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Engaging Faculty in Learning Analytics: Agents of Institutional Culture Change

George Rehrey,[1] Linda Shepard,[2] Carol Hostetter,[3] Amberly Reynolds,[4] and Dennis Groth[5]

Abstract

To successfully implement Learning Analytics (LA) systems within higher education, we need to engage administrators, faculty, and staff alike. This paper is by and primarily for practitioners. We suggest implementation strategies that consider the human factor in adopting new technologies by analyzing the viability of our Learning Analytics Fellows Program (LAFP), where faculty are empowered as agents of institutional change. This program directly addresses known barriers to the use of LA, dealing with culture management, adoption, and sustainability. The Fellows program engages faculty in inquiry about student success, providing them with a view of the student experience through institutional data. Faculty, with their knowledge of students and programs as well as their research expertise, are well-positioned to advance LA efforts on our campuses. In our case, faculty are also the end users of their findings, and are able to provide input into the design of the analytical tools created for them. Expanding on a paper presented at the LAK 18 conference (Rehrey, Groth, Fiorini, Hostetter, & Shepard, 2018), we describe the rationale for the implementation strategy, reflect on the effectiveness of this strategy by analyzing self-reports from our LAFP, and consider the broader impacts of this approach for the future.

Notes for Researchers

- The purpose of this study was to determine how effective our LA program has been at influencing change on our campus thus far, as we cultivate a data-informed culture for the purpose of improving overall student success. The primary focus of our program is to move from research to actions that will impact student performance, persistence, retention, and graduation rates.
- Because of the purpose of this study and the evolving nature of our program, we used Action Research strategies to understand, inform, and continually improve the meaningful application of learning analytics by faculty and the staff and administrators who support them.
- In the future, a summative evaluation will consider other aspects of the program, including the administrative perspective and a richer exploration of the individual faculty projects.
- The types of analytics that faculty used in their research encompass both learning and academic analytics as defined by Long and Siemens (2011). Taken together, Fellows' projects analyze course, department, and institutional data that benefit students, faculty, and administrators alike.

Keywords:

Learning analytics, faculty learning community, student success, cultural change

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Corresponding author [1] Email: grehrey@indiana.edu Address: Center for Learning Analytics and Student Success (CLASS), Indiana University Bloomington. Office of the Vice Provost for Undergraduate Education, 625 N. Jordan Ave., Bloomington, Indiana, USA. 47405.

[2]Email: lshepard@indiana.edu Address: Bloomington Assessment and Research. Indiana University Bloomington. Office of the Vice Provost for Undergraduate Education, 625 N. Jordan Ave., Bloomington, Indiana, USA. 47405.

[3]Email: chostett@indiana.edu Address: School of Social Work, 1127 E Atwater Avenue, Bloomington, Indiana, USA. 47405

[4]Email: ammreyno@iu.edu Address: Center for Learning Analytics and Student Success (CLASS), Indiana University Bloomington. Office of the Vice Provost for Undergraduate Education, 625 N. Jordan Ave., Bloomington, Indiana, USA. 47405.

[5]Email: dgroth@indiana.edu Address: Office of the Vice Provost for Undergraduate Education, 100 Maxwell Hall, Indiana University, Bloomington, Indiana, USA. 47405

1. Introduction

Learning analytics (LA) and the availability of institutional data provide promising opportunities to understand and improve higher education (Long & Siemens, 2011) at the course, department, and institutional levels. Evidence-based decision making is no longer just for a few in-the-know administrators; data and information are abundant and the possibilities for data-informed

faculty, department heads, deans, and higher education leaders are ground-breaking. Strategies for advancing the use of LA data at our institutions are highly varied. Some institutions have responded to the data needs by organizational change (e.g., fully staffed LA units engaged in intensive institutional data collection, provisioning, and analysis) whereas others may have research offices with data experts who can respond to information needs for campus initiatives or planning, and others have developed change models to drive policy and development (Ferguson et al., 2014; Macfadyen, Dawson, Pardo, & Gašević, 2014). All approaches seek to uncover unique insights that lead to LA products/tools used to enhance the student learning experience. However, the development of new tools may be easier than finding adopters who will use them. Researchers (Tagg, 2012; Macfadyen & Dawson, 2012) openly discuss concerns about barriers to change caused by end-user resistance. In fact, among the numerous obstacles to successful implementation of LA on our campuses, institutional culture surfaces as one of the most challenging (Macfadyen et al., 2014; Tagg, 2008).

Theories of change offer insights that can inform our strategy for implementing LA in transformative ways. Our campuses are complex adaptive systems made up of several sub-systems (Ferguson et al., 2014). Realizing change by targeting one subsystem is disadvantaged (AAU, 2017; Austin, 2013), given the multiple levers that influence transformative actions across our campuses. Austin (2013) suggests that these multi-lever frameworks provide opportunities for positive institutional change.

In this paper, we assess our Learning Analytics Fellows Program (LAFP) to date. The purpose of the program is to build LA capacity around an innovative (and successful) Faculty Learning Community (FLC; Cox, 2017) already predisposed to improve teaching, learning, and student success. Baepler and Murdoch (2010) advocate for faculty participation in LA as a means for opening up new opportunities for understanding and improving student success. Faculty working in isolation may provide insights into their classroom but enabling a community encourages faculty to think more broadly about the student experience. By coupling access to Student Information Systems data and interactions with interdisciplinary peers, faculty are empowered to see beyond their classrooms and encouraged to envision changes in curriculum sequences, departmental practices, or campus policies that may enhance student pathways to success.

Change takes time. Given the infancy of our program, faculty are in the early stages of a cycle of change. For change to take place through the use of LA, faculty must first become aware of and understand what is happening in their courses and programs before they can take meaningful action and reflect on its effectiveness. LA Fellows are primarily in the stages of awareness and understanding, but as the program continues, we anticipate their involvement with the program will eventually lead to actionable changes that will impact student success.

1.1 Rationale for the Learning Analytics Fellows Program

The LAFP engages faculty in scholarly inquiry about teaching, learning, and student success using student data collected and made available for evidence-informed decisions and planning at the course, program, and institutional levels. Faculty are well-positioned to advance this work as they have a unique perspective on the student experience from their role as advisors, mentors, and teachers. They are knowledgeable about curriculum and disciplinary requirements for success, and are connected to networks of disciplinary peers. In addition, they bring research expertise for asking and answering questions about student performance. With this research, some faculty may contribute methodological developments, others may advance our use of data mining techniques, and others may contribute knowledge about the student learning experience (Rehrey, Groth, Shepard, & Hostetter, 2019). We acknowledge that faculty engagement is an essential ingredient of this implementation strategy for advancing LA on our campus and growing a data-informed citizenry. When faculty view student success as their responsibility and are well-situated in a networked culture of like-minded scholars, we set the conditions for change to occur. The LAFP acts much like a Community of Practice, with a group of faculty members solving problems, addressing barriers to student success, and sharing research questions and results (Wenger-Trayner & Wenger-Trayner, 2015; Kezar & Gehrke, 2015).

Isolated results from faculty projects, while potentially influential, are not sufficient levers for change (Tagg, 2012). Fairweather (2008) suggests that the key to improving education is to move from research findings to actions in the classroom and that evaluation of actions requires a community of disciplinary faculty to "judge impact." Williams et al. (2013) and Reinholz and Apkarian (2018) recognize departments as the place where barriers often exist and how they can be a key factor for enabling institutional change when there is appropriate administrative support. Faculty oversight, empowered by evidence that supports recommendations coupled with an administration that values and facilitates innovations, will lead to institutional cultural advances and sustained change at the departmental level.

Correspondingly, Bichsel (2012) recommends that LA work align with top-down administrative goals and objectives. On our campus, the strategic plan specifically calls for enhancing student progression to graduation, improving success for all students, and empowering faculty to adopt innovative technologies; thus advancing the use of LA for planning and decision-making. In addition, resources have been allocated to expand and support these objectives. A Center for Learning Analytics and Student Success (CLASS) was introduced on our campus to promote and facilitate the faculty work. This centre is integral

in shaping LA opportunities for faculty both on our campus and beyond. In addition, funding for research as well as data and technical expertise are administrative resources allocated for the purposes of advancing this work.

1.2 Faculty Engagement Process

The LAFP engages faculty in the scholarship of student success. The engagement process begins with an annual call for proposals and a campus event to explain the goals and set the stage for the program. At that information session potential LA Fellows have the opportunity to view existing data and consider their own questions about student success. Following the event, faculty submit a proposal outlining their projects goals and intended outcomes. Fellows with accepted proposals attend a kick-off event prior to meeting with the Bloomington Assessment and Research (BAR) staff to discuss their projects and to develop a research strategy. As an LA Fellow, they uncover answers to their questions, work with colleagues in other disciplines who are part of the program, and share results at an annual event and at our annual LA Summit. Often their initial answers provoke more questions for deeper analysis (Figure 1).

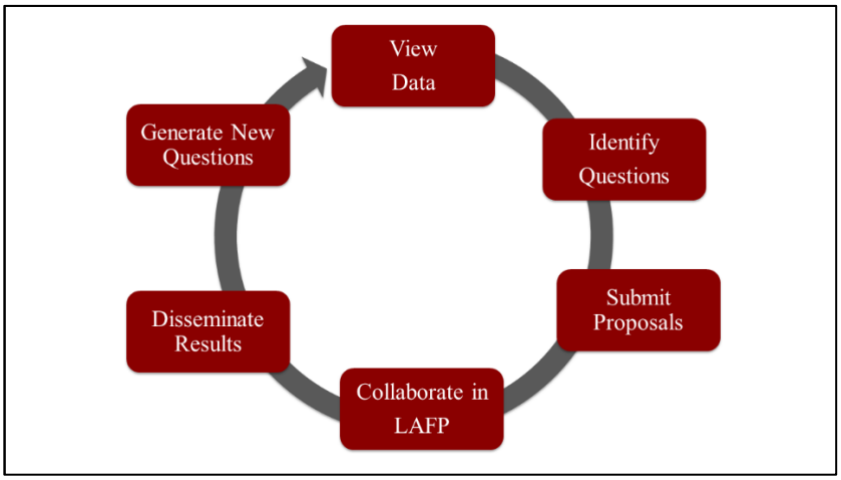

Figure 1. Iterative cycle of faculty engagement.

CLASS facilitates the program, selecting the proposals that will receive funding, holding monthly meetings, sponsoring an annual campus-wide showcase, and hosting an annual celebration attended by the Provost and Vice Provost of our campus. BAR provides support to the faculty, offering useable student records data, various data dashboards, and statistical analysis to those who request it. All aspects of the work are discussed with the BAR staff, including the availability of data, how data will be analyzed and the skill sets of the researcher. For some, this initial conversation is the beginning of a close partnership with BAR, while other Fellows opt to work independently, only returning to BAR with specific questions or data needs (Rehrey et al., 2018). The Office of the Vice-Provost for Undergraduate Education (OVPUE) is also part of the community, providing funding and important high-level visibility to the faculty projects (Figure 2).

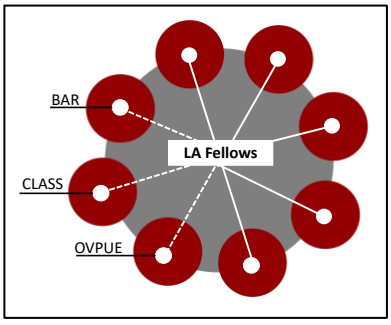

Figure 2. Structure of the LA Fellows Program.

Data is provided to each faculty member who meets the research requirements of their project. The typical data made available include the following: a longitudinal view of student progression from admission to graduation, a historical record

of student performance in courses, academic major choices/major changes, and admission/demographic information about the students such as academic preparation for college (e.g., SAT/ACT, HS GPA), residency, gender, and ethnicity. Data dictionaries and data security measures are provided to facilitate the work (Rehrey et al., 2019). When we started the program, we had created data dashboards and analytical tools for campus administrators. As the Fellow program unfolded, faculty needs and input helped to shape the further development of those tools for broader campus use. Thus, a program that was initiated to advance a data-informed culture, evolved into a human-centred design process.

Table 1. Selected Examples of LA Fellows' Projects

Program	Level of Analyses/Who Benefits	Questions	Analysis/Findings
Public & Environmental Affairs	**Course Level:** Students in the target course **Who Benefits:** Students, instructors, curriculum designers, advisors	What is the profile of the students who are successful (grade of "C" or better) in healthcare finance and economics courses? Should prerequisite sequence be enforced to improve student success in the course?	Descriptive and inferential analyses comparing profiles of successful/non-successful students particularly as it relates to academic preparation for the target course. Prerequisite courses are not showing desired effect in target course performance.
Business	**Program Level**: Degree recipients in program **Who Benefits:** Students in programs, curriculum committees, scheduling officers, academic advisors	How does the sequencing of major courses influence student success? Does taking major courses earlier in their college years contribute to greater success?	Descriptive analyses provided initial insights suggesting that early start of major courses did not lead to higher academic performance, or quicker time to degree, or higher credit hour accumulation.
Economics	**Institution Level:** Degree recipients at the institution **Who Benefits:** STEM instructors, STEM administrators	Does academic performance by gender make a difference in student persistence in STEM disciplines? Are women more sensitive to grades in their decisions to persist in STEM?	Descriptive analyses and predictive analyses suggest that women exhibit a relatively stronger response to grades in their decisions to persist in STEM or switch to another field. Men's decisions to persist in Social Sciences, Humanities, and Education show relatively stronger sensitivity to grades.

Table 1 provides selected examples of the Fellows' projects. These projects illustrate a broad definition of LA used on our campus, which is the measurement, collection, and analysis of data about students for the purpose of improving teaching, learning, and student success at the course, program, and institutional levels. This definition differs slightly from the prevalent one of Long and Siemens (2011) that focuses on students as learners and on optimizing learning environments. Generally, our Fellows ask questions about student success across all levels of analysis. This includes the profile and preparation of students in their courses, the performance and academic pathways of students after completing their course or understanding successful trajectories for students in their academic programs or at the institution. For each example project, Table 1 shows the Fellow's home program, the level of focus (there is one example each for course level, program level, and institution level), who would benefit from the results, the types of questions being asked, and a brief description of the analyses and some initial findings.

Now in its fourth year, the LAFP has engaged 41 faculty from 22 individual disciplines, representing all the major academic fields. We encourage faculty to submit new proposals each year as their research matures and evolves. To date, 17 faculty have returned for a second or third year, with four faculty participating in the program each of the four years.

We have observed that a majority of the faculty questions about their students could be categorized into four major factors that influence student success: choice, persistence, preparation, and performance (Figure 3). It is worth noting that these factors are interrelated, with most faculty questions simultaneously touching upon more than one factor. For example, one participant wanted to determine the impact an upstream course had on the students in her course, and whether it influenced the performance of underrepresented minority students in her course differently. The project questions helped us shape the data infrastructure to best serve the lines of inquiry that most faculty are interested in pursuing.

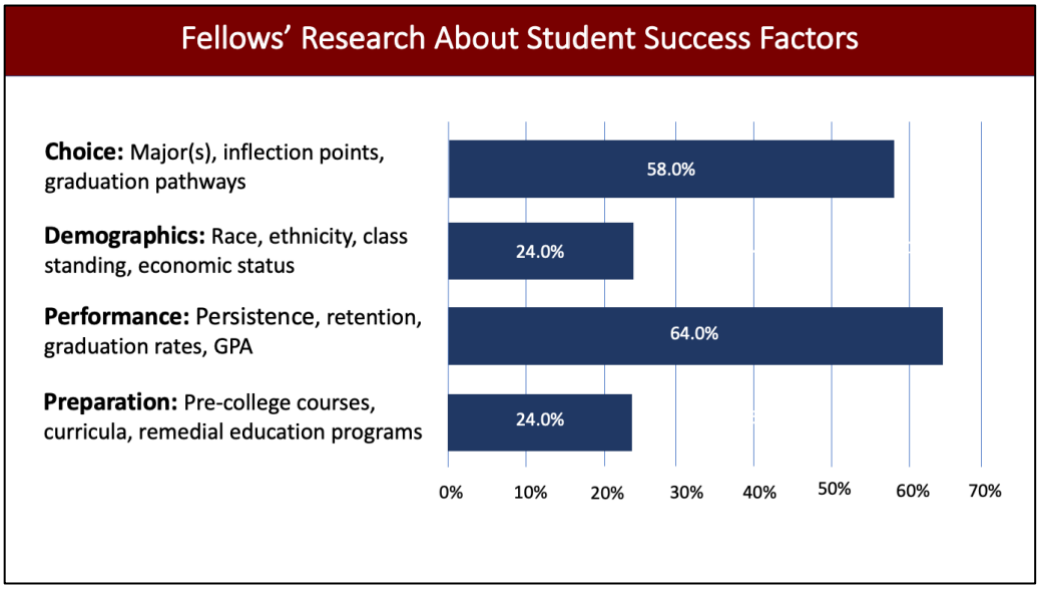

Figure 3. Focus of the faculty research questions as self-reported.

It takes time to establish a fully operational culture that values LA. According the Association of American Universities (AAU, 2017), sustained adoption of new practices in higher education can take upwards of seven to ten years to be achieved. Thus, we are particularly interested in understanding elements of an emerging data-informed culture that will enhance the student experience and student success. For this paper, we asked the following Evaluation Questions (EQ):

1) Did the program engage faculty in the ownership of student success?
2) Does faculty engagement in the scholarship of student success help create and advance a data-informed culture?
3) To what extent do faculty see themselves as part of a community with a mission of increasing student success?

2 Methods

To evaluate the effects of the LAFP and its outreach over the first four years, we collected faculty insights from three sources: 1) a survey distributed to the 41 faculty who completed their research projects; 2) a departmental survey distributed to 1110 persons with teaching appointments (i.e., faculty and graduate assistant instructors) based in the departments of the participating faculty; and, 3) in-depth interviews with three research teams chosen for longevity in the program and multiple faculty on the project. The project teams were from the Student Academic Center, Department of Economics, and the Department of Recreation, Parks, and Tourism Studies.

The faculty survey had 10 items, seven Likert-style, two project description questions, and one question about dissemination. All items provided the opportunity for participants to add comments. The 10 survey items were designed to address our EQs, as previously discussed. In Table 2, for example, survey items 1–4 were designed to provide responses that would answer EQ1. The departmental survey consisted of three items designed to determine the possible spread of a data-informed culture sought through the LAFP. The survey was distributed via Qualtrics to each department where a faculty member was based, with two follow-up email requests.

An inductive approach was used to analyze the qualitative data generated by the in-depth interviews. Three of the authors of this paper individually identified themes in the text of the hour-long project team interviews after they were transcribed. After agreeing upon keywords for those themes, the texts were coded to identify ideas that could be related to EQs. Our conclusions about the success of the program were drawn from that analysis.

3 Results and Discussion

In this section, we discuss the results of the faculty and departmental surveys before reporting on the in-depth interviews that we conducted with a select number of LA Fellows, as described in the Methods section.

3.1 Faculty Survey

The response rate for the faculty survey was 90.5% (38 of 42 projects were represented by Fellow responses to the survey, for the four years the program has been in existence). Table 2 shows the responses to the survey items and how they aligned with our three program Evaluation Questions (EQ). In general, we see positive responses to EQ1: Did the program engage faculty in the ownership of student success? As indicated in the table, a majority responded that they have made or will make teaching and learning changes, that they now see student success as a part of their role, and that they now see the value of using student LA data to make academic decisions. The question about valuing the importance of students' academic careers more than before participating in the LAFP was less compelling; only 33.4% were in agreement with the statement. Nine participants wrote comments explaining why they disagreed in their responses. Six of the nine indicated that they had "always" valued the importance of their students' academic careers.

For EQ2, respondents were asked directly about whether designing research projects on student success helped create a data-informed culture in their department. The majority did report that working with student learning analytical data had increased the chance that their department would use data to inform its decisions. However, only 41% indicated that their department has made or will make administrative decisions on the basis of their research. A typical comment explaining the lack of agreement with this statement is that within a unit, discussions are taking place and actions are still being considered. This suggests that it may be too soon to see change at the departmental level. To some degree, this affirms one of the underlying premises of our change model, which is that cultural change at the departmental level requires long-term engagement with multiple faculty members.

The third EQ asked to what extent faculty see themselves as part of a community with a mission of increasing student success. The survey asked this directly, and the vast majority of faculty responded in the affirmative. One faculty member indicated that the community was a major strength of the program while another affirmed that, "As a new faculty, it can be hard to begin making connections outside of my department and this has allowed me to meet and interact with other faculty who share the same values as I do regarding student success."

To understand how LAFP participants might be communicating with other faculty in order to form a community, we also asked them to tell us where they had shared the results of their projects (if indeed they had shared them). We found that 79% had shared with other faculty in their department, 50% had shared with faculty in other departments at our university, 38% had shared at a national learning analytics colloquium, 24% had shared at other professional conferences, and 18% had shared through manuscripts written for publication. Faculty could and did share in more than one way, so these numbers do not sum to 100%. The responses provide some information about how faculty can build a community with a mission of increasing student success, by extending what they have learned about analytic data to other faculty through dissemination.

Although we recognize that self-reporting surveys can be biased (Ebert-May et al., 2011), based on the responses to the survey questions aligned with the EQs, we can make some tentative claims that the program engaged faculty in the ownership of student success, the faculty generation of student success questions is beginning to create a data-informed culture, and faculty see themselves as part of a student-success supporting community. However, the results must be viewed as preliminary steps to understanding the effectiveness of the program in reaching its goals.

3.2 Departmental Colleagues Survey

While surveying the LAFP participants, we also reached out to faculty and administrators who were colleagues of the faculty. We sought to learn how many were aware that they had a colleague conducting learning analytics studies. We sent a brief, three-question survey to 1110 faculty and administrators. If the response to the first question (whether they knew someone conducting learning analytics research) was "No," the survey was over. The response rate was only 14%, which means that the surveys we did collect should be viewed with a high measure of caution. Of the 14% of colleagues (153 people) who did respond to the survey, 39% (60 people) said they did know someone conducting this research, either in their own department, in another department, or both. Continuing to the next question, 56% agreed or strongly agreed that they were familiar with how learning analytics can provide information for student success. The final question, "I see the value of using student learning analytics data to make academic decisions," yielded "agree or strongly agree" responses from 65% of the colleagues. Again, these numbers should not be taken as an indication that there is a spread in the ideas about learning analytics, since the response rate is so low. We might at best consider this a baseline and hope to see these numbers grow in future years.

Table 2. Faculty Survey Response

	Strongly agree or agree	Neither agree nor disagree	Strongly disagree or disagree
EQ1: Did the program engage faculty in the ownership of student success?			
1. I have made or will make teaching and learning changes as a result of my most recent student learning analytics project	64.7%	23.5%	11.8%
2. I now see student success as a part of my role as a faculty member more so than before I joined the LAFP	58.8%	17.6%	23.5%
3. I now see the value of using student learning analytical data to make academic decisions more so than before I joined the LAFP	82.4%	11.8%	5.9%
4. I now value the importance of my students' academic careers more so than before I joined the LAFP	33.4%	45.5%	21.3%
EQ2: Does faculty engagement in the scholarship of student success help create and advance a data-informed culture?			
5. My working with student learning analytical data has increased the chance that my department will use data to inform its decisions	73.5%	20.6%	5.8%
6. My department has made or will make administrative decisions on the basis of my student learning analytics research	41.1%	44.1%	14.7%
EQ3: To what extent do faculty see themselves as part of a community with a mission of increased student success?			
7. Being a part of the faculty program has helped me feel a part of a community with a mission of increasing student success	85.3%	11.8%	2.9%

3.3 In-Depth Interviews

To gain a fuller understanding of the impact of the LAFP, we conducted in-depth interviews with three units (six people) that had multiple faculty with multiple years of experience as participants in the program. With these participants we hoped to observe a progression of change, moving from new awareness to actions. The insights from the interviews affirm the findings from the faculty survey across our main research questions, facilitating ownership of student success, an evidence-driven culture, and a community with a mission of institutional improvement. Faculty have indicated a new ownership and responsibility for the success of our students. As one faculty member stated, "I think that there is a steady cultural change about how the faculty had been affected by the work, such as attitudes or beliefs about student success or even changes going on thanks to the availability of this data and so it is definitely having an effect."

Within this limited time-frame, we have collected evidence of an emerging culture and community focused on student success. Faculty specifically stated that the biggest change over time had been a growing interest among faculty in their department. One faculty member described how the research provided him with more confidence to speak about their programs, highlighting the value of a data-informed culture: "Because of the research we have conducted, I have a lot more confidence about our programs ... It's much better than being vague and saying we offer this class and think it helps."

4 Conclusion

Our initial results confirmed previous insights discussed in the literature we have cited about transforming higher education. As suggested by Baepler and Murdoch (2010), we found that by engaging faculty in LA, there are new opportunities for understanding and improving student learning. One faculty member stated that the program had provided a sense of empowerment to use data to find answers, improving the student experience and curriculum. Williams et al. (2013) discussed isolation as the most challenging barrier for culture change. We observed growing communities in many of our participating units along with an increase in the number of faculty participating in the work. Program participants communicated with disciplinary peers and shared research findings, providing opportunities for the results to be validated by their colleagues (Fairweather, 2008). The formation of a community takes time (AAU, 2017) and yet we hear optimistic comments from our program participants.

The vast majority indicated that being a part of the LAFP has helped them belong to a community with a mission of increasing student success. Faculty have commented that one of the major strengths of the program was sharing work and being connected to a community focused on enhancing the student experience.

Our formative program evaluation has provided a limited view of the culture we aspired to cultivate and grow. Increased participation in all of our surveys and interviews could facilitate richer insights into the progression of our program. We also discovered that multi-year participants responded to the faculty survey by reporting on their collective years in the program. Since those faculty work on different projects each year, there may be value in having an annual survey for a contextual understanding of their comments. The extremely low response rate (14%) for the departmental survey limits our ability to use the results. The main information we sought was whether departmental colleagues knew of someone doing a learning analytics project. The fact that so few people responded to the survey may itself be an indicator of the lack of knowledge about learning analytics research.

In the future, we plan to analyze in more depth the actual findings of the faculty projects and how they have disseminated their work in published manuscripts, scholarly journals, and disciplinary forums. We will also determine what actions the faculty have taken to advance student success based upon their findings. New measures besides self-reports are needed to capture the emerging culture. We are currently in the process of developing a more comprehensive program assessment strategy, based partially upon the limitations discovered in this study. We recognize that these initial evaluation results provided information from the bottom-up (faculty) and middle-out (department), but we do not yet have formal information from the administrators and facilitators of the program (top-down).

The preliminary results from this initial evaluation of the LAFP are promising. We envision, as does Williams et al. (2013), a time when inquiry, evidence, and innovation are a part of academic discourse and the results from inquiry affect the student experience. This will mean that faculty will look beyond anecdote and ask to be informed by data, and that they will be empowered to enact innovations and know that they can readily collect data about their effectiveness. We have observed that the faculty project results are being discussed broadly across disciplinary boundaries and our typical institutional silos. We are heartened by the emerging data-informed culture on our campus and broad and deep participation of our faculty as they engage in the scholarship of student success. We look forward to the opportunities for classroom, program, and institutional improvements based on knowledge gained, thoughtful dialog, and growing participation.

Declaration of Conflicting Interest

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