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Movers, Shakers, & Everyone in Between: Faculty Personas Surrounding Active Learning in the Undergraduate STEM Classroom

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Faculty Personas Surrounding Active Learning in the Undergraduate STEM Classroom

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Introduction

Several studies have reported positive academic and learning outcomes following the implementation of active learning (Armbruster, Patel, Johnson, & Weiss, 2009; Campisi & Finn, 2011; Carmichael, 2009). For example, active learning improves academic outcomes such as performance in the form of grades and GPA (Armbruster et al., 2009; Carmichael, 2009; Eddy & Hogan, 2014; FitzPatrick, Finn, & Campisi, 2011; Preszler, 2009; Yoder & Hochevar, 2005) as well as learning (Campisi & Finn, 2011; Cavanagh, 2011; FitzPatrick et al., 2011; Nelson & Crow, 2014; Smart, Witt, & Scott, 2012). Active learning has also been shown to positively impact student engagement (Cavanagh, 2011; Gauci, Dantas, Williams, & Kemm, 2009) and attitudes about the material (Armbruster et al., 2009; Campisi & Finn, 2011; Minhas, Ghosh, & Swanzy, 2012; Smart et al., 2012).

Although there is a dearth of research surrounding faculty attitudes towards active learning, some literature from physics journals indicates that physics faculty are not using active learning due to situational barriers, such as physical classroom structure and lack of evidence-based knowledge about active learning (Dancy & Henderson, 2010; Henderson & Dancy, 2007). However, articles in other fields regarding this topic were not found; this lack of research warrants additional exploration of this subject. The current research study will attempt to address this gap and further examine the attitudes of STEM (Science, Technology, Engineering, and Mathematics) faculty towards active learning.

The purpose of this qualitative, exploratory study is to examine STEM faculty attitudes surrounding active learning pedagogy at a large, Midwestern research university. The specific aim of this study is to understand how STEM faculty who have used active learning techniques feel about them, in addition to what barriers to active learning they have faced. For this research study, active learning (AL) is defined as any pedagogical technique that encourages students to engage in the material, in the form of meaningful activities that support course learning outcomes (Prince, 2004).

The current study explores the following three questions as they pertain specifically to the author's university of study:

1. What attitudes do STEM faculty have about AL?
2. What barriers do STEM faculty face when implementing AL?
3. What would encourage STEM faculty to use AL?

Positionality

My stance surrounding the topic of AL is two-fold—both as a former undergraduate STEM student as well as a current adjunct faculty member. As an undergraduate pre-med student, I found the typical lecture, especially in my science courses, to be dull, unengaging, and intimidating. I felt that listening to my professor read off slides directly from our textbook was counterproductive to my own learning. While this isn't necessarily what deterred me from my initial career path from the sciences to the humanities, it was certainly a contributing factor. That being said, as a psychology instructor, I have experienced the difficulties on the other end as I implement AL into my own undergraduate classroom. I have found resistance to AL not only from students, but from myself as well, as I struggle to balance my time to create and implement AL activities with time to properly cover the material that I am obligated to teach my students. Each of these perspectives has led me to take an interest in providing faculty and graduate student instructors with teaching support.

Methods

Participants

Participants (n=12) were recruited via email through my connections with STEM faculty members, in combination with snowball sampling (Creswell, 2015). Participant recruitment took place at the institution where I am completing my doctoral studies, which is the same institution where I completed my undergraduate degree. Participants were from a variety of departments, such as biology, physics, neuroscience, engineering, and psychology. The sampling strategy involved the following inclusion criteria: (a) faculty who are teaching or have taught undergraduate students at the current institution; (b) faculty teaching in STEM departments; and (c) faculty who have used AL techniques in some capacity in their undergraduate classroom. The current study includes the social sciences within STEM.

Data Collection

Data was gathered using a modified group-level assessment in an online format. Group-level assessment (GLA) is a qualitative methodology meant for collecting data with large groups in a participatory fashion (Vaughn & Lohmueller, 2014). This research study planned to follow the process for conducting a GLA as described by Vaughn and Lohmueller (2014). However, difficulties arose in scheduling a single two-hour block in which multiple faculty members could attend data collection at the same place and time, so the GLA process was modified for an online setting. In a traditional GLA, participants respond to prompts on large sheets of paper in the "generating" phase (Vaughn & Lohmueller, 2014). Following this phase, a reflection step and an informal thematic analysis are conducted with participants. In the current modified online version, the GLA involved participants responding to a series of prompts via Google Documents,

and, therefore, did not extend past the generating phase. The GLA was available online for two weeks, and participants were free to respond anytime within that time frame. Responses were anonymous. Participants were instructed to put a star (*) next to responses from other participants that they agreed with. The Appendix includes the GLA prompts used.

Each of the personas finds value in AL as "a way to truly interact with the material," and sees AL as evidence-based and successful.

The current study was reviewed by my institution's IRB, who deemed the research to be "nonhuman subjects" and, therefore, exempt from review. Because this study aims to explore faculty attitudes at my university of study in particular, the findings are not generalizable.

Data Analysis

I analyzed the GLA documents using Braun and Clarke's (2006) thematic analysis approach through searching for patterns, coding GLA responses, and developing themes. I began by separating out relevant prompt responses, grouping similar responses together, and using these to create initial codes. These codes allowed me to identify salient patterns, and, finally, identify my main themes. Based on the thematic analysis, I developed personas (Chapman, Love, Milham, ElRif, & Alford, 2008; Vaughn, DeJonckheere, & Pratap, 2016) to represent typical faculty members' experiences with AL and address their specific needs.

Findings

I developed four personas as a result of the thematic analysis—the Mover, the Shaker, the Planner, and the Feeler. Each of these personas has individualized attitudes and needs surrounding the implementation of AL in the undergraduate STEM classroom. Table 1 provides a summary of these four personas, which includes barriers and support factors in regards to applying AL, as well as faculty needs in order to better implement AL. Each of the personas finds value in AL as "a way to truly interact with the material," and sees AL as evidence-based and successful. One participant claims, "Studies indicate that (various) active pedagogies work better than standard lecture instruction." Another respondent believes AL is important because "if students are not mentally active during the learning process, then they are not as likely to learn," and five other participants agreed with this statement. One faculty member even compared AL to "playing a sport" and lecture to "watching [a sport] on TV." However, although the personas share similarities in terms of their support for and feelings towards AL as a pedagogical strategy, the individual personas are motivated and deterred by distinct groupings of factors.

Table 1
Faculty Personas Surrounding Active Learning

	Persona 1: The Mover	Persona 2: The Shaker	Persona 3: The Planner	Persona 4: The Feeler

Barriers	Class size Room structure	Lack of support	Time constraints Too much content	Fear Resistance
Support factors	More space Better technology	Teaching assistants Peer and administrative feedback	More time Less content	Creativity Courage
Needs	Maneuverable classroom environment	Student, administrative, and peer support	Ideas for activities Help with class prep	Help with creativity Overcoming fear

Persona 1: The Mover

The first faculty persona, "The Mover," is focused on the classroom environment and climate. Movers are primarily concerned with visible aspects of the classroom, such as class size, room structure, and technology present in the space. For example, as one respondent indicated, "seats bolted to the floors" are an actual physical barrier that make it difficult to implement AL activities that involve group work. Movers prefer a maneuverable classroom environment that provides technological flexibility and the ability to arrange a large class size into smaller, more manageable groups. Movers are looking for "better designed classrooms" that are spacious and promote ease of navigation by both the professor and the students.

Persona 2: The Shaker

The second faculty persona, "The Shaker," seeks to mobilize support at all levels: student, faculty, and administration. Shakers feel that there is a lack of support from university administration, and are seeking "support at the top levels (dean, provost) for [active learning]." Multiple participants in the GLA indicated a need for "student support" and "administrative support." Shakers would benefit most from "support personnel," such as teaching assistants for help with grading or "learning assistants" to aid with classroom management. Shakers also seek constructive "feedback" from both peers and administration, which could include "institutional rewards and recognition for good teaching."

Persona 3: The Planner

The third faculty persona, "The Planner," is searching for a way to integrate the necessary content to be covered with complementary AL activities into their classroom routine. Planners are interested in planning their classroom time and structuring activities that accompany course material. Planners struggle to balance their time between lecturing and interactive activities, and they feel that they lack enough "time to prepare" and have "too much content to cover." One of the faculty member participants described time management as being their biggest struggle, in that it is difficult to predict "how long things will take" during class time, which can lead to facing a difficult decision of "which existing materials to sacrifice." Planners would like "other professors to…give ideas" surrounding how they can better fuse course content with AL.

Persona 4: The Feeler

The final faculty persona, "The Feeler," is motivated and deterred by a series of internal factors, on the part of both themselves and their students. Feelers are emotionally charged and depend

upon reactions from students and peers. This persona can be hindered by fear of AL, a fear that they believe they share with their students. A GLA participant described students as being "nervous" about AL, with some even experiencing "fear," both of which are barriers to executing engaging AL activities. Feelers are also concerned with their own creativity—they acknowledge that both lack of "courage [and] creativity" can make it difficult to utilize AL. On the other hand, while fear is a barrier, excitement is a support factor. One faculty member describes their excitement with using AL for the first time: "It was so much better than lecturing!" Peer and administrative support for fostering creativity and overcoming fear is the main need of Feelers.

Conclusion

The findings from the GLA indicate that each unique faculty persona has individualized needs, which should be considered when determining how to help each type of faculty persona implement AL in the classroom. Because AL is a successful classroom technique, and it is unclear how often it is being used in the undergraduate STEM classroom, program development in this area is needed. Specifically, programs should be created or modified to support faculty members who are using or want to more effectively apply AL strategies. Additionally, because each faculty persona has needs that cannot be achieved by the faculty member independent of outside help, it is clear that administration and faculty members must work together to develop customizable ways to increase faculty use of AL.

Because AL is a successful classroom technique, and it is unclear how often it is being used in the undergraduate STEM classroom, program development in this area is needed.

There are a few limitations of the current study that could be improved upon in future inquiries. First of all, there were only 12 participants, so future studies with more faculty members involved would improve the trustworthiness of the study. Additionally, because responses to the GLA prompts were anonymous, I was unable to ask specific follow-up questions regarding initial responses. Finally, an online GLA was necessary due to participant constraints, but this modified method was not ideal, particularly because the final steps of the process were left incomplete. A potential future study could involve an in-person GLA that would provide built-in member checking during a first-wave of coding with the participants. Moreover, integrating interview data in future studies in conjunction with GLA would provide triangulation of data, and, therefore, stronger trustworthiness.

Additional future directions for the current study could include expanding the research beyond a single university and comparing results between the current university and universities with similar profiles. Further inquiry into this topic could also compare responses between different STEM fields—for example, whether or not social sciences faculty versus natural sciences faculty have different views on AL.

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Action Research (ECAR) Program. Her research interests revolve around utilizing participatory action research to reform teaching practices and inform program development in higher education.

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Appendix

GLA Prompts

1. I would define AL as _____.

2.

Barriers to AL are...	Support factors for AL are…

3. AL is important because...

4.

I wish more faculty knew _____ about AL.	We can increase faculty awareness of AL by _____.

5.

I am most challenged by _____ when using AL.	The most challenging part about course planning is _____.

6. I felt _____ when I first started implementing AL.

7. I chose to begin using AL because...

8.

UG students feel _____ about AL.	UG students feel _____ about lecture.

9.

I need more _____ to better implement AL in my courses.	I need less _____ to better implement AL in my courses.

10. I immediately think _____ when I see a faculty member not using AL.

11.

Examples of AL techniques include:	What AL techniques are the most useful?

12. *AL* is to _____ as *lecture* is to _____.

13. Come up with a catchphrase for AL:

14. Lecturing/lectures make me feel _____.

15.

I need _____ to support my teaching.	UG students need _____ to be successful.