

8-2017

Undergraduate and Teaching Assistants^{II}TM Perceptions of Classroom Community in Freshman Biological Sciences Laboratories and Implications for Persistence and Professional Development

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UNDERGRADUATE AND TEACHING ASSISTANTS' PERCEPTIONS OF CLASSROOM
COMMUNITY IN FRESHMAN BIOLOGICAL SCIENCES LABORATORIES AND IMPLICATIONS
FOR PERSISTENCE AND PROFESSIONAL DEVELOPMENT

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
Biological Sciences

by
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August 2017

Accepted by:
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ABSTRACT

The American economy hinges on the health and production of science, technology engineering and mathematics workforce (STEM). Although this sector of the American workforce represents a substantially fewer jobs the STEM workforce fuels job growth and sustainability in the other sectors of the American workforce. Unfortunately, over the next decade the U.S. will face an additional deficit of over a million STEM professionals, thus the need is here now to fill this deficit. STEM education should, therefore, be dedicated to producing graduates. One strategy to produce more STEM graduates is through retention of student in STEM majors. Retention or persistence is highly related to student sense of belonging in academic environments. This study investigates graduate teaching assistants (GTAs) perceptions of their classrooms and the implications of those perceptions on professional development. Furthermore, correlations between classroom community and student desire to persist, as measured by Rovai's Classroom Community Index (CCI) were established ($P=0.0311$). The interactions are described and results are discussed. Using a framework of teaching for community, and a qualitative analytic case study with memo writing about codes and themes methodology supported several themes including passion to teach and dedication to student learning, innovation in teaching practices based on evidence, an intrinsic desire to seek a diverse set of feedback, and instructors can foster community in the classroom. Using the same methodology one emergent theme, a tacit rather than explicit understanding of reading the classroom, was also present in the current study.

ABSTRACT (Continued)

Based on the results and using a lens for professional development, strategies and suggestions are made regarding strategies to enhance instructors' use of feedback and professional development.

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INTRODUCTION

STEM is defined as academic courses, degrees and jobs pertaining to the investigation and application of science, technology, engineering and mathematics. Two prior presidential administrations have placed emphasis on the health and growth of the STEM workforce (Borrego, 2002; Committee on STEM education National Science and Technology Council, 2013). Federal action plans and initiatives as well as state action plans and initiatives have been outlined to meet this emphasis (Committee on STEM education National Science and Technology Council, 2013; South Carolina State Department of Education, 2014). Some of these initiatives include delegating more state and federal funds towards current programs in STEM (South Carolina State Department of Education, 2014). Other programs focus on earlier engagement for K-12 students in STEM sciences (Presidents Council of Advisors on Science and Technology, 2010). Federal and state governments are investing heavily in STEM education primarily because the United States' economy relies heavily on graduates in STEM fields from colleges and universities (Gonzalez & Kuenzi, 2012). STEM jobs in the American workforce are responsible for supporting job growth and sustainability in other sectors of the American workforce (Langdon, McKittrick, Beede, Khan, & Doms, 2011). Furthermore, according to a report from the U.S. Department of Commerce, STEM job growth over the past decade has shown triple the growth as non-STEM job (Langdon et al., 2011). And, according to the same report, over the next ten years the STEM

workforce is expected to increase by 17 percent compared to non-STEM jobs at just under 10 percent growth. Therefore, producing competent STEM graduates continues to be a priority for American colleges and universities in order to grow the STEM workforce to keep pace with demand (Atkinson & Mayo, 2010).

To produce more graduates, colleges and universities have two options. Colleges and universities can place emphasis on recruitment of more students or they can place the emphasis on retention and persistence of current students. Although increased recruitment is considered to be a long-term solution to increasing graduation rates, it is a complex, multifaceted problem dependent on many factors. Recruitment depends on individual goals and the sum of student life experiences (e.g., academic, social, physical and spiritual experiences: Elliott & Healy, 2001). These are issues primarily for college and university administrations and beyond the scope of this work, which focuses on biology instructors and current STEM students. However, increasing retention and, more specifically, persistence is a path to increased production of STEM graduates that college and university instructors can influence.

Retention and persistence of students are readily achievable goals and are more of an “act now” solution to increase production of STEM graduates to bolster the American workforce (Elliott & Healy, 2001). The U.S. Department of Education defines and differentiates retention and persistence. Retention can be viewed from several different perspectives depending on which statistical outcomes the researchers are looking at (Styron Jr, 2010). For the purpose of this study, because our research focused

only on one institution, investigating one STEM department, retention will focus on institutional retention. Institutional retention is measured as the percentage of students who complete a program or maintain enrollment at their first institution (Cuccaro-Alamin, 1997). Persistence is the act of progressing towards an academic goal (Cuccaro-Alamin, 1997). Persistence is measured as the percentage of students who complete a program or maintain enrollment in any post-secondary institution. Efforts to increase retention and persistence essentially place priority on combatting attrition.

Attrition is defined by the reduction of students in academic majors due to students switching majors (decreasing persistence) or dropping out of college (decreasing retention) (Styron Jr, 2010). Attrition has been a major issue for STEM education for many years (Graham, Fredereick, Byars-Winston, Hunter, & Handelsman, 2013). Attrition and retention can be used as a measure of the “health” of an academic program within a university (Rovai, 2002). To better understand the underlying causes of attrition and retention, it is necessary to consider the problem from the students’ perspective, which is why we focus on persistence. Decreased retention of STEM students, resulting in decreased production of STEM graduates, stems from decreased persistence in STEM disciplines. Persistence is often affected by many intrinsic student factors such as determination and emotional intelligence (Parker, Hogan, Eastabrook, Oke, & Wood, 2006).

However, a student’s sense of community in an academic or social setting has been theoretically linked to increased likelihood of persistence by creating a sense of

belonging (Ashar & Skenes, 1993; Rovai & Wighting, 2005; Tucker, 1999). Research done by Tinto (1987) helped to form a model by which students in higher education are more likely to persist. Students that feel a stronger social connection to their peers (sense of community) have a greater sense of belonging to an academic discipline, and thus have a greater likelihood to persist within that discipline. Tinto's persistence theory emphasizes the importance of social integration and sense of belonging in higher education because a sense of belonging is fundamental in remaining in a social setting. Enhancing student sense of community in STEM disciplines is possible for college and university instructors, and is therefore in the scope of this study (Bitner & Bitner, 2002; Cooper & Robinson, 2014) . Because laying the foundation of enhancing student sense of community is crucial to improving STEM we investigated classroom community from the perspective of both instructors and students.

Background & Literature Review

Excellence in Teaching

To address attrition in higher education, U.S. colleges and universities need to equip instructors and future instructors to apply theory to practice in the classroom (Tinto, 2006). This means instructors should learn excellent teaching practices and incorporate them into their teaching practices (Langdon et al., 2011). Excellence in teaching is a standard for instructors in higher education meaning performing with

excellence in teaching roles is required for tenure and reappointment decisions in college and university academic departments (Ebert-May et al., 2015). Excellence in teaching however, is an ill-defined term and is not well described by just one single practice. Theory in excellence in teaching has sought to describe excellence in terms of instructor characteristics and practices and from the perspectives of both teachers and students. However, without a standard definition of excellence, description of excellent teaching is difficult.

Qualitative research on award-winning instructors' teaching practices and perceptions of their classes has, however, yielded a framework for excellence in teaching. Chickering et.al. (1987) and Dunkin's et.al. (1992) Excellence in Teaching framework equates excellence with award-winning. Excellence in Teaching describes three crucial characteristics of excellent instructors. These characteristics are having a passion to teach and a dedication to student learning, displaying innovation in teaching practices in response to evidence from feedback, and having an intrinsic desire to seek a diverse set of feedback. By viewing instructor data through the lens of excellence in teaching, it will help identify ways in which instructors are effective and whether they are capable of improving classroom community. Using this model and framework, conclusions about excellent instructors and excellent teaching can be described. For this reason, excellence in teaching will serve as one of the supporting frameworks for our Teaching for Community framework.

Excellence in teaching does not come overnight. More experienced instructors have had time to develop excellent teaching practices (Williams & Grudnoff, 2011). Unfortunately, less experienced instructors often report feeling lost or not provided continual training regarding their teaching (Park, 2002). Novice college instructors begin their teaching experience in graduate school as graduate teaching assistants (GTAs). Often these instructors teach small courses such as labs and discussion based classes (Muzaka, 2009). However, GTAs are sometimes not given the instructional development they need. GTAs often must split their time among teaching, research, and their classwork, with no clear direction as to which is most important (Dudley, 2009; Park, 2002). GTAs have a higher likelihood to have more direct contact with students because they generally teach lower enrollment courses as opposed to their faculty counterparts. Furthermore, GTAs represent future college and university faculty members. For these reasons GTA participants are used as a model for novice instructors in this study. As future college and university faculty, it is important GTAs are given avenues to teach with excellence and promote classroom community.

Professional development of instructional skills is available in many forms for faculty members. The most common form of feedback of teaching quality available to instructors in college courses are end of course evaluations (Kuh, 2003; Smith, 2007). End of course evaluations are intended to measure student perception of teaching quality. Many instructors and students agree the most accurate evaluation of a student perspective must come from students (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008;

Wilson, 1998). However, end of course evaluations are not always considered valid and their use as an indicator for quality instruction has also been called into question (Morrow, 1977; Smith, 2007). There have not been any tools to measure true effectiveness in the classroom using the traditional end of course method because data gathered does not always reflect teaching (Centra, 1993; Morrow, 1977). If instructors are trained to interpret end of course evaluations and use those interpretations appropriately end of course exams have the power to help instructors improve their teaching abilities (Pambookian, 1974). Furthermore, it appears STEM courses and departments participate in traditional end of course evaluations simply because they provide an avenue to make teaching measurable, whether or not the evaluation is meaningful (Marlin & Niss, 1980). Even still, many instructors and students believe in the merit of participating in end of course evaluations (Ellison, Steinfield, & Lampe, 2007). End of course evaluations are useful and can help instructors improve if the feedback is appropriate to the goal of professional development (Marsh & Roche, 1997). If end of course evaluations are to be useful, they must be appropriate for excellence in teaching (Pambookian, 1974). Appropriate end of course survey should be established that addresses problems with the current methods.

Classroom Community

With previous studies dedicated to causes of attrition and the college environment, colleges and universities need ways to translate the theory into

reasonable action steps and promote retention in higher education academic settings (Tinto, 2006). In colleges and universities, the academic and social environment plays a major role in student retention especially in first year retention rates (Rovai & Wighting, 2005). A sense of belonging is a strong indicator of student persistence in the college environment (Tucker, 1999). College and university students that have a greater sense of belonging in their academic settings are more likely to remain in college. Therefore, retention and persistence are valuable indicators of effectiveness of an academic program (Tinto, 1987).

Establishing relationships and assimilating into groups (developing a sense of community) in higher education is a key factor to one's persistence in higher education. Sense of community is comprised of smaller factors that have an impact on students' sense of belonging such as trust and confidence to interact with others. Inability to make personal connections with the instructor or peers and other factors associated with a student's lack of sense of community have been associated with skipping classes and unsatisfactory performance (Rovai & Wighting, 2005). In classrooms, connections are formed through cooperation and collaboration with others. Building these connections by promoting cooperation increases student learning gains and students' sense of belonging (Cooper & Robinson, 2014; Rovai, 2002). Furthermore, collaboration promotes learning and critical thinking in academics (Gokhale, 1995). Because of the value classroom community has on persistence classroom community will serve as one part of the qualitative framework for the current study.

Sense of classroom community can be measured in a student reported survey (Rovai, 2002). The classroom community index (CCI) was first developed by Alfred Rovai that measures students' sense of classroom community in the classroom. The Classroom Community Scale (Appendix 1), is a survey validated to measure student sense of belonging in a classroom setting. Student sense of belonging is an aspect of education linked to persistence and therefore teaching effectiveness (Tinto, 1987). The CCI has been validated and found to be a reliable measure of sense of belonging (Rovai, 2002). The survey uses easy to understand language and asks students questions GTAs and instructors can interpret and use for professional development. Student sense of belonging is an influential aspect of higher education. College and university students who have a higher sense of belonging are generally more likely to persist in an academic environment (Ashar & Skenes, 1993; Vann & Hinton, 1994). One possible way in which sense of belonging might increase persistence is by reducing the feeling of "burnout" which can lead to attrition (Ellison et al., 2007; Royal & Rossi, 1996). Burnout in college and university students is defined as emotional exhaustion, depersonalization, and a reduced sense of personal accomplishment (Jacobs & Dodd, 2003). Burnout can cause social conflicts and decrease social satisfaction. Sense of community increases persistence through sense of belonging (identity formation: "I am a biologist") and decreases attrition through reduction in burnout (social support: "other biology students are here to help me through tough times") In this way, burnout is just one

mechanism by which a lower sense of belonging or sense of community has been shown to influence attrition.

Teaching for community

Teaching for Community is a framework that applies characteristics and practices of excellence in teaching and strategies for fostering classroom community. We developed the Teaching for Community framework as the intersection of the Classroom Community and Excellence in Teaching frameworks. Teaching for Community is the idea that instructor characteristics and practices that promote students' sense of community in the classroom will increase student persistence. It follows that in order for instructors to promote student community to the extent that student persistence increases, their teaching practices and style must be rooted in the ideals of excellence in teaching. Since excellence in teaching demands the use of evidence to evaluate one's own teaching and support innovation, we propose that promoting community be considered a teaching innovation that must be supported by student feedback. It is vital to the concept of Teaching for Community that instructors receive feedback about students' perceptions of the classroom community and that this feedback is incorporated into future innovations or modifications of teaching practices.

We generated four predictions from our Teaching for Community framework, based on the combination of Excellence in Teaching and Classroom Community.

Instructors that teach for community should have “a passion to teach and dedication for students to learn”, produce or use “innovation in teaching in response to evidence from feedback”, possess an “intrinsic desire to seek feedback from a diverse set of resources”, and recognize that “instructors can foster classroom community”.

A passion to teach and dedication for students to learn is a characteristic that represents instructors value in teaching. Chickering and Gamson (1987) describe this theme paraphrased as showing true joy in teaching and performing teaching practices that help students learn. The researchers described this as a quality that excellent instructors possess, but do acknowledge average instructors do possess some level of a passion to teach and dedication to learn.

Displaying innovation in teaching in response to evidence from feedback is a constant process for instructors. Innovation does not need to be considered a large-scale overhaul of classroom management or teaching practices, although it could. There are many larger innovations such as flipped classrooms, asynchronous learning networks and entangled learning. However, innovations don't always need to be this involved. In many ways innovation is responding to feedback by improving deficit areas in teaching. This could mean adjusting classroom practices to allow the instructors to learn student names to better promote classroom community. Or restructuring classroom practices to promote student collaboration. Excellent instructors display innovation in their teaching practices, but only approach or display innovation in response to evidence from feedback.

Seeking a diverse set of resources for feedback is a crucial theme to instructors improving their teaching practices. According to Chickering *et.al.* and Gamson *et.al.* it is important for instructors to seek many different forms of feedback on top of university mandated forms of feedback. Instructors that seek several forms of feedback show a drive to sharpen teaching skills, and have advantages when reflecting on professional development options. Seeking a diverse set of resources for feedback is imperative to improving teaching practices, and because of this, excellent instructors are always pursuing diverse forms of feedback on their teaching.

The last theme in the teaching for community framework is that instructors can foster classroom community. From the previous work done by Tucker, Tinto, and Rovai as well as others there is enough evidence to support claims suggesting classroom community is important. In the context of this framework the instructors must see the value in classroom community. Instructors do this by innovative methods such as flipped classrooms, learning communities, or simply valuing students through establishing rapport. Establishment of rapport is a practice GTAs are able to easily establish through making a simple interpersonal rapport.

Currently persistence has only been theoretically linked to sense of community. There has not been any quantitative exploration of the relationship between student sense of belonging and student desire to persist. The survey could be enhanced and more valuable to GTAs as well as experienced instructors by using a persistence

inventory alongside the inventory for classroom community and provide not only the classroom community score but student desire to persist through the major.

Research Questions

In this study, we investigated the relationship between community in the classroom and persistence. The study will have three separate parts with unique purposes. First, we investigate graduate teaching assistants (GTAs) perceptions of their classrooms. The purpose of this study is to investigate whether GTAs perceive their classrooms as communities and which kinds of feedback GTAs value. Study one addresses the questions: What are current GTAs perceptions of their classrooms? What do these perceptions mean in the context of professional development? We used a semi-structured interview protocol with GTA participants to answer the questions in this part of the study. We conducted an exploratory thematic analysis of coded participant responses loosely based in the phenomenology methodology. The objective was to use TA interviews to better understand the phenomenon of teaching introductory biology laboratories. The results are interpreted through the teaching for community framework.

In the second part of the study we investigated the relationship between sense of classroom community and persistence from the student perspective. In this study, we define persistence narrowly as the percentage of students who complete a biological sciences program at any post-secondary institution. We measure persistence as a

student's intention to remain within a biological sciences major. The purpose of this study is to determine if the Classroom Community Index (CCI) can be used to predict student intent to persist. Our research question for this part of the study focuses on whether there is a quantitative relationship between CCI and persistence and whether other factors, such as TA, influence student intent to persist. An online survey is used as the method for data collection. Data from the surveys is statistically analyzed using a hierarchical linear model.

Finally, our third study will specifically investigate GTA perceptions of classroom community. The purpose of this study is to investigate whether new forms of feedback specific to classroom community result in changes in GTA perspectives on classroom community and their teaching practices. Specifically, this study asks, how do GTAs use and value classroom community survey responses. We used a guided interview procedure with GTA participants to determine how classroom community feedback influences their perceptions. The interviews are considered guided because the classroom community index questions and statistical results from the previous study are used as the prompt in the interviews in this study. The participant responses are analyzed in the same fashion as the previous qualitative study, and will use the same teaching for community qualitative framework. In addition, the results from this study are compared to the results from first study.

Each of these exploratory studies are intended to investigate the significance of classroom community in biological sciences laboratory classrooms. The results of these

studies, taken together, and interpreted within the theoretical framework of Teaching for Community will inform steps towards developing professional development practices to address the attrition problem in higher education.

CHAPTER 1: GTA PERCEPTIONS OF CLASSROOM, COMMUNITY AND PROFESSIONAL DEVELOPMENT

Introduction

Because the nation is facing a deficit of STEM graduates, strategies need to be explored to establish effective STEM higher education (Pascarella, Seifert, & Whitt, 2008). Effectiveness as previously described can be considered the number of students persisting through academic curriculum (Chen, 2013). Quality instruction starts with this goal in mind. Quality instruction is essential for college and university instructors and professors. Tenure and promotion decisions are based on excellent and effective instruction as reported by student end of course evaluations. However, graduate teaching assistants (GTAs) are often not privy to professional development regarding their end of course evaluations (Kendall, Niemiller, Dittrich-Reed, & Schussler, 2014). Furthermore, GTAs are also often not privy to knowing what quality instruction is. GTAs are often given mixed messages on what is most important in their graduate careers

(Muzaka, 2009). Because helping GTAs grow as instructors is a vital part of addressing the problems facing STEM education, research is needed into GTAs' perspective of their teaching and classroom community. Our research question for the current study is, "What are current GTA perceptions of their classroom, and what are the implications of these perceptions on professional development?" The purpose of this study is to begin to investigate GTAs' current perspectives on their teaching and professional development in order to establish structure for future professional development. To approach the purpose of this study we are going to pursue an exploratory pilot study using the teaching for community framework.

Using a hybrid framework of excellence in teaching and classroom community termed the teaching for community framework developed initially in 'white papers' and subsequently expounded upon through two extensive qualitative investigations on teaching excellence by Chickering et.al. and Dunkin et.al. These groups of researchers investigated the future of higher education in the context of what excellent instructors are doing that sets them apart from their average counterparts. Overall, those individuals defined as excellent instructors had passion to teach with the determination for students to learn. They were innovative in their approaches to how they presented materials meaning they were open minded to adapting to what would help the students if evidence supported it. Lastly, they had an intrinsic drive to seek feedback from their students in regard to their teaching performance. Excellent instructors critically analyzed feedback to internalize it and possibly produce changes. Furthermore, at the

intersection of excellence in teaching is the classroom community framework. The classroom community framework is based on the work of Tucker (1999), Tinto (1987) and Rovai (2002) and supported with further research. The framework centers around the importance of classroom community to student persistence in higher education programs. Also outlined in the classroom community framework is the importance of classroom community to student learning and critical thinking as well as the importance of instructors fostering classroom community. The classroom community framework works in conjunction with the excellence in teaching framework because by participating in the actions consistent with excellence in teaching instructors are also promoting classroom community. They were able to pinpoint the differences in perspectives about teaching, classroom management, and views on professional development.

Methods

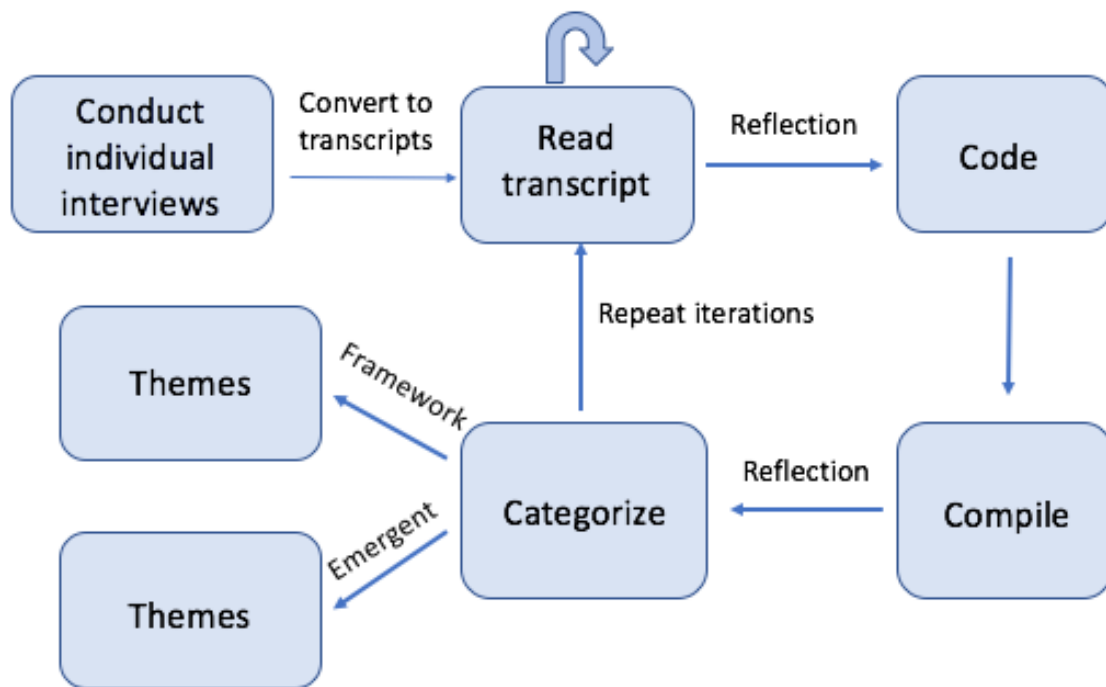
The nature of the current study was observational. Before investigating a larger sample of GTAs current GTAs' perceptions are of their classrooms should be established. The purpose of this study is to investigate whether GTAs perceive their classrooms as communities and which kinds of feedback GTAs value. A sample of four GTAs from freshman principles of biology laboratories volunteered to participate. They were chosen at random based on interest and availability to participate. There were three female GTAs and one male GTA. This is representative of the GTA population for the

department where the study took place. The GTAs varied in experience, but each GTA had taught at least one semester before the current study began. Two GTAs had taught for four years or more with one GTA having taught at multiple institutions. For this study, we classified more than two years of teaching experience as being an experienced GTA instructor. Fewer than two years of experience teaching is classified as a novice GTA instructor. Based on this designation there were two experienced GTAs and two novice GTAs. The GTAs were interviewed and asked questions regarding classroom community, their classroom management procedures, and their preferences towards feedback and professional development.

The interviews were semi-structured and carried out around the midterm point in the spring semester. Interviews were conducted after several weeks of the GTAs teaching their classes to allow GTAs to assimilate into their new teaching responsibilities, and allow GTA the opportunity to learn their students and their classroom as it was pertinent to the interview questions. The interviews were scheduled at the convenience of the GTA, and lasted no longer than twenty minutes. Short interviews and interviews conducted at the convenience of the GTA were done to not burden the GTA, and to make sure they remain engaged in the interview and report accurate responses. The transcripts from the interviews were analyzed to produce the data from which we produced our results and developed our conclusions. Interview transcripts were coded through several iterations. All members of the research team performed the steps outlined in figure 4. Coding interview transcripts in several

iterations ensures all available data is captured. Codes from each researcher of each GTA were combined into one consistent codebook and categories of codes were established and patterns began to be described. Patterns that support the teaching for community framework theme were described as framework based themes. Patterns that were consistent in the interviews across GTA participants are described as emergent themes. From the results of this study we describe four framework based themes and one emergent theme. Results are arranged by framework first and emergent themes identified thereafter.

Figure 1.1



Results

To understand the participant pool and their perceptions of their classroom in terms of our framework specific characteristics can be outlined. The four participants willingly volunteered to be part of the study which showed their passion to teach and to learn more about their teaching. Their experience in the classroom varied. GTA1 and GTA3 both had at least 4 years (or 8 semesters of teaching experience). GTA3 has experience teaching at multiple institutions, and GTA1 had experience as a tutor while studying as an undergraduate. GTA2 had a moderate amount of experience (less than 4 years but greater than 1) and GTA 4 was in their first year of teaching. Of note. GTA4 was an undergraduate upperclassman acting in a GTA role. GTA1 spoke in the most depth on topics addressed and gave critical responses to support the topics within the framework.

Through the lens of excellence in teaching, we found evidence to support the following themes. The GTAs all had prior experience teaching. Two of the GTAs had what was termed as a lot of experience for the context of this study because both had at least four years of teaching experience. The remaining two GTAs were less experienced with both having two years or fewer of teaching experience. The participants also seemed to speak positively about their prior teaching experience. As a general trend, all GTAs spoke about the importance of building rapport with students, even citing examples of ways they believe they help do this. Furthermore, GTAs tended to have mixed feelings about structured classes, citing that with no structure or a semi

structured class, GTAs had the flexibility to cater to student needs. On the contrary, GTAs also mentioned with more structure comes a greater flexibility to in their roles as graduate student researchers. When speaking about community, GTAs also posed a sort of juxtaposition regarding their views and their roles. GTAs valued student classroom community. They generally spoke about the importance of having congenial classes, and how they feel a welcoming or encouraging classroom community has positive impacts on the students. However, GTAs seemed to not be confident in their abilities or unaware of their influence on building community in the classroom. However, it is interesting to note the GTAs had at least a tenuous grasp of the impact of student classroom community and student desire to persist. From this point observed themes were identified as support for a priori framework based themes. Furthermore, patterns emerged that gave credence towards an emergent theme based on the consistency and frequency at which the emergent theme was discussed by the GTA participants. Results are outlined in Table 1 and Table 2.

Table 1.1

Framework Theme	Observed Theme	Evidence
A passion to teach and determination for students to learn	GTAs were consistent and enthusiastic about their teaching responsibilities	“to go from lecturing to actually teaching”
Displayed innovation in their teaching in response to evidence from feedback	GTAs were not focused on innovations	The lab is very structured GTAs do not have to plan and design any lab exercises
Have an intrinsic drive to seek feedback from a diverse set of resources	GTAs were aware of other feedback sources but most reliant on their own	GTAs rarely spoke about peer feedback faculty mentors were informal

	experiences	and negative and relied mostly on their own self-reflection from self-experience
Excellent instructors can foster classroom community	Instructors have little impact on classroom community	Students and the intrinsic classroom characteristics have the most influence on classroom community

Table 1.2

Emergent Theme	Evidence
A tacit rather than explicit understanding of “reading the classroom”	GTAs mention either cause or effect but rarely link the two

A passion to teach and determination for students to learn

GTAs showed a definite passion to teach and a determination for students to learn. Each GTA spoke freely and at great length of their passion to teach. Many of the GTAs spoke about rewarding experiences or the joys of teaching. Some also cited their passion to do more than just tell students about the contents of the subject as exemplified by the comment “going from just instructing to actually teaching” mentioned by GTA 1. As a consensus, GTAs wanted students to learn when they teach. Some examples include GTAs mentioning their desire for students to “actually understand concepts”.

Furthermore, GTAs were consistent in mentioning being accessible and approachable as a method to help students learn. GTAs were confident in their passion to teach, and conveyed that message effectively.

innovation in their teaching practices in response to evidence from feedback

The data shows minimal discussion of GTAs' willingness or desire to innovate their teaching style in response to evidence based student feedback. GTAs spoke to the minimal level of control they have in designing their classrooms as graduate students rather than professors. GTAs implied innovation must be a large adjustment in classroom procedure or drastic change in teaching practices. Because of the GTAs' highly structured teaching responsibilities GTAs seem to not be focused on innovations in their teaching practices. Based on dynamic it could be expected GTAs do not think about developing innovation for the classroom.

Intrinsic drive to seek feedback from a diverse set of resources

The data shows GTAs use a very diverse collection of sources of feedback. GTAs were open minded to many forms of feedback, and confident in their ability to learn from feedback. Interestingly, GTAs main sources of feedback were their own reflections and experiences followed by student evaluations and student in-class interactions. When speaking about their own experiences, GTAs consistently mentioned learning from or correcting negative experiences and reinforcing things that helped students.

Instructors can foster classroom community

GTAs were unaware of their potential impact on classroom community. The GTAs were aware of classroom community and made mention to why it is important to each of them. Importance ranged from being an asset for collaboration and student learning to references to welcoming environments being essential to students feeling comfortable. Interestingly, it seems GTAs do not feel they can be an influence on

classroom community. GTAs mentioned classroom community as being an important aspect of the classroom, but referred to it as the nature of the students or the environment, meaning they saw themselves as just a minor part of classroom community.

Tacit rather than explicit understanding of “reading the classroom”

This theme emerged from analysis of code categories rather than *a priori* from our theoretical framework. GTAs spoke frequently about the in class signals they use to read the classroom. These signals allow GTAs to design their teaching strategies. Although GTAs did not speak about what they did in response to signals, they did speak about how they interpret the signals. Signals such as students finishing the laboratory exercises in a timely manner were interpreted by GTAs as the students understanding the material presented during the laboratory. Altogether, GTAs presented instances of cause and effect while discussing their classroom management without stating the relationship between the cause and effect.

Discussion

This study was performed over the course of one semester in a freshman level biology laboratory class. The participants in this study were just a subset of the GTAs teaching the course this semester. Participants were limited based on availability. Interviews were only conducted once for the present study in comparison to a longitudinal study with multiple rounds of interviews. Thus, this study is limited in the

participant pool and longevity and conclusions should be made only through careful consideration.

Our results show evidence to suggest professional development strategies proposed in our discussions. However, being that this is a pilot study with an exploratory perspective larger conclusions cannot be made. A pilot case study is a single example of a phenomena and does not present reliable information about the broader phenomena. However, pilot case studies are very useful and important in the beginning stages of addressing a research topic, as was the case in this study (Flyvbjerg, 2006). Suggestions for future research would be to expand the participant pool.

Expanding the participant pool to the entirety of the course in focus would allow for more generalizability and conclusions can be made based on the perspective of GTAs for the course in questions. Furthermore, carrying out the study over multiple semesters could help investigators observe changes in GTA perceptions and thus could suggestions for professional development could be substantiated.

Passion to teach and dedication for students to learn

The GTA participants in this study were all passionate to teach. This theme was guided by our framework, and supporting this theme followed a process. First, several iterations of reading the transcript occurred before the transcripts were coded. The analytical method from transcripts to codes and further to patterns and themes was a case study using memo writing about codes and themes. Codes were further categorized, and upon categorization a process of writing memos began which led to

the description of patterns and themes. Using codes and categories we were able to support this framework based theme. The GTAs seemed to love their responsibilities to teach and cited working with the students as one of their favorite joys. GTAs displayed their dedication for students to learn by the way they seemed to reflect on their performance in the classroom. The passion to teach and dedication to learn is a valuable asset for GTAs to have in regard to professional development and learning from meaningful feedback. The GTAs were so passionate about their teaching it could be concluded they would be passionate about improvements. In this manner departments can help foster this passion. Departments have the influence to manage GTA identity as instructors

Display innovation in teaching in response to evidence from feedback

GTAs displayed a lack of critical thought on teaching innovation. This was a framework-based theme supported by codes and categories which produced patterns that shaped this theme. The codes and categories that emerged and supported this category were intended to be “source of feedback”, “teaching philosophy”, and “mode of content delivery”. These categories of codes produced minimal evidence to support GTAs routinely pursuing feedback based or evidence based innovations in their teaching. Based on thematic qualitative analysis we were unable to establish a dedication to teaching innovation as a quality in our sample of GTAs. GTAs spoke about class procedures as though they were set in place. This could be a result of the nature of GTA assignments and responsibilities. The GTAs are not responsible for creating class

design or curriculum and really do not have as much authority to innovate in their classrooms. GTAs may not be comfortable with innovation, however they did not articulate that reluctance. More plausible would be the notion that GTAs know they do not have much authority with innovation in their classroom, thus they do not regard innovation as a worthwhile topic to discuss. However, without direct description of the GTA position we cannot say for sure, meaning the absence of a topic is not necessarily confirmation that quality is lacking, but rather more indicative of the circumstances GTAs work within.

intrinsic drive to seek feedback from a diverse set of resources

GTAs were diverse and active in their sources of feedback. This is consistent with our framework and from previous work describing excellent or quality instruction. However, GTAs seem to display a majority reliance on their own personal feedback or personal experiences. When describing their preferred methods of feedback GTAs would outline how they internalize how they perceive their performances and describe their personal reflections. GTAs did express value in feedback from student evaluations or student interactions. These comprised the second most mentioned or developed theme GTAs spoke about regarding feedback. Interestingly, GTAs seemed not to value or not to use much peer feedback. Only one GTA described their use of peer feedback, and it was minimal. Furthermore, when describing feedback given obtained from faculty mentors GTAs spoke in a negative tone. Majority of the feedback obtained from faculty was centered around what the GTA feels is bad examples of teaching and instructing.

Therefore, GTAs main sources of feedback are their own self reflections and student evaluations and interactions. A few implications can be drawn from GTAs reliance on these sources. First, GTAs are limited based on their own perceptions of effective feedback and their own perspectives of their classroom and their performances. GTAs are professional and well equipped to speak to their own circumstances, however without outside input GTAs are doing themselves a disservice. Professional development regarding feedback might be met with resistance or apathy if GTAs are more reliant on themselves or student evaluations themselves. However, departments can still help train GTAs to learn from their end of course student evaluations. If GTAs are at least tacitly aware of the value of student evaluations then departments can use that as a tool to help GTAs use their end of course evaluations more effectively.

Instructors can foster classroom community

GTAs were aware of and valued classroom community both from the students' learning perspective and their own teaching perspective. However, GTAs regarded classroom community as not an entity they have direct or strong influence over. When speaking about community GTAs mostly approached the subject without hesitation and with at least decent confidence. They spoke about fostering personal connections and maintaining a welcoming classroom. However, GTAs implied classroom community was more innate to the classroom environment (i.e. class time, type of class, class level) or related to student characteristics. Depending on the time of the day or the time of the week maintaining classroom community was implied to be more manageable to the

GTAs. Furthermore, GTAs implied class level influences classroom community saying in freshman classes the students are not yet ingratiated into the college community and may be reluctant to contribute to classroom community. Altogether GTAs do value classroom community and are not naïve to its meaning and concepts. However, GTAs placed their role in influencing classroom community below that of the student and of the classroom environmental characteristics such as the day of the week the lab is scheduled, the time the lab is scheduled, or the composition of degree majors of the students enrolled. This can be valuable for potentially developing professional development. This investigation was able to describe current GTAs perception of their role in classroom community, and so steps can be made to help GTAs manage their classroom communities more directly. With this knowledge professional development on the topic of classroom community must first help GTAs see their role before describing strategies GTAs can use to establish and promote classroom community.

Tacit rather than explicit understanding of “reading the classroom”

GTAs were descriptive in their approaches to describing how they read their classroom for self-evaluation, however the participants seemed to describe a tacit rather than explicit understanding. This emergent theme arose from the iterations of coding and categorizing and subsequent pattern and thematic analysis. When describing their methods of self-evaluations and sources of feedback GTAs consistently described processes of reading the classroom. Their descriptions were strong, however the descriptions skipped important cause and effect statements. GTAs would state either an

active process of reading the classroom, for example GTAs consistently mentioned the presence or lack of questions during the didactic portion of the lab or during the lab exercises was an indicator for learning in the classroom. This kind of tacit link between a signal and interpretation lacks critical understanding of reading the classroom. Although it is not known if GTAs are unable to make the connection or they had not directly stated their understanding of the connection certain conclusions can be made regarding professional development. Conversely, GTAs would state an interpretation without directly stating what indicator or signal led them to that conclusion. For example, GTAs would interpret quick or efficient work through laboratory exercises as the students working well together and collaborating effectively. This could be the case, however not necessarily. GTAs overlooked the possibility that students may not be collaborating. In this situation, they are delegating work effectively and as a result the groups finish the lab work in an efficient way. These findings present opportunity for professional development for GTAs. First, GTAs show a tacit grasp on the connection between indicators and interpretations while reading the classroom for self-evaluation. Explicit direction to GTAs helping them make these connections is the first step in enhancing their ability to self-evaluate. Furthermore, as stated previously, GTAs seem to be heavily reliant on their self-evaluations and personal experiences so presenting strategies to enhance GTAs ability in this area presents a great opportunity. Secondly, GTAs making conclusions based on loose interpretations could lead to errors in their self-evaluations.

Although, their interpretations could be correct GTAs should be coached and taught to give critical analysis of interpretations as a result of an indicator.

CHAPTER 2: QUANTITATIVE DESCRIPTION OF THE RELATIONSHIP BETWEEN CLASSROOM COMMUNITY INDEX (CCI) AND DESIRE TO PERSIST

Introduction

Instructors and professors at colleges and universities are required to establish and maintain excellent teaching for tenure opportunities. However, many instructors are not sure what excellent teaching looks like (Berk, 2006; Bos, Zakrajsek, Wolf, & Stoll, 1980; Kendall & Schussler, 2012). Furthermore, feedback through end of course evaluations do not currently directly report instructors' level of excellent teaching (Centra, 1993).

The issues related to end of course evaluations and feedback on instruction are not new. Many professors and administrators are skeptical about the feedback given by student end of course evaluations. In some disciplines such as biology, end of course evaluations are used for instructor feedback simply because it provides a measure administrators can use for faculty tenure, promotion and reappointment decisions (Marlin & Niss, 1980). However, there are arguments about this practice. Many believe the evaluations are not reporting anything meaningful, and they should not be used to

determine faculty decisions (Morrow, 1977). Many even say it is unwise to base tenure or promotion decisions on evaluations when the validity and meaningfulness of these evaluations is in question (Marsh & Roche, 1997).

Sense of classroom community is a meaningful report of teaching excellence and effectiveness because of its impact on persistence (Tucker, 1999). Student persistence in an academic program is one measure of the program's effectiveness. The purpose of this study was to use two established surveys to quantitatively describe the relationship between students' sense of belonging and persistence. Our research question is, "Can a meaningful end of course survey assessing classroom community and desire to persist be established?"

Methods

This investigation took place during the spring semester of 2017 at Clemson University in 5 freshman principles of biology laboratory sections (n=71). One GTA's data was not included in the analysis due to their substantially lower sample of students. Although this does eliminate one of the GTAs from the quantitative analysis, the data from this GTA participant's students only served to wash out data due to the low sample size and considerable variability. The study focused on the relationship between student perceived classroom community and their reported desire to remain in biological sciences major. Our research question sought to answer, "Can a meaningful end of course survey assessing classroom community and desire to persist be established?"

Meaningful in this context is taken from the literature that claims sense of belonging being closely associated with persistence. The purpose of this study was to establish a meaningful form of feedback and establish an evaluation that uses student sense of belonging related to their desire to persist.

A survey first developed by Rovai (2002) measuring student perception of their classroom community was delivered electronically at three time points during the semester (Appendix 1). Students were instructed to complete the survey outside of class and that the survey will take no longer than 10 minutes to complete. The survey is appropriate for measuring sense of community in academic settings (Rovai 2002). This twenty question survey has been validated (Cronbach's $\alpha=0.93$) and contains two sublevels of community, learning and connectedness. The survey had very specific guidelines for analysis. The survey is scored on a scale of 0 to 4 for each question and scores are added together. Each of the subscales can be added alone for total scores of 40, however the total scale of the CCI is measured on a scale that ranges to 80. Half the questions are scored from 0 to 4, with 0 indicating "strongly disagree" and 4 indicating "strongly agree." The other half of the questions were coded from 4 to 0 in the opposite directions, going from strongly disagree to strongly agree. Administered along with the CCI was a survey developed to measure student motivation to persist (Appendix 2) (Benson & et.al., 2017) . The survey is a four point Likert style scale. The data was scored on a scale of 1 to 4 for each of the six items in the survey. The averages of scores totaled from the six items in the survey was taken for each student participant. The average was

taken because some missing item data from the data set. Missing data was minimal with only a small number of participants' data missing a report from one item. This occurred either through user error or computer error in reporting data. The survey is intended to assess student perceptions of the future and their intent to remain in their current academic major. From this point on we call this the students intent to persist. Both surveys were administered together one after the other and data was used to explore a relationship between the two scales.

Results

The data was analyzed by hierarchal linear modeling. The structure of the data was that students were nested within laboratory sections, laboratory sections nested within GTAs. Using a model in which the previously mentioned structure comprises the random variables and the CCI and time point data represent fixed effects (Table 3). The data suggests there is a significant interaction between the classroom community index and student mean persistence scores ($P=0.0311$). After accounting for variation between teaching assistants, the labs within teaching assistants, and the students participating in multiple time points throughout the semester there also showed significant interaction of time point in relation to student mean persistence scores ($P=0.0002$). This means as the time point the survey was administered during the semester changed so too did the students' desire to persist. There was, however no significance based on a value of $P=0.05$ for the interaction between CCI and time point

(P=0.1402). All together a model for the correlation between student perceived classroom community and mean student desire to persist is dependent upon the overall mean of the data plus TA variation, lab blocked by TA, individual student blocked by labs and TAs to account for variation with time point, CCI and CCI by time point interaction all having significant values. This means that once hierarchical variation is accounted for there is a significant effect of students' sense of classroom community on their desire to persist through their current academic major.

During analysis of the model described above some suggestive data regarding the varying effects of GTA on the positive relationship between CCI and intent to persist (Table 2.1). From this data, we can see the relationship between CCI and some differences among GTAs in student reported sense of community as reported by the CCI as well as student mean persistence and differences in time points (Figure 2.1, 2.2).

Table 2.1

Fixed effects table	
Source	Prob>F
Time point	0.0002
CCI	0.0311
CCIxTime point	0.1402

Figure 2.1

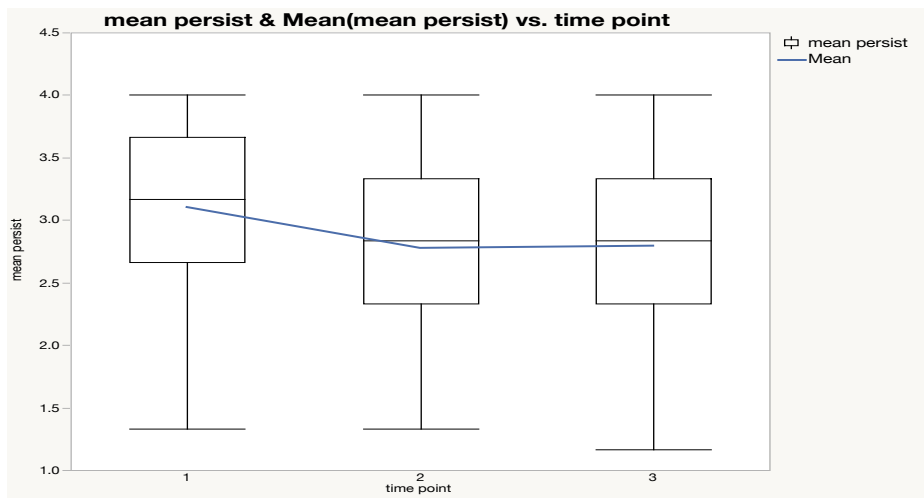
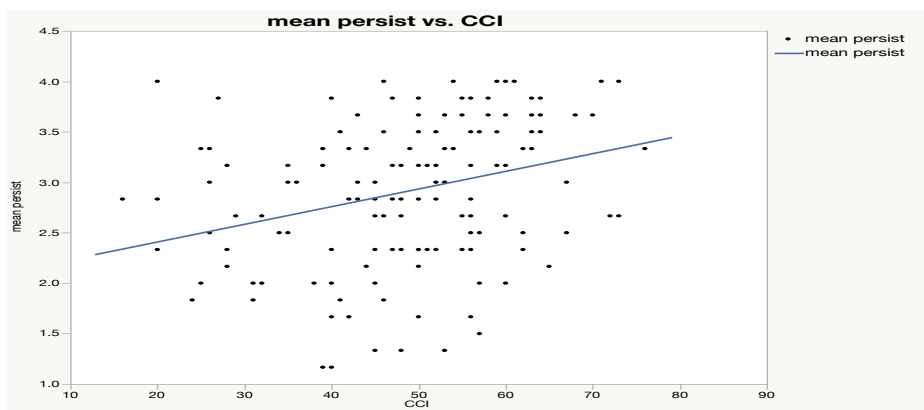


Figure 2.2



Discussion

The quantitative analysis of student sense of belonging as measured by the classroom community index correlated with the students desire to persist was demonstrated in the current study. The results discussed above showed a statistical correlation can be made between student sense of belonging in the context of an academic environment and the students' desire to persist in their current academic

major. After accounting for variation between instructors, labs, and the student participants the data these is a statistical significance in the correlation between the classroom community index and students desire to persist. Although this was a small scale exploratory pilot study this investigation shows the feasibility of using two surveys to develop a model of the relationship between student perception of classroom community and the students' desire to persist. The significance of this finding is that although this correlation has been suggested in literature there has never been statistical significance demonstrated (Tinto, 2006; Tucker, 1999). Also, there seems to be an effect of time point on student desire to persist throughout the semester. This could be due in part to burn out throughout the semester as it has been shown to have an influence on student perceptions (Brackett, Palomera, Mojsa-Kaja, Reyes, & Salovey, 2010). It is interesting to note that time point throughout the semester had no significant effect on student classroom community. This means that once classroom community is established it does not change much over the course of one semester.

CHAPTER 3: GTA PERCEPTIONS OF TEACHING AND THEIR CLASSROOMS IN RESPONSE TO FEEDBACK

Introduction

Quality instruction and effective teaching is essential if the U.S. is to meet the current and projected STEM graduate deficit (Pascarella et al., 2008). Quality instruction and effective teaching centers around a cycle of feedback and professional development (Marlin & Niss, 1980). End of course evaluations are the most common form of instructor feedback. However, end of course evaluations are not effective at providing feedback to instructors (Centra, 1993). Some instructors, such as GTAs, do not always know how to effectively use end of course evaluations for professional development. Also, many professors and instructors are skeptical about the validity of end of course evaluations and some administrators question whether they should be used at all if they are not useful for making decisions. Currently, end of course evaluations are used for decision making in most departments simply because they are measurable, easy to obtain and provide interpretable feedback. Even still, if the evaluation provides meaningful feedback and if the feedback is used appropriately end of course evaluations can be a valuable source of feedback for instructors.

Over the next decade STEM degree programs will have to meet a deficit of over one million equipped graduates. However, in this same time STEM departments must train future instructors and professors and/or equip current instructors and professors through professional development. In doing so it is important to first assess instructors' current mindsets on meaningful feedback. In the current study GTAs current perceptions on a piece of meaningful feedback is explored. Our research questions

“When presented with meaningful feedback, what are GTAs perceptions of the feedback?”. The purpose of this study was to explore GTAs innate perceptions of a piece of meaningful feedback. Furthermore, based on GTAs innate perceptions methods of professional development will be proposed.

Methods

This study was performed in freshman Principles of Biology (a biology major’s course) laboratory sections. The study used a sample of the total GTAs teaching the laboratories in the spring semester. During the first study in the project four GTAs participated. There were two experienced and two less experienced GTA instructors. Three female GTAs and one male GTA participated in the study. During the second study the two less experienced GTAs withdrew from the study due to scheduling conflicts. Therefore, the results, analysis and discussion in this chapter only includes the interviews from the experienced GTA instructors.

Upon completion of the survey investigating the relationship between classroom community and student intent to persist, a post interview was conducted with the same group of GTAs. The nature of this interview was exploratory. The purpose of this interview was to present the GTAs with the new survey with blinded data from the survey taken that semester. Their perceptions and analysis of the newly developed survey for professional development served as the basis the data for this study. This

study took place during the same week the GTAs were required to view and reflect upon their end of course evaluations for the semester.

This interview was structured with the intent to ask if the GTAs perceived the data and model of interactions from the new surveys (students' CCI and intent to persist in their major) are beneficial. The GTAs were given blind data showing the correlation between students' sense of classroom community and their intent to persist in their major. GTAs were then asked to reflect on what the data means to them in context of classroom community. followed by showing them the survey used to produce the data. They were shown the questions from the survey and asked to reflect on the survey and compare to the current end of course evaluation. GTAs were asked whether or not the questions from the CCI gave them a more descriptive feedback about their class compared to the traditional end of course evaluation method. Furthermore, GTAs were asked if there is any other information they would like to see that could help them with their professional development. The interviews were converted to transcripts, and those transcripts became the data used in this study.

Qualitative analysis followed the same methodological approach as used previously in the prior study in Chapter 1. GTAs' perceptions of their teaching and classroom environments. Several iterations of reading and coding occurred before any analysis began to ensure a completely exhaustive process and all data was extracted. Descriptive coding was used and from those codes and descriptions patterns emerged. Those patterns were analyzed and produced categories. These categories then

substantiated our framework based themes and also contributed to emergent themes. Codes were described in the codebook for guidance in the analysis of the codes (Appendix 3). Based on the descriptions of codes patterns began to support the framework based themes. Following the development of patterns, themes and validations of those themes began to emerge. The qualitative analysis, case study with memo writing on codes and themes, was used. The same framework as described in Chapter 1 was used to interpret the results from the analysis.

Results

Three framework based themes emerged and were substantiated based on the codes and the interview data (Table 3.1). In this context GTAs showed more interest in classroom community and seem to place more value on the idea of fostering classroom community. All of these themes are organized from framework based to emergent themes.

In this study two experienced GTA instructors were interviewed, and their interviews were analyzed and results based on that analysis are discussed. The two experienced GTA instructors in this study are the same GTA instructors as in the previous study. After the first study interviewing GTAs focusing on GTA's perceptions of their classroom community two of the GTA participant dropped out based on their availability. GTAs simply could not accommodate into their schedule another interview, thus their interviews did not occur.

Table 3.1

Framework based theme	Observed theme	Evidence
Passion to teach and a dedication for students to learn	GTAs reiterated their enjoyment in teaching	GTAs wanted to make sure their students were learning in context of classroom community
Innovation in teaching practices as a result of evidence from feedback	GTAs brainstorm ideas to increase classroom community	GTAs started to reimagine their teaching practices in the context of classroom community
Instructors can foster classroom community	Shifting perspective on classroom community	GTAs begin to pair learning and classroom community as essential to their classes

Passion to teach and dedication for students to learn

GTAs expressed a passion to teach based on their comments about how their classroom community impacts student learning. GTA1 expressed direct concern about fostering a welcoming environment in response to viewing one of the questions from the CCI. The GTA saw the question in the CCI asking students their comfortability asking

questions in class, and in response expressed concern that they are dedicated to making sure students feel comfortable enough to answer questions. GTA3 saw the results of the survey and showed interest in welcoming and fostering collaborations. This GTA expressed interest in managing these collaborations so that they are beneficial to the student.

Furthermore, participants cited multiple times that they wanted to see the classroom community and intent to persist in the context of the student grades. GTA1 spoke about the value of the given survey, comparing it to the traditional survey which they termed “vague”. GTA1 spoke about how the new survey that shows the relationship between CCI and intent to persist gives some more information and the new information seems more valuable towards giving them better ideas on how to manage their classroom. The GTA went on to speak about their dedication to ensure student learning by wanting to see grades in relation to the given output. GTA3 expressed the same thoughts. GTA3 mentioned that it would be beneficial to see student expected grades. The GTA cited this would give a good picture of the GTA’s influence on the student performance and the students own performance. Given data like this the GTA spoke about how they could use it to reinforce or adjust their strategies on how they influence their classroom community and student learning.

Innovation of teaching based on evidence from feedback

As previously stated, GTAs began to reflect and describe strategies to enhance their classrooms and teaching qualities based on the results from the survey. The GTAs

were prompted by the results of the survey as well as the survey the results came from. The prompting allowed GTAs to reflect on their current practices describe some strategies they believe could innovate their classrooms to better promote classroom community. GTAs seemed to receive more information regarding new strategies to attempted in the classroom, and specifically cited the question in the CCI asking students about their comfortability asking questions in class as one example. GTAs used this question and started speaking about the ways they can ensure students are confident to speak in class and relating those strategies to being able to help students. Based on the patterns that emerged to support this theme, GTAs had a shifting point of view of for this theme after being prompted by the more meaningful survey. More professional development in recognizing strategies to improve teaching based on feedback could be useful for GTAs.

Instructors can foster classroom community

In the previous study GTAs were aware of and could articulate the value of classroom community but seemed to imply their influence wasn't as impactful on the classroom community than the influence as a result of the environment or other factors such as the students' pre-existing friend group, the time the lab is taught or the day of the week the lab is taught. However, in the current study it seems as though the GTAs perspectives were changed, possibly due to the prompting of the new survey. GTAs expressed greater interest in classroom community, and began to use questions from the survey as avenues to think of strategies to better manage classroom community.

GTAs spoke about how they can control aspects of classroom community like being comfortable in class and providing an environment conducive to asking questions. GTAs began brain storming ways to promote classroom community. GTAs returned specifically to the survey questions asking students their comfortability asking questions in class as inspiration for new ways to foster classroom community. GTAs showed concern over this question, saying it is important for student to feel comfortable to ask questions in class. GTAs went on to discuss ways they can help student feel comfortable to ask questions in class. Some of the examples of how GTAs thought they could help students feel more comfortable to ask questions included the GTA creating a fun atmosphere by being comical, preemptively discussing silly questions, or responding to all questions positively. In this study GTAs seem to place more importance on their role in classroom community after being prompted with more descriptive or more meaningful feedback.

Discussion

In this study GTAs were presented with data as well as the survey from which the data was produced. Two framework based themes and one emergent theme were supported by the coding a categorizing of the interview transcripts. The themes are discussed in the order from framework based themes to emergent themes

Passion to teach and dedication for students to learn

This framework was consistent between the two qualitative studies. GTAs do not seem to need any help to arouse passion for their teaching or for the students in their class. No GTA participant displayed apathy toward their teaching responsibilities. In fact, GTAs seem to be eager to talk about their classrooms and their passion to teach. Some of the GTA participants even explicitly stated their enjoyment for teaching. Furthermore, GTAs were proud of their teaching. GTAs were willing and eager to reflect upon their growth as GTAs. Departments can encourage GTAs in this area by fostering this passion and helping GTAs continue to find value in their teaching (Kendall et al., 2013).

Innovation of teaching based on evidence from feedback

Innovation of teaching based on evidence from feedback was a theme present in the prior study. However, there seemed to be a shifting perception on innovation of teaching in the present study. In the first study GTAs did not show their interest in innovating in their classrooms and did not convey their ability to innovate in their classroom. Previously, we discussed this could have been due to the limited amount of authority GTAs have in their curriculum and their teaching (Muzaka, 2009). However, after the GTA participants in this study were prompted with meaningful or more descriptive feedback, GTAs began to present ideas of how they could innovate in their classrooms in response to this feedback. The GTAs spoke about altering the way they approach the environment and specifically spoke about ensuring the classroom is welcoming and safe for students to have questions. Based on the GTAs' very quick

ability to formulate ideas of innovation it can be assumed the GTAs are able to innovate in manageable ways in their teaching practices. However, it is because they are often not encouraged to or possibly not allowed to that GTAs often don't think reasonable innovation is a pertinent process for teaching. In this manner faculty mentors or academic departments can step in to show GTAs what kind of manageable innovation they can implement (Ebert-May et al., 2015).

Shifting perceptions on Classroom Community

Classroom community and the GTA's role in promoting and fostering it was an emergent theme from the previous study. However, in the current investigation there seemed to be a shift in the perspective of classroom community. In the previous study the GTAs did not feel they could be a major influence on classroom community, and thought it was rather a quality innate to the classroom or to the student groups. In the current study GTAs displayed a greater value on classroom community. In the context of the current study the GTAs cited student learning as their motivator behind promoting and investigating classroom community. This can be valuable GTAs in their development as instructors. GTAs have already shown their passion to teach and dedication for students to learn. So, if GTAs can recognize the value of promoting a strong classroom community GTAs might become more motivated to continue to pursue professional development in areas related to excellent teaching (Chickering & Gamson, 1987). GTAs could be shown the value in student perception of classroom community including the impacts it has on student learning in order to help promote their own passions for

student to learn (Royal & Rossi, 1996; Vann & Hinton, 1994). The shifting perceptions of classroom community presents a very usable opportunity for professional development in GTAs.

CONCLUSION

Over the next decade the U.S. economy will face a deficit of over one million competent STEM graduates (Federal Inventory of STEM Education Fast-Track Action Committee on STEM Education National Science and Technology Council, 2011). This is quite a large task as well as a very important task because the impact the STEM workforce has on the U.S. economy (Atkinson & Mayo, 2010). College and University STEM departments must therefore establish strategies to either retain or recruit more STEM graduates. Furthermore, college and university instructors must place a higher emphasis on excellent instruction (Chickering & Gamson, 1987). Along this same topic college and university departments need to train GTAs, future instructors and professors, to become excellent instructors (Kendall et al., 2013). One aspect of helping GTAs become excellent instructors is helping GTAs learn to pursue professional development and learn from end of course student evaluations (Kendall et al., 2014).

In the first study in Chapter 1 we investigated GTAs innate perceptions of teaching, classroom community and professional development. In this study, we were about to establish several framework based themes and one emergent theme. In this study, we found GTAs have a solid passion to teach and dedication for student to learn.

Overall, GTAs were aware of and had tacit grasps of forms of innovation and professional development, however due to extra factors GTAs were not always pursuing these avenues. GTAs do have a very structured teaching responsibility. This could be the reason why we saw GTAs have an awareness of concepts, but not have an active involvement in those practices.

In the quantitative study in Chapter 2 an establishment of the relationship between student perception of classroom community and student desire to persist was achieved. In this study, we demonstrated positive interactions between classroom community and student desire to persist. This means that as the students' perception of classroom community increases so too does their self-reported desire to persist. Furthermore, we saw an effect of time point during the semester and student desire to persist. Although, this was an exploratory study we can conclude there is quantitative reason to believe there is a direct relationship between student classroom community and student desire to persist. Furthermore, the results from this study were used as a prompting tool for the qualitative investigation in the following chapter. In this regard, the establishment of this survey serves two purposes. First, to directly describe the relationship between classroom community or sense of belonging and student desire to persist. Second, the survey seems to be an effective tool to promote ideas for professional development in GTAs.

In the final qualitative analysis in Chapter 3, an investigation to GTAs perceptions of their teaching and professional development was explored. In this study GTAs

reinforced their passion to teach and dedication to help students learn. However, there seemed to be some shifting perceptions on professional development practices and classroom community. When given appropriate feedback the GTAs were able to formulate ideas for innovation in the classroom and were able to make deeper connections in the value of classroom community. This kind of shifting in perceptions is consistent with literature (Pambookian, 1974). Furthermore, this study demonstrated the opportunity departments have for GTAs to continue to pursue excellent teaching. Altogether the three-part study showed the benefit to providing GTAs with appropriate feedback.

APPENDICES

APPENDIX 1

Classroom Community Index

DIRECTIONS: Below you will see a series of statements concerning a specific course or program you are presently taking or recently completed. Read each statement carefully and place an X in the parentheses to the right of the statement that comes closest to indicate how you feel about the course or program (SA = strongly agree, A = agree, N = neutral, D = disagree, SD = strongly disagree). You may use a pencil or pen. There are no correct or incorrect responses. If you neither agree nor disagree with a statement or are uncertain, place an X in the neutral (N) area. Do not spend too much time on any one statement, but give the response that seems to describe how you feel. **Please respond to all items.**

- 1 I feel that students in this course care about each other (SA) (A) (N) (D) (SD)
- 2 I feel that I am encouraged to ask questions (SA) (A) (N) (D) (SD)
- 3 I feel connected to others in this course (SA) (A) (N) (D) (SD)
- 4 I feel that it is hard to get help when I have a question (SA) (A) (N) (D) (SD)
- 5 I do not feel a spirit of community (SA) (A) (N) (D) (SD)
- 6 I feel that I receive timely feedback (SA) (A) (N) (D) (SD)
- 7 I feel that this course is like a family (SA) (A) (N) (D) (SD)
- 8 I feel uneasy exposing gaps in my understanding (SA) (A) (N) (D) (SD)
- 9 I feel isolated in this course (SA) (A) (N) (D) (SD)
- 10 I feel reluctant to speak openly (SA) (A) (N) (D) (SD)
- 11 I trust others in this course (SA) (A) (N) (D) (SD)
- 12 I feel that this course results in only modest learning (SA) (A) (N) (D) (SD)
- 13 I feel that I can rely on others in this course (SA) (A) (N) (D) (SD)
- 14 I feel that other students do not help me learn (SA) (A) (N) (D) (SD)
- 15 I feel that members of this course depend on me (SA) (A) (N) (D) (SD)
- 16 I feel that I am given ample opportunities to learn (SA) (A) (N) (D) (SD)
- 17 I feel uncertain about others in this course (SA) (A) (N) (D) (SD)
- 18 I feel that my educational needs are not being met (SA) (A) (N) (D) (SD)
- 19 I feel confident that others will support me (SA) (A) (N) (D) (SD)
- 20 I feel that this course does not promote a desire to learn (SA) (A) (N) (D) (SD)

Scoring Key

CCS raw scores vary from a maximum of 80 to a minimum of zero. Interpret higher CCS scores as a stronger sense of classroom community. Score the test instrument items as follows:

- For items: 1, 2, 3, 6, 7, 11, 13, 15, 16, 19; weights: Strongly Agree = 4, Agree = 3, Neutral = 2, Disagree = 1, Strongly Disagree = 0
- For items: 4, 5, 8, 9, 10, 12, 14, 17, 18, 20; weights: Strongly Agree = 0, Agree = 1, Neutral = 2, Disagree = 3, Strongly Disagree = 4
- Add the weights of all 20 items to obtain the overall CCS score.

CCS subscale raw scores vary from a maximum of 40 to a minimum of zero. Calculate CCS subscale scores as follows:

- Connectedness (social community); add the weights of odd items: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19
- Learning (learning community); add the weights of even items: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

APPENDIX 2

Intent to Persist Survey

The following questions pertain to your feelings and perceptions about your career plans. Please answer the following from 'strongly disagree to strongly agree' based on your current thoughts about your future plans.

- 1) I am confident about my choice of major
- 2) A career that applies biological sciences is the most rewarding future career I can imagine for myself
- 3) My interest in a biological sciences major outweighs any disadvantage I can think of
- 4) I do not think about my future career to determine what is important in this course
- 5) My future career influences what I want to learn in this course
- 6) My future career is an important consideration in how I decide to approach this course

Appendix 3

Codebook

Page/L ine	Text	TA	pre/p ost	Coder	Code	positive comment	negative comment	my thoughts
Page4L ine #27	I have to do this	TA 3	pre	Andre w Kardo hely	“have to”	TA used a phrase that means a little bit of non passion for teaching		this is just a pet peeve of mine when people use this term it usually means they are not all in
Page4L ine #3	that I'm able to apply my experience as a student, and, you know, tell them that I was just there	TA 4	pre	Andre w Kardo hely	applying experiences for teaching	TA is using what they learned as an undergrad to help students pass the same course		I don't know what to code this it is very unique and I feel like it is a reflective action to be able to think back to how one was taught and then take that knowledge into the classroom as a teacher
Page3L ine #16	that's just a part of learning how to teach	TA 2	pre	Andre w Kardo hely	aware of developme nt	TA implies learning to get better is part of teaching		TA reflecting on a practice of critical teaching

Page3Line #1	congenial class	TA 1	pre	Andrew Kardohely	Classroom community	congenial meaning the social aspect of community	not active promotion of community	this was a TA description of community or cohesive class
Page2Line #37	because you may get more negative comments versus positive comments if they're not really happy, and it could be stemming from negative experiences with their lab mates	TA 3	post	Andrew Kardohely	Classroom community	TA is speaking about the comments students can give in a survey and relating that to interactions between students in groups	isn't necessarily speaking about group dynamics but merely talking about looking for reasons for why the results are happening	TA seems to be talking skin deep in my opinion yeah these are good comments but they are also kind of superficial in nature
Page2Line #21	It's pretty much the same as it is now, so he puts us into, I think he calls them learning groups	TA 4	pre	Andrew Kardohely	classroom community	TA states the type of community established for them in the classroom		later in this transcript TA basically uses this foundation to build rapport and foster community

Page2Line #24	I mean I always try to impart a culture of openness in my class	TA 4	post	Andrew Kardohely	Classroom community	TA now after seeing a new survey about classroom community is speaking about how they try to promote classroom community	TA is not getting defensive	I think when asked in a survey the TA can understand the feedback better maybe because this is the language of research which TAs understand
Page3Line #13	about the interactions of the students in the course	TA 4	post	Andrew Kardohely	Classroom community	TA reflects on the survey's ability to provide information regarding interaction within the classroom community	did not use this language	TA is speaking about how the survey can provide information about the interactions of students even without a network analysis this is profound due to the nature of how complex the idea of interactions mattering to community

Page5Line #8	Obviously if you're having a ... I think in general, if you are having a good time socially, or you're being successful socially, you're going to also be successful academically. Generally that kind of meld of business and pleasure ...	TA 4	post	Andrew Kardohely	Classroom community	TA is explaining a perspective of how social and academics seem to flow together and maybe support each other		This was great to see the TA make this correlation without any leading question
Page5Line #11	If you're having a good time in one, chances are you're doing well in the other as well	TA 4	post	Andrew Kardohely	Classroom community	TA directly states their perception of social and academics		TA makes the correlation between academics and social environment and makes a deep claim on their perspective which requires critical teaching thoughts

Page7Line #12	I feel like it would just give you a little bit more information about how the student views themselves in terms of the class	TA 4	post	Andrew Kardohely	Classroom community	TA wants more info on how students are doing individually	TA is not speaking skeptically	TA is constantly seeking more information about their students
Page6Line #8	I would have to go ... I would have to give them actual-looking at that, match up the grades with the groups	TA 4	post	Andrew Kardohely	Classroom community (grades)	TA was not sure off the top of their head what the grades looked like for the various groups	TA was not completely unaware just not completely sure and did not give a guess	this was good to know the TA isn't perfect and isn't introducing any bias into our study because they were kind of caught off guard and starting thinking about some relationships of grades and groups

Page2Line #26	if you have a question, ask it because there's probably at least two other people that have the exact same question	TA 4	post	Andrew Kardohely	Classroom community (learning)	TA strives to reduce any inhibitions regarding asking questions in class by building a culture that suggests we are all learning and no one should be afraid to look stupid	TA says this kind of casually so it's unclear what they do to promote community or a safe culture	this is a critical teaching technique and a critical teaching mentality to promote a safe culture
Page3Line #1	And I feel like people that are less reluctant to speak up and they say that they're fine saying whatever is on their mind, they're asking whatever is on their mind,	TA 4	post	Andrew Kardohely	Classroom community (learning)	TA is implying a relationship of learning to classroom community in regards to being comfortable and being able to ask questions freely	TA does not use this terminology	I am interpreting this to be implying the TA sees the relationship between being comfortable and learning and further persistence

Page2Line #21	it looks like as their interconnect edness increases a little bit	TA 3	post	Andrew Kardohely	Classroom community (perception)	TA is looking at results from the survey and making an assessment on the students interconnect edness saying it has increased	not sure this was true but I think the term the TA is looking for is sense of community increased	it was good to see the TA can perceive gains
Page3Line #4	chance of continuing in the course because they're already feeling comfortable with their peers.	TA 4	post	Andrew Kardohely	Classroom community (perception)	TA makes relationship of being comfortable with wanting to persist	does not use this terminology but did make relationship	TA is giving critical thought to relationships not common to novice or younger TAs
Page5Line #24	You can pick out the groups that were definitely more academically inclined versus groups that were much more socially inclined.	TA 4	post	Andrew Kardohely	Classroom community (perception)	TA is stating they can pick out different types of groups	does not state any feelings towards either type of group	good to note TA is keen on picking out different types of groups

Page2Line #22	they were happy, so they like their area that they're in, so they're probably going to want to continue on, pursue their degree.	TA 3	post	Andrew Kardohely	Classroom community (persistence)	TA is making a correlation between happiness and persistence based on the results from one question that asks for this information from the students		TA can spot the correlations
Page2Line #33	to teach the course and approachable enough that they can talk to	TA 4	post	Andrew Kardohely	Classroom community (reflection)	TA is reflecting on the new survey and applying the results of the question to classroom community	not a direct statement on community	this was very abstract to bring up how one question can apply to community based on the way the question is phrased
Page3Line #1	Yeah, absolutely, so that definitely comes down to the classroom community	TA 4	post	Andrew Kardohely	Classroom community (reflection)	TA reiterates the classroom community aspect of the question and their ability to critically think about the survey just presented to them		

Page6Line #5	, I definitely play music in my class	TA 4	pre	Andrew Kardohely	classroom environment	TA is creating a fun or welcoming environment	TA is talking about the total class environment not the personal environment	TA knows the importance of putting students in the appropriate frame of mind and welcoming them to the classroom
Page6Line #11	I definitely try to play ... Like Pandora and get their suggestions and stuff, and kinda like, blast the music, people in the lab, I mean the building are probably like, What is going on there? But ... That's kinda something I do, and then for like holidays, like, you know, like Easter and like Halloween and stuff I always bring like candy or like [crosstalk 00:08:55] and they can eat it on the way out, so.	TA 4	pre	Andrew Kardohely	classroom environment	TA reiterates how they try to establish a great teaching and learning environment		TA seems to know that a great atmosphere helps build community and rapport

Page3Line #13	I just try and have a warm atmosphere where no question is silly, and there's jokes and stuff throughout class.	TA 1	pre	Andrew Kardohely	classroom environment (encouragement)	makes sure students feel welcome and able to learn	does not speak to individual needs but rather whole community level	the TA has repeated that jokes are important when they establish rapport and promote community
Page6Line #26	two or three groups off the top of my head that they would come and get it done and they're all-most of them are A students or high B students.	TA 4	post	Andrew Kardohely	Classroom perception	TA knows off the top of their head a few great groups that do well in class	does not speak to their social interactions here but kind of implies those groups work well within themselves	TA is pretty perceptive in a general sense
Page2Line #13	go back and remember my days as a freshman in biology and chemistry and ecology and try to remember the effective techniques that those TAs had with me,	TA 2	pre	Andrew Kardohely	classroom procedure	TA does outline the good things that they experienced as an undergrad		effective techniques stuck out to me and they go on to talk about those in other contexts

Page3Line #2	constructive based	TA 1	pre	Andrew Kardohely	Classroom procedure based	knows the importance of classroom congenialness	not a procedure on how to increase community	TA explicitly says social aspect of class is important rather than just having an academic or stepwise type laboratory
Page3Line #31	. It really helps because usually not everyone gets good results in their little lab experiments, so if one of them miraculously works correctly, I make sure that everyone gets to see it and send them around the room	TA 3	pre	Andrew Kardohely	Collaboration (perception)	TA knows that collaboration has helped students do well on lab reports		When asked the TA knows the power of collaboration when it comes to students doing well academically

Page2Line #31	emphasizing that if everybody comes to the lab prepared and everybody reads through the procedure, then it will go a lot faster than relying on the one person, who probably didn't read it either, to finish the whole lab.	TA 4	pre	Andrew Kardohely	collaboration (progress)	TA is describing how they may promote collaboration through processes that allow everyone to contribute		I thought this was good because not only are they saying they want to emphasize collaboration but they are outline a plan to accomplish it
Page3Line #5	but they all talk with each other.	TA 2	pre	Andrew Kardohely	community	TA describes one part of community	is not talking about all other aspects of classroom community	This was good that the TA talked about students talking with each other but maybe it shows the TA is not quite aware of other aspects of classroom community

Page3Line #6	Last semester they were all still kind of knew to Clemson and they didn't really know how to interact with people they'd never met before,	TA 2	pre	Andrew Kardohely	community (perception)	TA describes reasons for growing community in their classroom	they are not giving any reasons that they directly encouraged	I thought this was a noteworthy perspective because the TA says they can recognize community while also talking about things that may influence it
Page3Line #8	, they feel more comfortable with biology and being in a lab setting	TA 2	pre	Andrew Kardohely	community (perception)	TA gives their input on how they think the students feel in the class		The TA gives their opinion on student community
Page3Line #21	, they become more and more open to socialization	TA 3	pre	Andrew Kardohely	Community (perception)	TA is talking about how students are more likely to socialize the more time they are in school	they are not talking about anything they have done to find this out or promote	TA has to have had experiences and be perceptive to community to be able to make this kind of assessment
Page3Line #35	but they definitely get the opportunity	TA 3	pre	Andrew Kardohely	Community (perception)	TA knows students get opportunity to collaborate	does not speak to their role in this opportunity	my thought was that it's good they can see that students have opportunity

Page3Line #26	there's definitely some friend groups and stuff that hang out outside of lab	TA 3	pre	Andrew Kardohely	Community (perception)	TA states they can see friend groups	does not really expound more on this	it's a good start for a TA to see collaborative or social groups
Page3Line #5	gravitate towards those groups that I can tell it's only that one person kinda trying to get the other people involved, and ask them questions-	TA 4	pre	Andrew Kardohely	community (perception)	"can tell" means the TA has a sense about how the group is working and the TA also outlines how they correct the problem		TA said they can sense issues or something happening and also knows how to correct it or at least address it
Page3Line #13	there's two groups that definitely have to kinda like, push along, 'cause if not, they'll be there for the whole three and a half hours	TA 4	pre	Andrew Kardohely	community (perception)	TA directly states groups that are struggling and says she is doing what she can to help them	not too detailed can only grab what is told	another reiteration of TA being able to sense student perspective and

Page3Line #25	I don't think that they necessarily thought that she was a great student, but they just kinda didn't want to do it. So, they just left the work for her.	TA 4	pre	Andrew Kardohely	community (perception)	TA was very perceptive to a student being isolated from the rest of the group and made to do all the work in lab	wondering if the TA thought about doing anything to help	This is pretty advanced perception the TA knows exactly how the group dynamic is working you could assume the TA has a good idea about other groups as well
Page3Line #11	I think maybe that might be something that I try to promote in them	TA 2	pre	Andrew Kardohely	community (promotion)	TA is referring to promoting positive attitudes in the lab in a way to make everyone feel more comfortable	is not directly claiming to promote community	TA is trying to promote an aspect that probably would lead to better community
Page5Line #16	although I know that with freshman and they're an interactive bunch and so there are definitely a lot of chatting times when they're not necessarily doing the academic	TA 4	post	Andrew Kardohely	Community (social)	TA knows that community is important and as long as it does not impede the academic side they are all for it	is not stating what they do to promote the social in this statement here	I think this shows the TA has a healthy mentality and balance of social and academics

	portions							
Page2Line #31	That's been something I'm kinda trying to work on	TA 4	pre	Andrew Kardohely	community collaboration (encouragement)	TA says they are working on making groups work more efficiently or collaboratively	is not describing how they are working on it so that makes me think they may not know how to work on it	I like that they are saying they are trying to work on it that tells me they know they can get better

Page3Line #34	That's not for me to decide as much	TA 3	pre	Andrew Kardohely	community encouragement (weak)	TA says they interact but it's not really for them to decide with whom or to what extent	they are not taking full responsibility for classroom community	TA is right to suggest they cannot be in complete control over classroom community and that's true however this comments seems to suggest they don't give enough input or encouragement for students to collaborate freely
Page5Line #16	There are going to be groups that are going to be a lot better than others.	TA 1	pre	Andrew Kardohely	community perception	the TA shows they can read a classroom	they are not talking about the class as a whole but rather individual students	the TA directly identifies students can be higher caliber or lower
Page2Line #25	You know, some groups are better than others	TA 4	pre	Andrew Kardohely	community perception	TA can see how some groups work better than others	is not saying what the definition of better is	it is valuable to know the TA can sense some sort of community productivity

Page2Line #26	some groups work together as a group of four, some make one or two people, you know, do most of the work, and you can clearly tell the other two people are just sitting there on their phones talking to each other, so-	TA 4	pre	Andrew Kardo hely	community perception	TA is expounding on the actual dynamics of groups	still not really describing what better means in terms of working well	TA can see when groups are uneven or when information is traveling unidirectional
Page5Line #17	They work more effectively or they're smarter or they're more efficient.	TA 1	pre	Andrew Kardo hely	community perception (collaborative benefits)	TA shows they are aware of collaborative benefits	does not point out how to promote collaboration	the TA identifies that students can be on different levels of efficiency
Page2Line #31	they interact well	TA 2	pre	Andrew Kardo hely	community perception, (neutral)	TA says students interact well with each other	not describing any intricacies	my thought is that they are aware of community structure in the class they also place an adverb on their interaction saying the students do it well

Page3Line #27	, I know that	TA 3	pre	Andrew Kardohely	Confidence	TA followed up a good statement with a phrase of confidence		this was a good change from some other instances that used a phrase of non confidence
Page3Line #12	the time of your lab really makes a difference as far as the quality of students goes	TA 3	pre	Andrew Kardohely	Critical assessment (due to experience)	TA makes an assessment only experienced TAs would make	does not say which times are best or worst	This is a comment I would expect to see from a more experienced TA rather than a novice because you have to have learned teaching
Page4Line #20	I had a chance to teach at a technical college for a semester where everything was literally on me from the presentations to the lab practicals to making the quizzes to everything, which is more work, but it's also cooler because you're really	TA 3	pre	Andrew Kardohely	critical teacher (process)	TA is displaying adaptability and flexibility while taking responsibility for more things	lots of words and only a little substance	TAs that take on more responsibility is a sign of good teaching

	in charge then.							
Page3Line #22	Obviously, when you're- you need to tailor your surveys to your intended group and it comes to family	TA 4	post	Andrew Kardohely	Critical teaching (evaluations)	TA is aware of how you can tailor a survey to investigate various needs	it doesn't sound like they are dismissing the new survey but they are aware surveys are kind of fluid	I'm hoping the TA is not saying the surveys are a rubber ruler type method but even if they are that could expose their true beliefs on end of course evaluations and professional development

Page5Line #8	I'll split up into like this is the experiment. We're doing it all right now. We're all going to complete this in the beginning, all right, but I'm not going to take you through it step by step by step. I'll be like okay, off, here you go. Then approach problems as they come.	TA 1	pre	Andrew Kardohely	critical teaching (process)	describing the actual process by which TA allows "organized chaos"	is not being theoretical about the process	the TA describes the process they take in providing organized chaos
Page5Line #12	it's important, but it's not everything.	TA 1	pre	Andrew Kardohely	critical teaching (process)	outlines a general theme that is important but not everything	is not saying why it isn't everything or why the blend is important	the TA in one sentence almost captures their teaching philosophy when it comes to classroom management

Page5Line #4	I'm a big fan of organized chaos because it keeps me thinking constantly	TA 1	pre	Andrew Kardohely	critical teaching (process)	TA is describing a method to organizing the classroom	TA is not giving specific example	it takes skill to be able to know the goals of the class each day and provide enough structure to get that done while allowing creativity and critical thinking by the students
Page4Line #5	I think my favorite is when the student finally opens up enough to you, and apparently I'm very intimidating, which I didn't realize until some students have picked it out.	TA 3	pre	Andrew Kardohely	critical teaching (process)	TA enjoys when students develop enough rapport to start to open up to the TA		I thought this was a critical thought because they are stating they enjoy a process that takes a while and is a result of good teaching

Page4Line #27	Favorite part is I think it feels good to teach and be able to convey a clear message to students and have them grasp that and be positive	TA 2	pre	Andrew Kardohely	critical teaching (reflection)	TA enjoys teaching and teaching well as explained by being able to convey a clear message	they are not speaking about particular teaching moments	I thought this was a good indication of critical teaching because it takes some deeper thought or reflection to know when students grasp something
Page4Line #31	and actually understand the concepts that we're supposed to address in the lab	TA 2	pre	Andrew Kardohely	critical teaching (reflection)	TA likes seeing the students understand concepts	is not going any deeper than that	It is a higher level of teaching to be able to know when students actually understand and even deeper to reflect and have feelings about it

Page3Line #15	, I feel that this course is like a family. I don't think that you need to have your classroom feel like a family. That shouldn't matter. You shouldn't need to ... Just because it's ... It's not that, I just think it's a silly question. But that's- sorry, that's something that jumped out when I was looking at it.	TA 4	post	Andrew Kardohely	Critical teaching (reflection)	TA almost contradicts themselves by saying the classroom does not need to feel like a family	a negative comment could be that the TA has a different definition of what family in the context of the classroom means	even though this sounds like the TA is being dismissive the TA is giving insight into their views of family in the context of family and to make these kind of claims means they are reflecting very critically
Page3Line #25	The traditional survey is very vague at times	TA 4	post	Andrew Kardohely	Critical teaching (reflection/ PD)	TA states the current end of course evaluation is very vague and we could imply not very helpful for professional development	TA does not explain how they are vague or what they could really improve or what they would want to see	TA has the ability to separate the unhelpful forms of professional development from helpful in terms of their own preference

Page2Line #17	I want them to know that I'm accessible and approachable , and they can ask me any question and I'll try to answer it as best as I can.	TA 2	pre	Andrew Kardohely	critical teaching (reflection0	the TA speaks to wanting to know if they are performing how they feel they are		this is something that only critically performing teachers do I would say this is a characteristic of an excellent teacher
Page5Line #16	Yeah, exactly	TA 1	pre	Andrew Kardohely	critical teaching (skill)	Adaptability is a skill the TA uses to manage the lab	not a explanation on how well adaptability works	to be adaptable is a critical teaching skill that helps students learn in their own ways

Page5Line #23	You can kind of push the kids that need a little bit of help down the hill a little bit more, and then run and catch another group and give them a push, and bounce back and forth between the groups. If you're walking through ... I feel like you lose more by going through step by step and being overly organized	TA 1	pre	Andrew Kardohely	critical teaching (skill)	TA is using collaboration to be more effective	did not explicitly say collaboration but that's what is being described	The TA describes a process by which they promote collaboration on this is a skill that is unique to higher caliber teachers
Page3Line #1	Yeah, I think it's completely necessary to have like a congenial class, rather than just a constructive based.	TA 1	pre	Andrew Kardohely	Critical teaching (thinking)	takes a deeper thought to recognize social verses academic sides of teaching	not outlining actual actions	this thought process is a not a quality of inexperienced or low quality instructors

Page3Line #26	get from just from instructing to actually teaching	TA 1	pre	Andrew Kardohely	critical teaching (thought)	more than just teaching		the TA knows that teaching isn't just standing in front of a class and telling them things about a subject
Page3Line #15	Which says some things about their time management skills	TA 3	pre	Andrew Kardohely	Critical teaching (thought)	as a result of something going on the TA makes a comment on time management skills	they are not talking about their own time management skills	as a result of the lab time the TA made an inference on student time management skills which could be true or not
Page4Line #2	leadership opportunities	TA 4	pre	Andrew Kardohely	critical teaching (thought)	TA finds teaching a leadership opportunity		this is a critical teaching thought because teachers are not only educational guides but also leaders also a sign of reflection

Page4Line #19	But you're so far removed	TA 4	pre	Andrew Kardohely	critical teaching (thought)	TA pointed out without any leading thought that the interviewer is seen as too old or too far removed from the students position and that could contribute to older instructors difficulty building rapport	TA was not criticizing or attacking other instructors	this is exceptionally perceptive and also speaks to the TAs passion to establish rapport with students
Page4Line #21	They think that you're like, way out there	TA 4	pre	Andrew Kardohely	critical teaching (thought)	TA was continuing the thought and elaborating just slightly from the previous statement		

Page2Line #31	how much the students trust their TA both a	TA 4	post	Andrew Kardohely	Critical teaching (thought)	TA is critiquing very accurately the meaning behind a question on the end of course evaluation		this is very crucial to the study without training the TA was able to reflect and deconstruct the meaning behind the questions of the survey
Page3Line #1	And I feel like people that are less reluctant to speak up and they say that they're fine saying whatever is on their mind, they're asking whatever is on their mind, probably have a better chance of continuing in the course because they're already feeling comfortable with their peers.	TA 4	post	Andrew Kardohely	Critical teaching (thought)	TA takes the question on the survey relates it to the classroom community and asking questions then relates that to students feeling comfortable enough to persist in the academic major	pretty much speculative	this is a huge comment that the TA without help or training related classroom community to persistence

Page3Line #6	And you can interplay 10 and 11- questions 10 and 11 pretty closely mostly because of their trust of the other people in the course and they're going to speak openly	TA 4	post	Andrew Kardohely	Critical teaching (thought)	TA interrelates two questions reflects on them and applies them to classroom community	TA does not directly say the term classroom community but based on the ongoing discussion that is what they are talking about	TA is digging deeper with each statement about the survey shown to them and expressing thoughts that are characteristic of an in tune instructor and one that has elite skills
Page3Line #13	of the- and of your efficacy teaching.	TA 4	post	Andrew Kardohely	Critical teaching (thought)	TA believes this survey reflects efficacy	TA does not define what efficacy means but it's obvious it is included in what they can infer from this survey	this is a deep thought on the benefits of this survey as compared to prior surveys
Page3Line #15	Like question seven	TA 4	post	Andrew Kardohely	Critical teaching (thought)	TA quickly picks a question that does not seem to be pertinent to their perspective		

Page3Line #35	I would like to see their related grades	TA 4	post	Andrew Kardohely	Critical teaching (thought)	TA quickly points out ways they feel the new survey can be improved		knowing what a tool can do is one level of thought on a subject but knowing how to improve it is a deeper level of thought
Page4Line #1	... If the people up here are the ones that have felt a good community and also want to continue and these are all As, then of course they're- because they're doing good, they're going to want to continue.	TA 4	post	Andrew Kardohely	Critical teaching (thought)	TA is critically analyzing the results from the survey	TA is not dismissing the survey merely trying to describe a phenomena that would explain the results	TA is critically thinking of ways the results could be discredited or expected which requires a great deal of thought and reflection

Page4Line #8	Maybe you've got a group of people here that have Cs and they're on the fence about whether they want to continue and how they feel with the courses, is that indicative of their grades? Or are their grades indicative of their- kind of like apathy towards the course?	TA 4	post	Andrew Kardohely	Critical teaching (thought)	TA is exploring causal correlations and critically thinking about how to interpret and use the survey		TA is reflecting critically and using a deeper level of thought to accomplish this
Page4Line #17	It would be- especially because it tells me as a teacher, all right, do kids want to continue just because they're doing well, or do kids want to continue because they're being challenged?	TA 4	post	Andrew Kardohely	Critical teaching (thought)	TA is curious about the reasons the distribution looks the way it does	is not making a statement for any direction just a curious thought	this was very interesting that the TA spotted reasons without being trained

Page5Line #12	Necessarily, of course, there's- that runs the gambit	TA 4	post	Andrew Kardohely	Critical teaching (thought)	TA knows there are exceptions to trends and students can be outliers	TA does not use this language or outright state this	interesting point about how the TA can perceive students as individuals and not really part of a trend
Page2Line #28	That's what I'm here for is to answer questions and no matter how silly you think they are	TA 4	post	Andrew Kardohely	Critical teaching action	TA is willing to work to make sure students understand concepts	TA does not give example	the term no matter what is a critical teaching thought mentality and action phrasing their intent that way means they place a good amount of importance on student learning and they take responsibility for this

Page2Line #21	not try to really teach us any of it, but would just run through the lab and then kick us out.	TA 2	pre	Andrew Kardohely	critical teaching process	TA is outlining how their TA fell short in establishing rapport when it comes to content	this is not talking about the current TA	I felt like this requires higher thought on teaching to know the differences in teaching and to be self aware enough to commit to not doing things improperly
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Page4Line #26	, hey, what do you think that you did good. It's always kind of made me scratch my head because ... I guess that's something that we have to do for our TA, like our GTA evaluations, like self evaluations. That's always difficult because you think that you've done really well, and you can't even see the student evaluations until after you've filled out your GTA evaluations. That's always kind of strange	TA 1	pre	Andrew Kardohely	Critical teaching process (teaching reflection)	the TA is talking about the strange way TAs are made to perform reflections	this is not the TA giving a positive opinion nor is it the TA reflecting on personal experiences	TA critiques the process by which TAs perform reflections this requires a deeper thought on teaching and professional development
Page2Line #20	I actually kind of immediately was questioning 10.	TA 4	post	Andrew Kardohely	Critical teaching thought	TA is critically analyzing inventory questions from a newly presented survey on classroom community		

Page5Line #14	Because am I culturing a social setting or am I culturing an academic setting or am I doing a really good job at both of them?	TA 4	post	Andrew Kardohely	Critical teaching thought (community and academics)	TA ponders what kind of culture they are promoting in the lab	seems like just a pondering thought not a statement	this shows the TA is thinking about the kind of culture they are developing
Page2Line #23	Which makes sense	TA 3	post	Andrew Kardohely	Critical teaching thought (community)	TA makes statement about community and persistence and then follows it up with saying it makes sense		this means to the TA it's common knowledge that if students are happy they will be more likely to persist which is a very deep thought on teaching
Page5Line #18	they're not giving me that many, that much feedback	TA 4	pre	Andrew Kardohely	critical teaching thought (feedback)	TA explains where the current feedback system is lacking tacitly implies where they could improve	does not outright state what could be improved here	important that TA knows they are not getting a great amount of feedback which means they know they could or want to hear more

Page5L ine #14	the questions are pretty basic	TA 4	pre	Andre w Kardo hely	critical teaching thought (feedback)	TA is criticizing the evaluation questions saying they are not detailed enough	TA does not suggest better questions	very important that this TA knows whether they are being evaluated appropriat ely
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Page5Line #18	So they're not that helpful	TA 4	pre	Andrew Kardohely	critical teaching thought (feedback)	this is a blunt statement about the nature of the evaluation system	TA is not describing a way to improve the system	it is important that the TA is able to recognize if there are any benefits to the current feedback system for teaching
Page3Line #11	maybe it's not grades	TA 3	post	Andrew Kardohely	Critical teaching thought (new thought)	TA is being kind of curious about why things are happening		I think I led the convo away from a potentially interesting thought but the TA was talking about how grades may not explain correlations of why students want to persist I think they were going to argue it's a mosaic of grades and personal issues

Page2Line #24	because if you're not happy, you're probably not, because humans are really social beings, and they need interactions, and if they have positive interactions in biology, if that's their major, then that's probably a good thing, whereas if they're super lonely and they don't talk to anyone, then probably not very happy.	TA 3	post	Andrew Kardohely	Critical teaching thought (persistence)	TA is making a correlation between happiness and persistence using psych as a foundation	is not really speaking about why or how just stating that it seems obvious	I think this is pretty profound that the TA casual explains the relationship between happiness and persistence this must mean they think about these things regularly
Page5Line #24	Yeah, I think that that would be helpful to get a more detailed, like 'cause I, we're doing the same things that we should be like, critiqued in the same way, but	TA 4	pre	Andrew Kardohely	critical teaching thought (pro development)	TA states how the evaluation could be improved		this is a great statement about what the TA feels about the evaluation system it's true and very insightful

Page2Line #36	, this would also be useful to the comments I get from the students	TA 3	post	Andrew Kardohely	Critical teaching thought (professional development)	TA immediately points out a way to make the survey better	this could also mean the TA does not get how much more descriptive the new model is or they are not critically thinking about the new model	just like stated before this could mean the TA is eager for more or they are not critically thinking about the survey
Page6Line #30	So there's definitely corollary- you would be able to see- and whether they want to persist or not, you would definitely be able to be like, okay, maybe that group is like these guys right here. That would make a lot of sense.	TA 4	post	Andrew Kardohely	Critical teaching thought (professional development)	TA makes a comment and example of how to make the survey a little better and makes a comment about some corollary relationships	isn't very articulated sentence	very critical they way the TA is able to create new ideas for the survey
Page5Line #19	did give me some feedback, so I did take that into consideration this time.	TA 4	pre	Andrew Kardohely	critical teaching thought (reflection)	TA states they took the little amount of feedback and internalized it	TA does not state how they used the feedback just that they did that	TA takes feedback and reflects on it very crucial to excellent teaching

Page3Line #30	Yeah, and then it could also be the connectiveness in the class, then also go based on the TA evaluations, a number of things that cause that disconnect	TA 3	post	Andrew Kardohely	Critical teaching thought (superficial)	TA is thinking about different reasons for the correlations	does not really explain this well	this is a unique thought and deep but again not sure if it's related or kind of an isolated thought
Page4Line #31	no, I guess they all kind of make sense	TA 1	pre	Andrew Kardohely	critical teaching thought, lacks	does not give deep thought to evaluations	this does not mean TA never gives a deeper thought	the TA did not have a comment ready about the student suggestions however TA has given multiple examples already TA may have just been out of comments

Page2Line #9	drills a little deeper. It's a little more concept ... Well, not concept. TK's class is a little broader, just because these kids are just science majors, so they're in the College of Science. They're not necessarily going to get a bio degree, so it's more ... It's a lot broader.	TA 1	pre	Andrew Kardohely	Critical understanding of teaching	knows the depth of knowledge required for biology majors	not a theoretical thought this is one based on experience	the TA explains the difference in his teaching experiences
Page6Line #2	So, that probably makes a difference	TA 4	pre	Andrew Kardohely	criticism on feedback	referring to previous statement TA is criticizing the process of teaching evaluations saying the students are not in an environment to critique appropriately	TA is not outright stating this just implying it	very interesting they are so casual about stating this this could mean it's so normal or common for the system to be like this it's not a big deal
Page5Line #27	No, it's like one page	TA 4	pre	Andrew Kardohely	criticism on feedback	TA reiterates again the lack of detail for their evaluation		

Page3Line #23	Definitely a combination of all of those things	TA 2	pre	Andrew Kardohely	development (awareness)	TA says they use or can see the value in a mix of forms of teaching development	is not saying which one they prefer	when asked how they feel they improve their teaching skills they respond by saying it takes multiple forms of teaching development
Page3Line #21	but I started teaching labs in undergrad. I was an undergrad TA	TA 1	pre	Andrew Kardohely	Experience			TA explains they have been teaching and instructing either formally or informally since they were undergraduates

Page3Line #25	I tutored all through high school, and so I've always kind of done this in a sense	TA 1	pre	Andrew Kardohely	experience			TA speaks to their longevity teaching when they say they've "always done this in a sense" I think they mean they have always liked teaching and always liked helping students
Page2Line #3	sixth or seventh semester teaching, maybe eighth. A lot	TA 1	pre	Andrew Kardohely	Experience			this is how much experience this TA has. Notice the term "a lot"
Page2Line #7] Intro to Bio lab for science majors.	TA 1	pre	Andrew Kardohely	Experience	has taught multiple different classes	no negative	has experience in multiple settings
Page2Line #4	second semester teaching biology	TA 2	pre	Andrew Kardohely	Experience			TA states how long they have been teaching

Page2Line #5	I taught there	TA 3	pre	Andrew Kardohely	Experience	TA has had previous teaching experience	TA did not say how long at the previous place they taught	This is probably a good lens to view most of their comments through
Page2Line #8	I think it depends pretty much solely on the lab coordinator and how organized and how long they've been there, and that sort of thing	TA 3	pre	Andrew Kardohely	Experience	TA is describing the differences in the places they have taught	they are not describing their teaching experiences	I thought this showed that through experience they can tell the difference in leadership style
Page4Line #3	I've been teaching formally and non-formally for five years now. From internships to my job in between my degrees and now.	TA 3	pre	Andrew Kardohely	Experience	TA states how long they have been teaching		
Page2Line #3	This is my second. I taught in the fall, and now in the spring	TA 4	pre	Andrew Kardohely	Experience	TA states how long they have been teaching		I would say this isn't too long at the time of the interview they hadn't completed two semesters

Page2Line #8	so its only been two years since I've taken it.	TA 4	pre	Andrew Kardohely	Experience	TA took the exact same class not too long ago		I did not know whether to say this is experience or like a unique perspective
Page5Line #15	Because I would hope that I would be more on the academic side than social,	TA 4	post	Andrew Kardohely	Goals	TA is explaining what their ideal class would be like	does not imply social side of class is useless but as an instructor they hope the class is meeting the academic standards	this states outright what the TA wants in the culture of their class
Page2Line #17	I can remember what we would do when I was a student	TA 4	pre	Andrew Kardohely	immediacy (student mindset)	TA is so close in immediacy to the student position that they use their own past experiences in the class to help guide their teaching		reiterating their position as in tune with students based on their current status

Page2Line #4	1101. 11-11. 11-10, or 11-11	TA 2	pre	Andrew Kardohely	Knowledge (lacking)	the TA is not sure what the course code they are teaching	this isn't a lack of content knowledge of the course just the course code	not necessarily a bad thing might just be a result of calling the course by name and not by code
Page3Line #34	I would hope	TA 1	pre	Andrew Kardohely	lack of confidence	TA states a claim but does not have confidence the event is happening	is not a lack of confidence in teaching but rather how well they are developing	the TA is referring to how they gain professional development through a mentor but then remarks they are not sure how well they are doing
Page4Line #13	, I think	TA 2	pre	Andrew Kardohely	lack of confidence	Right after saying something profound about teaching the TA says a phrase of lack of confidence		

Page4Line #29	I don't know	TA 2	pre	Andrew Kardohely	lack of confidence	TA again follows up a profound statement with a phrase lacking in confidence		
Page7Line #13	If you're doing good in the class, you're going to hopefully consider the class is a decent class, I guess. I don't know	TA 4	post	Andrew Kardohely	Lack of confidence	TA states a pretty novel corollary but then follows it up with a statement of non confidence	not an indictment on TA	this was kind of disappointing because this TA had novel ideas throughout the whole interview and spoke with confidence then the last thing they say is not confident
Page3Line #18	I don't know	TA 2	pre	Andrew Kardohely	lack of confidence in development reflection	When asked to explain a comment the TA just says I don't know	the TA isn't unsure of all things just on the development of teaching in one aspect	TA just responded to a question by saying they don't know

Page3Line #12	I don't know	TA 2	pre	Andrew Kardohely	lack of confidence in new process	TA made a comment that was profound but then followed it up with a statement of low confidence	the TA is not unconfident in their teaching as a whole	the I don't know struck me as odd or maybe negates the profound critical teaching statement said immediately before
Page4Line #22	. I don't think I have a less favorite part, other than when I get frustrated when there's some sort of equipment malfunction and that stops the lab and the students look up at me, looking for me for advice saying, "What do I do?" And I don't know what to do because that equipment is not working or some computer program isn't working and so I'm just learning how to keep my cool and stay calm and	TA 2	pre	Andrew Kardohely	lack of confidence in progress in procedure	TA restating they do not like how the tools are not always reliable		I'm starting to get the feeling the most stress from this TA comes as a result of the tools in the lab not working they have stated this several times now

	move groups around so that at least the lab gets done							
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Page2Line #34	They're definitely useful	TA 3	pre	Andrew Kardohely	Lack of critical analysis of PD			I thought this was kind of odd the TA did not really expound on this thought and it makes me think maybe they are not giving any critical thought or reflection on their teaching
Page2Line #18	because I was thrown in in my master's and wasn't really given any guidance,	TA 3	pre	Andrew Kardohely	leadership	The TA is talking about the lack of leadership and guidance they had when they first started teaching	this is not talking about their own leadership	I thought this was a statement consistent with some papers on TA perspective
Page4Line #5	, even like personal things like what classes to take	TA 4	pre	Andrew Kardohely	mentoring	TA is interested in things beyond just teaching the content material		the TA is displaying an action consistent with excellent teaching which is going beyond the regular duties of content teaching

Page4Line #15	and so it's been kinda cool that I got to help them in that way too	TA 4	pre	Andrew Kardohely	mentoring	TA showing they care about the mentoring aspect of teaching	not talking about the process of mentoring	TA has stated on several occasions now that they enjoy the mentoring aspect of teaching
Page4Line #5	what professors to take and stuff, 'cause all these, most of these students are biology majors	TA 4	pre	Andrew Kardohely	mentoring	this is really a continuation from the previous statement on mentoring		
Page3Line #2	I like it, mostly because Dr. Kosinski makes it so easy for the TAs	TA 3	pre	Andrew Kardohely	Mentorship	TA states having a strong leader and mentor as the course director is important	does not go into detail on the mentorship	TA has said a few times about how mentorship is crucial to learning to teach well
Page5Line #1	like for lab reports especially Like they can meet with me, and we can like go over the lab reports or whatever	TA 4	pre	Andrew Kardohely	mentorship	TA explains they are available to counsel students on writing proper lab reports	this sounds like a temporary mentorship as opposed to previous statements about counseling students on class choices and	this TA is intentional about mentoring students in short term situations and long term situations

							degree options	
Page3Line #10	I don't do any kind of like team building	TA 1	pre	Andrew Kardohely	Passive community encouraged			TA does not structure collaboration

Page3Line #6	. I don't assign seats in class	TA 1	pre	Andrew Kardohely	Passive community encouraged	TA knows things that could produce controlled collaboration	does not see benefit to them	The TA says they do not structure any collaboration which is not inherently bad but does let us know they are not authoritarian when talking about community and collaboration
Page4Line #23	because obviously, if you're doing C work in the course or you're doing D work in the course, you're going to answer a lot differently than if you were doing A work in the course. I would think.	TA 4	post	Andrew Kardohely	Perception	TA is knowledgeable about the student position in regards to grades	TA doesn't state why this relationship of grades and persistence is tangible	TA states a relationship that is pretty obvious which is an easy thing to grasp however they don't present any reason why or an exception to the rule

Page3Line #31	mentors that are really good teachers	TA 1	pre	Andrew Kardohely	perception (good teachers)	TA recognizes good mentors	is not talking about themselves	it's clear the TA knows the difference between good and bad teachers furthermore they seek mentoring from the good ones
Page3Line #3	I would give it an eight	TA 2	pre	Andrew Kardohely	perception (self aware)	TA gives a reasonable number their classroom community	TA is only describing community and not the overall performance in the class	I saw this a realistic number indicating the TA is confident in the level of community in their classrooms but with room to grow so it implies they know they can get better

Page2Line #27	Some are naturally good, but some aren't	TA 3	pre	Andrew Kardohely	Perception (skill)	TA is giving their perception of TA skills	this TA falls in to the category of thinking a good amount of teaching skill is innate	This is not really a critical teaching thought because assuming teaching is innate is something a novice or inexperienced instructors would think
Page2Line #26	if I'm noticing that they're all answering the same questions	TA 2	pre	Andrew Kardohely	perception (student need)	TA is noticing they all seem to need the same thing	why would the TA not reteach the whole class if everyone is not getting something?	my first thought was that the TA knows how to read a general trend of the students
Page2Line #16	with a lot of grad students who haven't taught before	TA 3	pre	Andrew Kardohely	perception of experience	TA is explaining the benefits of leadership styles	they are not giving their perception of their own experiences	I thought this was a profound thought because they are thinking about the needs and development of others

Page4Line #33	they don't want to ask questions	TA 4	pre	Andrew Kardohely	perception of student	TA knows what the students are feeling	does not go in depth and is not saying students don't want to ask questions they just are nervous to	TA seems to know what the students need or want and how they think
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Page4Line #5	People don't like raising their hand	TA 2	pre	Andrew Kardohely	perception of student feelings			
Page3Line #22	they're kind of scared and don't really know what's going on yet or what to expect.	TA 3	pre	Andrew Kardohely	Perception of student perspective	TA makes assessment of what they think students are feeling in the class and why they may not be socializing right off the bat		I thought this was kind of deep because the TA needs to place themselves in to someone's shoes to make this kind of comment
Page4Line #20	I wouldn't consider this necessarily a challenging course	TA 4	post	Andrew Kardohely	Perspective	TA directly states their perspective of the class they teach		TA states their class isn't that tough but also seems to imply they can see how it can be to some people
Page2Line #11	, it's kinda nice that I have like that experience from just two years ago	TA 4	pre	Andrew Kardohely	process	TA is taking their perspective into the process of teaching and developing teaching process	is not describing a specific process is focusing on that perspective	again this is the unique perspective this TA brings to the classroom

Page6Line #11	It's not great time to have a lab	TA 4	pre	Andrew Kardo hely	process perception	TA is stating a difference in the overall lab based on the time of the lab	TA is not ranking or making a list of good teaching times	this is an advanced perception of teaching
Page3Line #27	I think it's been a process	TA 1	pre	Andrew Kardo hely	professional development			
Page3Line #21	It's been a process	TA 1	pre	Andrew Kardo hely	Professional development	gaining professional development has taken time		the TA has used their long experience for leverage in professional development. This could mean to the TA that with the right amount of time instructors can learn how to get better

Page3Line #19	Maybe	TA 3	post	Andrew Kardohely	Professional development	TA expresses the survey could tell more but is saying it in an unsure way		I think the TA has an idea of what they want to see and may be being a little dismissive with the new model
Page4Line #12	That sort of thing. Also, how much have you spent out of class actually working on it. And then also what grade do you expect, and it all connects together.	TA 3	post	Andrew Kardohely	Professional development	TA is explaining in this thought and the previous ones the things they would like to see in a survey which would end up building an separate subset of questions on the survey	is not thinking about the new model	this is critical thinking but critically thinking about how to design a survey about what they want to see not really what is being given to them
Page3Line #28	you're asking other TAs and then yeah, I didn't really communicate	TA 2	pre	Andrew Kardohely	professional development (collaboration)	TA states that asking other TAs for input has helped teaching development		not a well thought out response but based in the ongoing conversation I figured collaboration was important to this TA

Page6Line #34	that relies on the entire group taking it	TA 4	post	Andrew Kardohely	Professional development (end of course evals)	TA knows the struggle of end of course evals		this could mean this TA knows incentives are an important way to get evals taken this is important to professional development
Page7Line #1	Maybe for your information, if you overlay the- if I give you the groups of people and you can overlay their grades with an overlay of the responses, I think that you would probably see some pretty good information from that	TA 4	post	Andrew Kardohely	Professional development (end of course evals)	TA keeps giving ideas of what could make the survey better and in turn telling us what is important to them		TA is very invested in their grades
Page4Line #7	I learn more from what the students need by talking with them individually	TA 2	pre	Andrew Kardohely	professional development (practice)	the TA learns more what students need the more time they interact with them	not professional development through classes or mentors	The TA seems to like learning by doing

Page3Line #33	over time	TA 1	pre	Andrew Kardohely	professional development (process)	time is the process by which the TA gains teaching skills	does not talk about an actual process	time is key to developing professional development
Page3Line #36	I've read some stuff online and watched a video seminar or two, but probably it's more of a learned by example thing, not a learned through a class thing from what I've done.	TA 1	pre	Andrew Kardohely	professional development (pursuit)	how the TA pursues professional development includes a few examples	does not speak to motivation	the TA outlines a few examples of the preferred methods for professional development
Page3Line #30	I would say probably the latter	TA 1	pre	Andrew Kardohely	professional development (pursuit)	says there is a preferred method of professional development	does not show what motivation is or the degree to which they pursue	this comment says the TA does have a preferred method of professional development

Page4Line #5	I would say yeah	TA 1	pre	Andrew Kardohely	professional development (reflection)	TA reflecting on end of course evaluations	not profound realizations of new information	the TA is describing their process of reflecting in cooperation with the end of course evaluation
Page3Line #19	in past evaluations, they also had the students, had a question as far as I expect what grade they predict that they will get in the class. So it's not their actual grade, so it doesn't tell you that, but it tells you what grade they expect, so you can kind of gauge by that what kind of student they are	TA 3	post	Andrew Kardohely	Professional development (survey)	TA uses what worked for them in a past survey and applies it to the new one	I don't think the TA is critically thinking about this new model	the TA is creating new thoughts and thinking about how they get better as a teacher but I don't think it's in terms of the new model or if they are even thinking about it

Page3Line #22	feel like I got a lot of the mis-steps and mis-cues out of the way early before I got to grad school. I had them, absolutely	TA 1	pre	Andrew Kardohely	professional development (teaching)	how they got better	not talking about the actual process of professional development	TA speaks to a trial and error method to getting better as a teacher has to do with experience
Page4Line #21	I would say that I learn from the teaching evals	TA 1	pre	Andrew Kardohely	professional development (tool)	TA explicitly saying what form of PD they improve with teaching	is not making comments on which tools are not used	the TA claims the evaluations are used and places at least some importance on them
Page3Line #6	This semester's better than last semester	TA 2	pre	Andrew Kardohely	progress	TA implies they have gotten better over the semesters		This told me the TA knows they can and are getting better
Page3Line #15	I'm able to more clearly communicate the message	TA 2	pre	Andrew Kardohely	progress	TA talks about a skill they feel they are developing		I thought this was important that the TA is aware of skills that can make them better and that they feel they are developing them

Page4Line #18	I've learned how to address different situations.	TA 2	pre	Andrew Kardohely	progress (adaptability)	TA directly states without explanation their growth as a teacher		adaptability is a learned skill and a characteristic of critical teaching
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Page4Line #15	and learning how to react to troubles with equipment which pretty much happens every lab,	TA 2	pre	Andrew Kardohely	progress (procedure)	TA is learning how to cope with various things that happen each lab	does not elaborate on how to do these things	I felt the TA shows that they are addressing things that used to be real issues for them and is overcoming them
Page3Line #27	I just learned how to do that more efficiently	TA 2	pre	Andrew Kardohely	progress (procedure)	TA states because of teaching development they have become more efficient	does not state what specifically helps efficiency	I thought this was a result of reflection and critical teaching skills
Page3Line #23	Last semester was a big learning curve	TA 2	pre	Andrew Kardohely	progress (teaching)	TA is outlining that they learned a lot last semester	is not claiming anything was bad	TA states there was a learning curve for that to happen that implies the TA has also learned a lot
Page4Line #16	with students that aren't grasping a concept, students that are just frustrated, students that aren't studying	TA 2	pre	Andrew Kardohely	progress (teaching)	TA is talking about how they have made progress in aspects of teaching	they are not identifying particular steps or process	this was a continuation of the explanation about how the TA has gotten better

Page4Line #27	I kind of take it, you know, week by week and kind of see you know	TA 4	pre	Andrew Kardohely	progress (teaching)	TA is reflecting on their progress each week after they teach	is not outlining a long process	this sounds to me the TA reflects after each lab and makes an assessment if they need to make any changes or not
Page2Line #28	Why don't you ask some of your group members first? Then if there's still any cloudiness about the subject, we can go through it."	TA 2	pre	Andrew Kardohely	promotion of collaboration	TA uses need to flow information to promote collaboration		TA has a basic process to promote collaboration
Page5Line #3	, I just kind of try to get the feedback from them, and like see if they are learning stuff,	TA 4	pre	Andrew Kardohely	provide feedback	TA is pursuing feedback from the students to find ways to help them learn	this isn't talking about university level feedback systems like end of course evaluations	seeking feedback on their own is a characteristic of an excellent teacher because it means they reflect on their performance

Page5Line #21	I'm not ignoring too many of the other kids in lab because they're able to go about their own pace	TA 1	pre	Andrew Kardohely	rapport	how the TA meets individual needs		TA says how they meet individual needs this indirectly builds raapport
Page2Line #19	but I absolutely make it a point to engage with the students, chat with them about this, that, and the other thing. You know, try to make jokes in class, just because I'm going to be teaching them three hours a day, once a week, for eight weeks	TA 1	pre	Andrew Kardohely	Rapport	making students comfortable	the TA knows it is important to establish rapport	this is not active promotion of engagement
Page5Line #33	because you've got to keep it lighthearted, or I'll run around singing some stupid song as I'm preparing for class, and they get a crack out of that.	TA 1	pre	Andrew Kardohely	rapport	TA stresses the need for rapport		TA reiterates their perspective on rapport

Page2Line #18	and they can ask me any question and I'll try to answer it as best as I can.	TA 2	pre	Andrew Kardohely	rapport	TA spoke to how they establish content rapport	this is not total rapport	my initial thought is that the TA is well aware of rapport and it's importance but in this case they are strictly speaking about rapport due to instructors knowing the content or procedures of the class
Page4Line #1	I think honestly it's just the more interactions I have with students	TA 2	pre	Andrew Kardohely	rapport	Through more interactions the TA grows more and gains more student rapport	is not talking about how they promote rapport	TA does not come out and say anything directly but rather implies that more interaction makes the process of teaching development possible

Page4Line #14	you get that enlightenment and the students kind of open up and you have something in common with their interests	TA 3	pre	Andrew Kardohely	rapport	TA is talking about students opening up to them and that establishes something in common	does not seem like the TA is doing anything active to promote this	I was thinking that this enlightenment as the TA puts it is a very profound and the TA had to have been teaching for a time to be able to see that and obviously students opening up to them is a result of something
Page4Line #12	so kind of were able to connect more	TA 3	pre	Andrew Kardohely	rapport	TA speaks about the students being able to connect more		TA is talking about over time students are able to connect more with the TA because the TA is being more open about their experiences in the academic major

Page4Line #34	So I try to make an effort to you know, tell them that they can meet with me, to talk about any of the topics	TA 4	pre	Andrew Kardohely	rapport	TA is trying to get students to ask questions by building rapport		TA knows rapport will help build enough confidence with the students that students will be more up for the TA teaching them things
Page6Line #21	I feel like they like, are comfortable like talking to me about like things they need help with or whatever, just 'cause I am, so close in age.	TA 4	pre	Andrew Kardohely	rapport	TA states how great their rapport is with students based on similar life stages	TA seems to imply this is innate which is disappointing because of the previous statements on building rapport	TA recognizes the rapport but does not recognize they could foster or build better rapport
Page4Line #8	able to connect with them	TA 4	pre	Andrew Kardohely	rapport	TA states the phrase able to connect with the students	not a statement on promoting community just a statement about student teacher rapport	TA is using their position as a younger instructor to relate to students and to build rapport

Page2Line #17	I'm accessible and approachable	TA 2	pre	Andrew Kardohely	rapport (accessible)			the TA has reiterated that being accessible is important to them
Page4Line #7	also on a class basis	TA 2	pre	Andrew Kardohely	rapport (class)	TA communicates with the class as a whole		Same note as before but building rapport as a class
Page2Line #16	. I tried to be approachable to the students this semester and last semester, and yeah	TA 2	pre	Andrew Kardohely	rapport (important)	being accessible and approachable was important to the TA when they were and undergrad and they reciprocate now	is not talking about how they actually establish rapport	TA is speaking longitudinally over the span of a few semesters which I took to mean the TA is trying to get better at this each semester
Page4Line #6	I try to communicate with students on an individual basis	TA 2	pre	Andrew Kardohely	rapport (individual)	TA is describing how they build rapport with individual students		The TA is communicating with individual students in order to build rapport
Page4Line #3	I was thinking about it this morning	TA 3	pre	Andrew Kardohely	Reflection	TA must reflect on their experiences from time to time		

Page4Line #27	, if last week they were confused with the material, they weren't answering my questions, filling out my handout very well, then I'll make sure to spend a lot of time, like in prep sessions	TA 4	pre	Andrew Kardohely	Reflection	TA is describing a feedback system they use to continue making progress in their teaching		the TA keeps reiterating their reflection process this must mean the TA makes it part of their normal process
Page3Line #12	. I think that each one of the questions provides a little bit more description	TA 4	post	Andrew Kardohely	Reflection	TA is speaking about the questions on the new survey and stating they give more description	gave a broad answer does give some more specifics but does not go in to that much detail	TA is clearly aware of the benefits to the new style survey
Page3Line #15	I think some of the questions are a little silly	TA 4	post	Andrew Kardohely	Reflection	TA pokes fun at some of the questions in the survey but to do this the TA must have given them thought and reflected on their meaning	TA is not completely dismissing the whole survey	this is a critical skill to be able to evaluate the survey and make assessments on which items are crucial and which are trivial

Page3Line #29	you can interpret that in a lot of ways	TA 4	post	Andrew Kardohely	Reflection	TA states the traditional end of course evaluation is very fluid is not easily or readily available for practical use	TA is not saying it has absolutely not value but does suggest it can be better	this was pretty significant that the TA knows things could be less vague
Page3Line #29	This kind of gets down to a little bit more specifics about each one of those facets.	TA 4	post	Andrew Kardohely	Reflection	TA sees how the new survey is more detailed and possibly can infer from implied nuances that the new survey is better for practical use	does not state what facets they are talking about	TA is critically thinking about using the survey and the new survey provides better or more usable information
Page4Line #20	it would be nice to see ...	TA 4	post	Andrew Kardohely	Reflection	TA is seeking out more knowledge that could help them learn about their teaching and put things in to practical use	implies this	TA is constantly talking about the possibilities of what could be seen with the new survey if they had more metric data available

Page5Line #8	I think the more information, the better on that	TA 4	post	Andrew Kardohely	Reflection	TA would rather have more information than less when it comes to end of course evaluations		using this comment in parallel with prior comments the TA would most likely be in favor of more information that is descriptive
Page4Line #17	No, I think it'd probably just be one step closer	TA 4	post	Andrew Kardohely	Reflection (perception)	TA implies the evaluation and professional development process is in fact a process and things can always work to being better	TA is not saying there is no value in the survey developed	this is a good perspective of this TAs thoughts on reflections and evaluations
Page4Line #26	Let's see, what else can you rate ...	TA 4	post	Andrew Kardohely	Reflection (pursuit)	TA has grasped the concept of the new end of course evaluation and different metrics that can be rated with it	does not state new ones	the critical pursuit of reflection and information about their teaching is a critical teaching skill and quality

Page5Line #5	like I'll take that into account	TA 4	pre	Andrew Kardohely	reflection on performance	TA is once again reflecting on their teaching	TA did not explain what "take that into account really means"	This TA has shown they are determined to reflect on their performance in order to get better or serve student more
Page3Line #31	It's very rewarding	TA 4	pre	Andrew Kardohely	rewarding	TA teaches for the joy of helping		saying that the experience is rewarding would mean the TA reflects at least from time to time which is a quality of excellent teachers

Page2Line #18	I'm really awful with names	TA 1	pre	Andrew Kardohely	Self aware	was aware of deficit	not a great quality for rapport	this was the TA's first thought so they have obviously given it thought and know where they lack in their teaching
Page2Line #25	don't come with a degree of education background at all	TA 3	pre	Andrew Kardohely	TA experience	TA is speaking generally about biology TA in general		I thought this was an interesting thought because not many if any biology TAs come into their teaching requirements with any experience or training
Page2Line #20	useful especially for grad students who have not taught before	TA 3	pre	Andrew Kardohely	TA progress	TA makes profound statement on what is useful not just for them but for TAs in general	They are not talking about their own progress	I thought this was profound and a critical teaching thought because they are talking about how to help other TAs

Page2Line #12	I know well to kind of make sure they don't take those short cuts that we all took when I was a student	TA 4	pre	Andrew Kardohely	teaching	TA is giving students hints to help their efficiency or to help them learning the material better	not really a necessarily	
Page3Line #25	I've always enjoyed teaching	TA 1	pre	Andrew Kardohely	teaching (passion)	explicit interest in teaching	does not outline a specific process enjoyed	TA broadly speaks to their passion to teach but does not go in depth
Page4Line #20	Oh, I've got to do something about this	TA 1	pre	Andrew Kardohely	teaching development	identifying an area where the TA plans to improve	not an example of what is being done	TA says a statement consistent with being serious about improving
Page4Line #13	Every interaction I have with a student, I'm able to learn from it	TA 2	pre	Andrew Kardohely	teaching development (practice)	TA is reiterating what was said before about learning through practice and multiple interactions helps learn		

Page6Line #9	... You know your superstars, and you know the kids that are dragging on really easily. And then the folks in the middle would get a low grade, especially the ones that aren't very boisterous in class, that are just kind of there.	TA 4	post	Andrew Kardohely	Teaching perception	TA kind of waxes about the various types of student they perceive		I wonder if these would be considered categories for them or more of a spectrum
Page2Line #5	my first TA experience, so it's going really well	TA 2	pre	Andrew Kardohely	Teaching perception (positive)	TA claims the teaching experience is going well		TA says the experience is going really well which says they have at least some positive feelings so far towards teaching

Page5Line #30	since it's taking up time in their lab, they just kinda like, circle, circle, circle, turn it in.	TA 4	pre	Andrew Kardohely	Teaching perception (process)	TA is describing the flaws in the current evaluation system from the perspective of the student		it is interesting that the TA can see and understand one reason why the students don't give detailed evaluations
Page4Line #10	I take the comments into consideration	TA 1	pre	Andrew Kardohely	teaching reflection			TA takes in to account what students are saying and reflects on that to correct things said
Page4Line #10	I felt like I kind of failed them a little bit.	TA 1	pre	Andrew Kardohely	teaching reflection	taking to heart when an evaluation does not give expected reports	isn't reflecting on what they actually did but rather a reflection as a result of lower report	the TA does care and does take to heart what students have to say based on
Page4Line #23	the education is changing	TA 3	post	Andrew Kardohely	Teaching thought	TA seems to be aware of the state of education	this is the only comment we get on this	this is important but seems incoherent like it's coming out of left field

Page2Line #15	was a lot of the techniques that didn't work for me that they used, that I tried to remember	TA 2	pre	Andrew Kardohely	technique development	TA watched others and used personal experience to establish a teaching philosophy	is not doing this formally, this was the how they started doing the effective techniques they previously mentioned	
Page3Line #24	, it wasn't difficult	TA 2	pre	Andrew Kardohely	trying process	TA states learning to teach better is difficult		

Page2Line #18	I try my best to do names, but because I'm just really bad with names,	TA 1	pre	Andrew Kardohely	Trying to get better	Trying to work on a skill or quality previously mentioned to be lacking in	negative= kept identifying as still being bad instead of a language indicating the TA is improving	this would be a good quality of teaching because they are reflecting on their abilities and working on improving
Page4Line #14	One of the things last year, one of the comments I got last semester, some kid was like, "I don't think you ever learned any of our names."	TA 1	pre	Andrew Kardohely	was called out	student identified a deficiency	was not a malicious or area that clearly offended or crossed a line with a student	a student called out an area where the TA can work it did not appear the comment was coupled with any offense or the student feeling he was inappropriate seems like an example of taking a student comment into consideration and making steps to improve

Page2Line #27	so this is where you need to get them interested the most because if they're not interested now, they're not going to care later.	TA 1	pre	Andrew Kardohely	Welcoming community			TA reiterates the need for students to feel welcome in order to stay biology majors
Page2Line #22	it's the beginning of their science career, so I try and be more of a warm and fuzzy kind of opening than a harsh, stark reality.	TA 1	pre	Andrew Kardohely	Welcoming community	an environment where students feel comfortable to learn	not active promotion of community through collaboration	the TA makes it a point to establish some sort of welcoming community it seems they know this is important to students wanting to be there

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