

2020

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Guy, Batsheva R.. (2020). Participatory Approach to Program Evaluation: Learning from Students and Faculty to Improve Training in Biomedical Informatics. *i.e.: inquiry in education: Vol. 12: Iss. 2, Article 12.*

Retrieved from: <https://digitalcommons.nl.edu/ie/vol12/iss2/12>

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i.e.: inquiry in education is published by the Center for Inquiry in Education, National-Louis University, Chicago, IL.

Participatory Approach to Program Evaluation:

Learning from Students and Faculty to Improve Training in Biomedical Informatics

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Abstract

Participatory evaluation tools have been shown to be effective for program development in various settings, including in higher education. Taking student perspectives into consideration is key for graduate program development, particularly in interdisciplinary programs. The current study utilizes Group Level Assessment (GLA), a participatory program evaluation tool, to evaluate the Biomedical Informatics (BMI) PhD Program at the University of Cincinnati (UC) and Cincinnati Children's Hospital Medical Center (CCHMC). The study was conducted two years after the program was established, an appropriate timing to gauge the opinions of current doctoral students as the program grows and develops. The findings show the strengths and identify areas of improvement of the doctoral program, providing an evidence base for administrators and faculty to work collaboratively with students to capitalize on assets and address potential issues.

Keywords: Participatory Methods, Program Evaluation, Higher Education, Graduate Education, Biomedical Informatics

Introduction

Biomedical Informatics (BMI) is a heavily interdisciplinary field that combines the foundational theory and practice from fields such as medicine, information technology, engineering, computer science, and biomedical sciences (Kane, & Brewer, 2007; Patel et al., 2009). BMI bridges the gap between information sciences and applied healthcare practices and biomedicine, requiring multiple perspectives to be a part of developing BMI curricula (Kulikowski et al., 2012). As such, developing a BMI graduate program for graduate students must involve collaboration between departments as well as a variety of stakeholders in higher education. Taking student and faculty perspectives into consideration is key for graduate program development, particularly in interdisciplinary programs (Graybill et al., 2006; Seale, 2010).

Participatory evaluation tools have been shown to be effective for program development in various settings, including in higher education (Campbell et al., 2005). The current study utilizes Group Level Assessment (GLA), a participatory program evaluation tool (Vaughn & Lohmueller, 1998; Vaughn & Lohmueller, 2014), to evaluate the BMI PhD Program at the University of Cincinnati (UC) in partnership with Cincinnati Children's Hospital Medical Center (CCHMC). GLA is a novel method developed by Vaughn and Lohmueller in 1998 to create change in organizations through engaging multiple stakeholders. GLA is an interactive, participant-driven process that can be used to engage stakeholders in a community or program (Arthur & Guy, 2020; Guy, 2017; Guy & Boards, 2019; Vaughn & Lohmueller, 1998; Vaughn & Lohmueller, 2014).

GLA has been recently used for a variety of purposes in higher education with both faculty and students in order to develop programming that benefits the populations examined. Guy (2017) utilized the GLA process with faculty in science, technology, engineering, and mathematics (STEM) programs to explore their pedagogical techniques. Guy and Boards (2019) and Arthur and Guy (2020) implemented GLAs with women enrolled in STEM graduate and undergraduate programs, respectively, to propose programming that benefits students in STEM fields. Because BMI is an interdisciplinary STEM field, the GLA process could prove successful within a GLA program with both faculty and students.

Furthermore, data gathered with GLA methodology leads to the creation of action plans that work towards program development and problem-solving within an organization (Vaughn & Lohmueller, 1998; Vaughn & Lohmueller, 2014). By using a GLA within a graduate program, suggestions created in an action plan can be implemented to improve the program. The current study was conducted three years after the program was established, an appropriate timing to gauge the opinions of current doctoral students and graduate faculty members as the program grows and develops. Findings of this study show the strengths of the doctoral program and identify its areas for improvement, providing an evidence base for administrators and faculty to work collaboratively with students to capitalize on assets and address potential issues.

Method

Data was collected via two 1-hour GLA sessions. The participants in the first GLA (November 2017), who were recruited via email, included ten out of the 12 doctoral students enrolled in the BMI PhD Program when data was collected. The second GLA (August 2018) occurred during a regularly scheduled BMI Graduate Faculty meeting; participants included 16 out of the 36 graduate faculty members in the BMI PhD Program. Both GLAs involved a stepwise process (see Figure 1) of response, reflection, analysis, and discussion (Vaughn et al., 2011). The process of GLA involves six phases, or steps, and was conducted as follows:

1. *Climate Setting*: The GLA process is typically 1.5 to 2 hours long, but because I was only able to get two hour-long meetings with students and faculty, respectively, the climate setting phase needed to be truncated. The climate setting phase is typically meant as an ice breaker and to orient participants to one another as well as to introduce the GLA process and explain the purpose. However, in the current GLA, everyone already knew

each other well, so I went straight into introducing the purpose of the GLA as it relates to improving the graduate program, as well as briefly explaining the stepwise process.

2. *Generating*: The generating phase is the foundation of the GLA process, during which qualitative data is collected. Participants respond in writing to a series of prompts on large sheets of paper posted on the walls. Examples of prompts include “The BMI Graduate Program’s biggest strength is . . .” and “One thing I would change about the program is . . .” (refer to Appendices A and B for a full list of prompts in each GLA).
3. *Appreciating & Reflecting*: Again, due to time constraints, I combined two GLA steps that are typically split into two phases—appreciating and reflecting. In this combined step, participants walked around the room to read and individually reflect on the prompt responses as a whole.
4. *Understanding*: The understanding phase involves an abbreviated thematic analysis. Participants were divided into small groups of four or five and prompts were split between the groups. I then instructed participants to look across the prompts they were given and organize responses into a minimum of three and a maximum of five themes.
5. *Selecting*: In the selecting phase, the small groups come back together to form the larger group once again. Each small group shares out their themes, and as a large group with guided facilitation, the themes were combined and consolidated.
6. *Action*: Finally, participants used the key themes to develop an action plan to improve the program (see Tables 1 and 2).

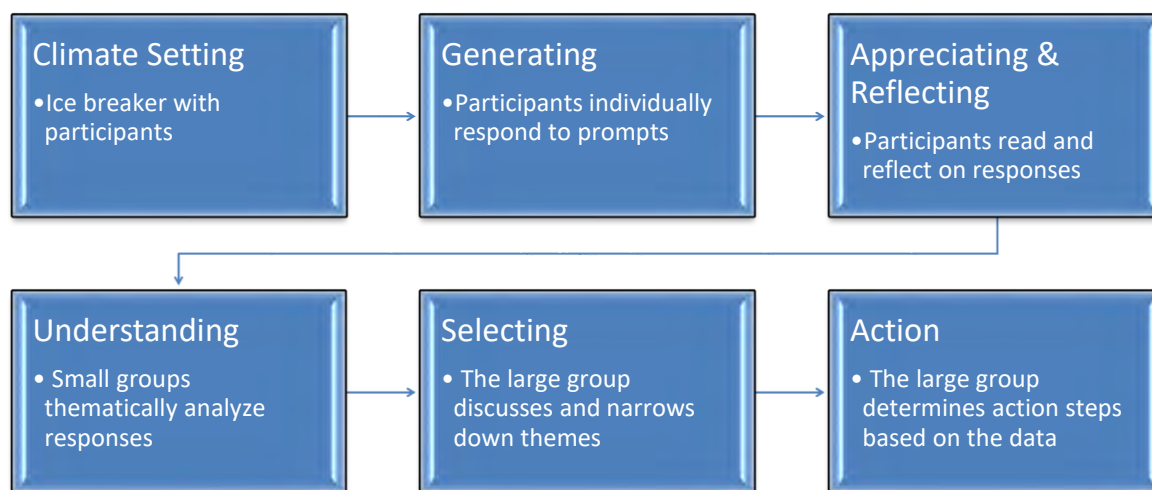


Figure 1. Group Level Assessment Process

Following the GLAs, I conducted a second wave of analysis of the combined data from both GLAs using Braun and Clarke’s (2006) thematic analysis technique.

Findings

Findings from the GLA with the PhD students indicated that while the BMI PhD program provides students with a balanced curriculum covering both clinical and bio-informatics, as well as a breadth of diverse research opportunities, the students would like the program to provide more opportunities and support for professional development. Following the consolidation of themes, participants also highlighted the importance of additional mechanisms to capitalize fully on the diversity of faculty research and backgrounds, and more structured forms of preparation for life beyond the PhD (e.g. help with job searches, time management, and work-life balance). Furthermore, participants decided on the following action steps to help meet the aforementioned goals: (a) creating an interactive PhD student timeline to measure progress towards completion of the dissertation, (b) updating the doctoral program handbook, (c) developing a comprehensive student page on Blackboard (UC's learning management system), and (d) scheduling biweekly advising meetings with BMI doctoral students (see Table 1).

Table 1. Group Level Assessment Findings with Biomedical Informatics PhD Students

Group 1 Themes	<ol style="list-style-type: none"> 1. Variety of people, places, skills 2. Balance 3. Conferences; networking; contacts 4. Funding
Group 2 Themes	<ol style="list-style-type: none"> 1. Diversity in research and people 2. Mentoring and involvement of faculty in BMI program 3. Coordination within and beyond the program
Final Combined Themes	<ol style="list-style-type: none"> 1. Timeline and requirements 2. Take advantage of diversity 3. (Faculty) mentoring/involvement 4. Life beyond PhD (jobs, balance)
Identified Action Steps	<ol style="list-style-type: none"> 1. Create student timeline 2. Update handbook 3. Create Blackboard page & Google sheet 4. Schedule biweekly meetings

During the GLA with BMI graduate faculty, participants discussed that they would like the PhD program to be more inclusive in consulting the diverse faculty group regarding admissions decisions and curriculum updates. Faculty also indicated a need for increasing faculty engagement, improving the program's core curriculum, and incorporating student feedback. As with the first GLA, participants agreed upon action items to help identify ways that the graduate program could be improved, including: (a) holding more frequent, topical graduate faculty meetings; (b) re-evaluating the curriculum and objectives (i.e. core courses); (c) developing an applicant selection process that is inclusive of all faculty; and (d) keeping faculty informed about student timelines and milestones (see Table 2).

Table 2. Group Level Assessment Findings with BMI Graduate Faculty

Group 1 Themes	<ol style="list-style-type: none"> 1. Mentoring is important 2. Students are spread too thin academically 3. Full spectrum communication with students 4. More computer science background students in the mix 5. Enhanced vision shared with faculty
Group 2 Themes	<ol style="list-style-type: none"> 1. Improve financial model 2. Broader selection process 3. Need student's feedback
Group 3 Themes	<ol style="list-style-type: none"> 1. Energy 2. Strong work ethic 3. Poor scientific research methods expertise 4. Faculty motivated by tangible, clinical translational work/interaction
Group 4 Themes	<ol style="list-style-type: none"> 1. Facilitation of acquisition 2. Training 3. Removal of obstacles, institutional and educational 4. Domain independent data sciences 5. Deep expertise/background recruitment 6. Speed dating between disciplines, inside and outside of department and institutions
Final Combined Themes	<ol style="list-style-type: none"> 1. Faculty engagement (input/communication/participation) 2. Financial barriers/resources 3. Quality of applicants 4. Student feedback 5. University integration
Identified Action Steps	<ol style="list-style-type: none"> 1. More frequent, topical graduate faculty meetings 2. Re-evaluate the curriculum and objectives (i.e., core courses) 3. Develop an applicant selection process that is inclusive of all faculty 4. Keep faculty informed about student timelines and milestones

Discussion

The heavily interdisciplinary nature of BMI poses particular challenges when programs try to implement a cohesive graduate program with a common core. The GLA methodology for engaging graduate students and faculty in shaping their own program has proven effective in several ways. Student participation was high, faculty were engaged, and feedback on the GLA process was positive. The GLA process unveiled several concrete action steps that the BMI program leadership was prepared to undertake, all of which would clearly have a positive impact on student life and on the progression of the PhD program. In fact, each of the action items from both the student and faculty GLAs were implemented within two months of the GLA date. The quick turnaround on responding to action items by BMI administration demonstrates the success of utilizing GLAs in program development. This success implies that the GLA process could be

used in a variety of educational settings as a form of program assessment that would lead to concrete, positive change.

GLA is a low barrier, simple-to-apply approach and can be administered by program staff with minimal training. GLA has been shown to foster collaboration between various stakeholders and can be implemented with faculty, administrative staff, and students during the same session. Additionally, the flexibility of GLA allows facilitators to tailor their prompts to either broadly evaluate a program or answer more specific programmatic questions. This, along with a diverse group of participants, paves the way for the integration of various viewpoints, and, therefore, a salient action plan that is relevant and timely. The current study, therefore, demonstrates that the education field could capitalize on the GLA process to improve the student and faculty experience in a variety of departments and offices. In the future, GLA could be implemented across higher education to evaluate and develop programming not only in graduate programs, but also in undergraduate programs, faculty development, and staff support.

Dr. Sheva Guy is a participatory action researcher and educator who currently works in the field of faculty development at the University of Cincinnati. Her research interests include equity and inclusion in higher education, particularly using feminist participatory methods to promote the retention of women students and faculty in STEM fields through program development. Dr. Guy, a graduate of University of Cincinnati's Educational and Community-Based Action Research PhD program, has recently published articles on topics such as: using participatory methods to understand women engineering students' experiences during co-op, exploring the "action" portion of a feminist participatory action research project, and using the listening guide to explore women's experiences with their late-term abortions.

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Appendix A: GLA Prompts with PhD Students

1. What I LOVE about being a BMI PhD student:
2. What I need from faculty/program coordinator
3. If the BMI PhD cohort was an animal, it would be a _____.
4. One thing I would change about the BMI PhD program is:
5. As a BMI PhD student, I am worried about . . .
6. Professional development opportunities that I have access to/ wish I had access to
7. The BMI PhD Program's biggest strength is . . .

Appendix B: GLA Prompts with Faculty

1. The department needs to change _____ to support the graduate program.
2. The department needs to keep doing _____ to continue supporting the graduate program.
3. Words that describe my encounters with the BMI graduate program include:
4. Words that describe my encounters with the BMI graduate students include:
5. The BMI graduate program can support me by _____.
6. The BMI graduate program's greatest strength is:
7. The BMI graduate program's biggest weakness is:
8. One thing I would change about the BMI graduate program is:
9. A book chapter to describe my experience with the BMI graduate program would be called _____.
10. I wish I knew _____ about the graduate program in BMI.
11. _____ would motivate me to engage in the graduate program.
12. A barrier that prevents me from engaging in the graduate program is . . .
13. I engage in the BMI graduate program by . . .