended in a dead end (i.e., not finding statistical significance and being unable to detect differences if they were there), I did have an interesting finding. It very well could be that the skill I was looking to compare is so poorly developed that I won't be able to find differences between groups of students. Perhaps what would be more interesting is examining the current note-taking skill level of students and developing educational interventions that help students develop effective note-taking skill. Ample evidence indicates that note-taking is a key skill that can aid student learning (Kiewra et al., 1991; Rickards & Friedman, 1978); however, students may not realize how bad at note-taking they are. In addition, it is also worth noting my own assumptions, and likely the assumptions of other faculty members, regarding student note-taking ability. I assumed that college students are already skilled note takers and that assumption impacted the design of this study; however, one plausible explanation is that my assumption is inaccurate and actually studying that assumption might be a fruitful area of research. Although I did not find statistically significant results in my study, I do think the finding was an interesting one and opened up an opportunity and invitation to future research.

So . . . What is a Chiral Carbon Anyway?

Janet Marshall teaches organic chemistry and a variety of courses related to the chemistry of food and cooking, including a study abroad course in Italy. Her laboratory-based research focuses on experiment development, and two of her recent publications, co-authored with undergraduate students, describe adding an element of discovery to the organic chemistry lab (Marshall & Comminos, 2013; Marshall & Hodge,2016). Her interest in SoTL prompted her to join this multi-disciplinary faculty learning community (FLC) to explore pedagogical-based research.

Over the past several years, I've developed and refined iPad exercises for my introductory and organic chemistry courses. In these exercises, students use the technology to better understand topics such as molecular geometry, shape, and stereochemistry. Images of molecules, such as melatonin and nicotine, are shown in 3-dimensional space and can be easily rotated using the touchscreen feature of the iPad. From my observations and student comments, the ability to visualize a molecular structure in 3-D seems to really help students understand spatially-related concepts.

When I joined our SoTL faculty learning community, I needed to identify a teaching-related topic that would be suitable for a research project. I delved into the literature and found many articles on spatial reasoning in chemistry and some articles on the use of iPads in chemistry (Amick & Cross, 2014; Harle & Towns, 2011; Hesser & Schwartz, 2013; Hofstein et al., 2013; McCollum, Regier, Leong, Simpson, & Sterner, 2014; Stieff, Ryu, Dixon, & Hegarty,

2012). I was excited about the fact that only a few articles had been published combining the two ideas and none of these publications discussed the applications or type of exercises I had developed. I was confident that a small research study would prove how valuable my approach was in improving students' understanding of chemistry and, as a bonus, yield readily-publishable results.

After conferring with my SoTL colleagues on the design of the research study, I decided to have my organic chemistry students answer a set of questions about several chemical structures after viewing them on the iPad in 3-dimensions (Chem3D app) and in 2-dimensions (ChemDraw app). My class was divided so that half of the students started the exercise in 2-D followed by 3-D and vice-versa. Presumably this would eliminate bias due to the "gadget factor" and really focus on the ability to "visualize the chemistry." I was pretty sure I had a well-designed study that would clearly show how the iPad improved students' spatial reasoning and ability to correctly answer challenging and important organic chemistry questions!

In order to have sufficient time for students to complete this exercise, I scheduled it during our 3-hour lab period. The iPads and instructions were distributed and I reminded students to follow the order of questions as assigned and to work independently. Pretty quickly, I could see that students were not correctly answering several of the questions. Some of the weaker students were even struggling to understand the questions. I became concerned that this exercise was not going to end well.

Then … one of my students asked a question that confirmed my suspicions. I asked the students to assign the absolute configuration of chiral carbons in several of the structures. This is a typical quiz question and student's ability to digitally-manipulate a chemical structure on the iPad should have made it really easy for them to answer the question. In addition, we had spent several weeks in the accompanying lecture course studying stereochemistry and the concept of chirality. Instead of progressing through the exercise as I had planned, this student, who was quizzically looking at the image of tartaric acid, said "What is a chiral carbon, anyway?" I wanted to say, "You've got to be joking," but I didn't.

I realized that my expectations for many of the students had been too high. Instead, I needed to review many of the concepts I asked my students to use for this exercise. So, I abandoned any hope of obtaining publishable research data; I recognized that I needed to "re-teach" students and took the opportunity to do so by abandoning my beautifully-designed research experiment.

So what did I learn? Most importantly, I recognized that I needed to scrap the research study and focus on helping my weaker students really understand the fundamentals of the topics I had been covering. I also learned that the exercise was probably "over-engineered." The idea of visualizing an image in 2-D followed by 3-D (or vice versa) seemed to be cumbersome and confusing. For students who were already struggling with the material, this was an exercise in added frustration.

In retrospect, I would have designed the study with easier questions and compared student answers with and without the use of an iPad. A simpler scaffolding approach would have been smarter and certainly less confusing to my students. However, from the study I attempted, I also learned to quickly regroup and address student questions about topics I believed were well-understood but really weren't. As is often the case with SoTL projects, the teaching and learning aspects (mine) were clear, even if the scholarship piece didn't go as planned.

Truth, Lies, and Murphy's Law

Karen Brown's background is in nursing, specifically, gerontological nursing education. Her research interests include the effects of intergenerational service-learning on student outcomes, and the impact of Human Patient Simulation, using high-tech mannequins, on nursing students' leadership skills and emotional intelligence.

My SoTL research study protocol incorporated a form of deception to determine if one student's tardiness affected other classmates' test scores. Using deception in human subject research by intentionally providing misleading communication regarding the purpose or procedures of the research requires a solid rationale (U.S. Department of Health and Human Services, 2011). According to the Belmont Report, "all cases of research involving incomplete disclosure, such research is justified only if it is clear that (1) incomplete disclosure is truly necessary to accomplish the goals of the research, (2) there are no undisclosed risks to subjects that are more than minimal, and (3) there is an adequate plan for debriefing subjects" (U.S. Department of Health and Human Services, 1979, "Part C: Applications," para. 6). Therefore, most Internal Review Boards (IRB) are stringent in their approval of the use of deception in research using human subjects.

To begin, per the IRB's instruction to minimize risks to the subjects, I recruited a confederate who was not a class member. In nursing, class cohorts know each other well, so I planned to conduct the experiment during the second week of class so the group would think this was a new member to their cohort. According to the experiment's protocol, individuals were randomly assigned into two groups; first, the control group moved to a separate classroom with an independent assignment. Meanwhile, the experimental group watched a video and the confederate entered late. After that, the control group watched the same video; however, no late entries occurred during the control group's video lesson. Finally, a post-test administered immediately upon conclusion of the video lesson assessed each group's understanding of the lesson's content and provided data needed to answer my research question. After the experiment, I reunited the class. At this time, I would debrief the class about the experiment, disclose the deception, provide informed consent allowing the use the post-test scores as part of the research, and note that the scores would not contribute to the course grade.

Despite my meticulous study protocol, Murphy's Law is alive and well, especially when it comes to SoTL research. As in my case, unexpected results can occur due to the complex interplay of course content, people, and processes inherent to SoTL research (Yeo, 2009). When my experiment went awry due to unexpected events outside of my control, I felt disenchanted. The first road block arose due to technology issues during the experimental group's lesson. Although my confederate entered the room at the pre-arranged time, the lesson's video did not play correctly; as a result the tardy confederate entered before the lesson began. Resiliently, I re-attempted the experiment during the next class session; this time, my confederate's house flooded and she could not attend. I felt stressed and ready to give up.

Fortunately, I was part of a FLC dedicated to SoTL research. The trusting bonds developed among the FLC allowed me to confess my experiment's failure and the events leading to it. As a result, the group helped me to bolster my confidence, offered advice to alleviate technical issues, and encouraged me to request IRB approval to recruit a confederate from the class. Fortunately, the IRB approved my request, I restructured my experimental protocol (Yeo, 2009) and, later during the same semester and course, successfully conducted the revised experiment. Ultimately, I presented the results of my SoTL project at a peer-reviewed, national

conference on teaching and learning. In short, the support given by my FLC prompted me to rebound, meet my teaching and learning goals, and beat Murphy's Law.

Compounding the unexpected challenges, I felt uncomfortable deceiving my students, even to acquire evidence of best teaching practices. I contemplated the lack of virtue of people who deceive others and the importance of role-modeling honesty in educational settings (Carr, 2014). Importantly, I wondered if this form of deceit would erode the trust I was building with the students (Lount, Zhong, Sivanathan, & Murnighan, 2008). Therefore, at the conclusion of the successful experiment, I found myself reluctant to confess my deception to my students. Surprisingly, the students seemed astonished and excited to be part of an experiment; no one expressed dismay that deception was involved. Later, when I acknowledged my conflicted feelings about the deception to my FLC, the group validated my feelings while noting that deception may be appropriate to expand SoTL knowledge. Through my relationships with FLC members, I tapped into the supportive, trusting social network of faculty colleagues to gain courage, face failure, recover, and eventually flourish (Southwick & Charney, 2012).

The 'Accidental' SoTL Project

Theresa Conover is an assistant professor of criminal justice in the Department of Justice and Community Studies at Miami University. She teaches research methods, capstone, crime prevention, and policing courses. Conovers's research interests include problem-solving approaches to address crime and quality of life issues, the criminology of place, and the role community engagement plays in crime prevention and public safety.

One of the goals of our FLC was to design and implement a SoTL project. The group met during the spring semester with the expectation that our project would be carried out during the upcoming fall semester. The timing posed a challenge because my research leave was scheduled for the fall and I would not be on campus. Therefore, I needed to create an activity or project in one of the courses I was currently teaching in the spring. I had discussed a class project with the local police department to integrate into the *Capstone*[1] *in Criminal Justice* course. The police department was interested in gathering feedback from local businesses in the central business district to determine their needs, levels of satisfaction, and other concerns before adding a new dedicated officer to the area. This experiential learning project would create opportunities for students to examine the literature related to police-citizen satisfaction, identify the best way to gather the information, determine the methodology, collect and analyze data, and to present findings and recommendations (Conover, 2015a).

Meanwhile, the FLC continued to meet, and I still had no research project. My failure was my inability to identify a project, but after discussing this with my FLC, it dawned on me: I did have a project and it was the experiential learning component of the capstone! The SoTL project would evaluate the student learning that took place using an existing pedagogy applied to a new discipline. In the process of searching for a SoTL project, I found my way to the literature that described a type of collaboration that occurs between universities, community partners, and students. It turns out that what I was doing had a name – it was community-based research (CBR). I found many examples of this pedagogy in other disciplines, such as teacher education,

[1] The Capstone course is designed to integrate and draw upon students' previous learning in the program and provides the opportunity to apply the knowledge and skills they have accumulated throughout their undergraduate career.

sociology, and psychology; however, I did not find any examples of its use in criminal justice. CBR is comprised of three pillars: (1) collaboration between community, faculty, and students; (2) situation of research within an educational context; and (3) the purpose of addressing unmet needs in the community (Paul, 2006). All of these components were designed into the experiential learning portion of my course from the start. My SoTL project would assess the learning outcomes for the Capstone class. However, it was my engagement with other FLC members that helped me recognize that I already had most of my research project set up.

Ideally, the assessment would use a pre-post design to compare the knowledge of research methods and skills before and after the course. However, the class had already started, and I had not done the pre-test. Fortunately, a member of the FLC suggested the use of the post-then-pre (retrospective post-then-pre) design which would accommodate this type of situation (Howard, 1980). Pre- and post-data are collected at the same time using the same instrument where questions are framed, for example, by asking "Before taking this course…" and "After taking this course…" in which students would respond to items measuring their perception of learning.

My SoTL research project focused on the "what is" of SoTL (Hutchings, 2000) and detailed the CBR pedagogy applied to a new discipline and measured student learning (Conover, 2015b). The student survey was administered to measure perceptions of knowledge and understanding of the research process, acquisition of research skills, and 'softer' skills which dealt with collaboration and professionalism. Results indicated statistically significant improvements in the perception of knowledge and understanding of the research process and survey methods and strong agreement that students had gained valuable professional skills while participating in the CBR project.

It turns out that the SoTL research question that I struggled so much to identify was right in front of me all along. Ultimately, it involved something larger than a single activity; it involved a method of teaching students survey methodology through a hands-on approach to designing and guiding research to address a 'real world' issue in the community. In the end, I applied a teaching pedagogy that was new to my discipline. It was a new approach to teaching in my field and through the 'what is' narrative, provides an example from which others can learn and implement.

Approaching Initial Findings as a 'First Cut' at the Research Question

John Forren is an assistant professor in the Department of Justice and Community Studies at Miami University. A political scientist by training, Forren's research and teaching interests focus on American politics, public law, criminal justice and civic engagement. The SoTL project described below grew out of the author's work as the academic director of a U.S. State Department-sponsored experiential learning program on civic engagement held at Miami University in 2013, 2014 & 2015.

My foray into SoTL research began with a rather straightforward empirical question: was an intensive summer program on civic engagement, specially designed to encourage active citizenship, actually producing the shifts in participants' political attitudes that my colleagues and I were expecting it to yield? In the spring of 2014, when this SoTL project began, I had a practical reason to seek an answer to this question. An interdisciplinary team at Miami University was working at the time to plan our second Study of the U.S. Institute (SUSI) on Civic Engagement – a U.S. State Department-funded residential program that immersed student

leaders from Africa, the Middle East and the United States in learning about democratic theory, U.S. politics and techniques of community engagement. For the summer 2014 iteration of SUSI, we had carefully planned a curriculum that blended roughly 30 hours of formal classroom instruction with an array of site visits, group discussions, 'hands-on' civic skills workshops and other intensive experiential learning opportunities. Looking forward to an anticipated 2015 version as well – and also viewing the 2014 SUSI as an ideal opportunity to 'field test' some hypotheses about the attitudinal effects of immersive civic engagement programs -- we set out to learn: was our program meeting its aim of shaping students' views about democracy, government and citizenship?

Drawing from the relevant literatures in political science, college student development and experiential learning (Conway, Amel, & Gerwein, 2009; Hurtado, 2009; Zuniga, Williams, & Berger, 2005), I hypothesized that active participation in the SUSI program would lead participants toward (1) higher levels of personal support for freedom of thought and expression; (2) greater personal support for government activism in support of social and political equality; (3) broader understandings of the obligations associated with democratic citizenship; and (4) changed perceptions – perhaps in a negative direction – of how responsive the American political system is to ordinary citizens' desires and concerns. To explore whether these attitudinal shifts were indeed taking place, I recruited volunteers from the 2014 cohort to complete identical paired 40-question surveys at the beginning and the end of their five-week SUSI experience. Using Likert scales to measure intensity of attitudes (Likert, 1932), these surveys elicited participants' views on a range of contested ideological and political issues; each participant's responses were then used to produce individual pre-SUSI and post-SUSI attitudinal scores along each of the four dimensions listed above (see McClosky, 1964). Paired T-tests were performed to determine whether the data supported our hypotheses regarding SUSI's impact.

The results, such as they were, fell generally in the expected direction. According to the data, at least some of the SUSI participants had indeed moved in the hypothesized directions for each of the measured variables. Sixty percent registered positive gains in their levels of support for freedom of expression and thought, a core democratic value that was discussed extensively in SUSI. Thirty percent of participants showed greater levels of support after SUSI for government action aimed at promoting equality. Half of the subject group revealed a broader understanding of the duties of citizenship at the end of their SUSI experience. At the same time, sixty percent registered increased skepticism about the degree to which U.S. politics fairly represents the views and needs of all of the nation's citizenry.

Such findings were certainly in line with our general expectations; what's more, they provided at least some modicum of support for the idea that our SUSI program was accomplishing its central attitudinal goals. Yet it had also become clear by the end of the process that the 2014 study had fallen far short of providing definitive answers to the practical and theoretical questions that had motivated it. Two related weaknesses in the data – an unexpectedly small sample size and a correspondingly weak statistical relationship between program participation and attitudinal change – made it impossible to generalize from the data standing alone in a scientifically rigorous way. (Despite my best recruitment efforts, only 10 of the program's 23 participants agreed to participate in the study.) Beyond that, a third unanticipated shortcoming in the study – the finding that many of our SUSI study participants had already possessed especially strong 'pro-democracy' attitudes even before starting the program – further weakened the vitality and generalizability of the results.

At the same time, two other considerations cautioned against our 'throwing in the towel' altogether on this research idea. For one, *other* sources of information that we had gathered on the impact of SUSI, including reflective narratives provided by participants throughout the five-week experience, suggested quite strongly that attitudes about democratic norms and citizenship had indeed changed in ways that our pre/post survey instrument perhaps had not captured. Second, by definition, the pre- and post-SUSI surveys addressed only the degree of attitudinal change that may have occurred *over the five-week SUSI program itself* – not any changes that may have occurred in later periods as the participants continued to absorb and reflect upon the experience. In this particular context, one could reasonably expect that a significant evolution in participants' views about politics and democracy may still be underway even years later.

So what to do? Sharing my concerns at one of our FLC meetings, several colleagues encouraged me to approach my results from a different perspective. Rather than simply abandoning the 2014 study as a failed experiment, they suggested, I might build upon its findings by gathering additional data which, when added to the 2014 results, could still yield significant conclusions that add meaningfully to the literatures on experiential learning and civic engagement. Taking that approach, I have since continued to track the 2014 SUSI cohort, hoping to discover whether evidence may still be found of long-term attitudinal changes within that group. Beyond that, I have also expanded my dataset by repeating the pre/post survey with another SUSI cohort in summer 2015 -- an effort that, the second time around, thankfully yielded a higher proportion of study volunteers from among the program's participants. With this larger set of survey data now in hand -- and with a final round of interviews and surveys of the 2014 and 2015 cohorts currently planned for summer 2017 -- I now anticipate that my initial pre/post survey will indeed contribute, albeit in a way quite different than originally designed, to a publishable analysis of program impact. Looking back at it now, my initial 2014 study was clearly not a 'failure,' even though it indeed fell short of producing the generalizable results that I had initially anticipated. Rather, as my FLC colleagues helped me to see, the 2014 analysis is perhaps best understood as a 'first cut' at the questions it was aimed at exploring -- and as such, an essential foundation for success in the broader project that it has produced.

Conclusion

As these research vignettes show, failures in research need not mark the discouraging end of once-promising ideas; rather, they can teach us important lessons, give us new insights and lead us down new paths of productive scholarly work. For the authors of this article, this realization -- that lemons could indeed produce lemon trees -- was the product of a sustained partnership with colleagues from a variety of disciplinary backgrounds and perspectives. What is more, it emerged from a FLC remarkable for its collaborative spirit, its sense of shared purpose and its openness to the sharing of frank but supportive feedback. While this FLC cohort represented multiple disciplines, we believe that we were able to help one another grow from our challenges and "failures" by encouraging each other to think more deeply about alternative possibilities; shared experiences of "failure" conceptually and experientially functioned as a generative commonality for alternative research inquiry. This confirms aspects of Sagor (2000) and Bradbury and Reason's (2003) principles from their action research theories that highlight the collaborative results of such research as improving the skills and knowledge(s) of the people involved.

One main result of this interdisciplinary reflective action research was how this FLC group helped each other consider the appropriate and alternative use of research methods outside of one's own discipline, even if this insight was gained in hindsight. For example, Kuznekoff and Forren employed quantitative research method approaches that could have been complimented by a better understanding of their respective student populations prior to the study. Kuznekoff, specifically, made assumptions about his student population and students note-taking skill level. Perhaps a quick assessment of students' note-taking abilities prior to the experiment would have created a baseline for the author to work from or, at the very least, help to support his explanation for the lack of statistically significant results. Similarly, Forren, in designing his initial study, did not sufficiently account for the effect that self-selection would have on the population of students in the program being studied. In both of these instances, we concluded that alternative research perspectives from other disciplines could have been helpful for designing such research and unpacking initial assumptions can help prevent design flaws and failures.

Other narratives in this article, such as Dich and Conover's account speak to the ways that FLC's can help researchers maintain an open and flexible approach to difficult or unexpected research circumstances. As Dich noted, she did not receive any participation consent in her study and initially considered her study a failure. Yet, her reflection demonstrated the need to ask different questions of a seemingly simple project. In fact, it was in failing that allowed her to consider a completely different set of inquiry, one that could be helpful to other researchers of online teaching. Conover's account also presented difficult research circumstances with work and time limitations, but such difficulty also forced Conover to reconsider an alternative research direction and a new pedagogical approach for her own teaching and field: "it involved a method of teaching students survey methodology through a hands-on approach to designing and guiding research to address a 'real world' issue in the community." In this way, Conover was able to innovate both research and teaching for her own discipline, an important outcome that can be overlooked with SoTL FLCs.

What we also see from Brown and Marshall is a narrative of ethical inquiry in relation to "failure." Theoretically, SoTL researchers understand that an ethical approach to research means putting the best interest of the students first. Yet, this theory doesn't always translate well to practice. This is not to say that researchers are not ethical, but that the benefit of being in an FLC is being able to assess and discuss ethical issues within an interdisciplinary group setting. As Brown showed, deceiving her students is a struggle that may emerge from the discipline-specific field of nursing, where ethics and trust are much more engaged within the teaching and practice of nursing. Yet, such ethical struggles may not be something other disciplines will see as an issue. Although Brown's students did not express an issue with being deceived, it did help other members of the FLC consider ethics within their own field, as evidenced by Marshall's narrative. Marshall demonstrated a moment of practiced ethics in which she made the decision to end her research in favor of student learning. This particular narrative reminded the group that the fundamental goal of FLC's and its research is to help teachers teach better and students improve learning outcomes. In the midst of research design and implementation, it is easy to forget the reason for such research. What this narrative can teach us is how an "over-engineered" experiment can set both the project and students up for failure and frustrations, regardless of discipline. But our first responsibility is to the students, and this can mean "scrapping" an experiment in favor of learning outcomes.

We also want to point out the institutional support that helped create the context for our continued inquiry and action research. We wanted to emphasize that such FLC's on campuses are beneficial to the whole campus because faculty can contribute their learning to their respective departments/disciplines, which can diminish some of the "silo" effect within academia. Ultimately, breaking down of silo-like knowledge can help bring different departments and areas of knowledge together to better serve students and enhance educational purposes. For instance, through the FLC, Kuznekoff and Marshall were able to collaborate on ways that iPads can be used in the classroom. While Kuznekoff was interested in notetaking outcomes, such a focus helped Marshall consider the use of iPads as a research and learning tool in chemistry labs. The knowledge gained from both of these studies goes beyond their respective disciplines and can be just as useful in other disciplines, but this sharing of knowledge would be unlikely without the FLC structure. Administrators or faculty considering FLC models should also consider the value of enlisting a diverse group of faculty who can represent multiple disciplines: members can contribute as experts in their own field, but grow from the engagement with other disciplines and perspectives. For example, our collective experience indicates that FLCs may do well with an initial activity asking members to unpack and examine personal and disciplinary assumptions about our students and each other. Such self-reflexivity may help us see the weaknesses in our designs, expose us to other disciplinary methods and tools, and avail us to other forms of knowledge-making.

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