

New Graduate Teaching Associates and Student-Centered Instructional Methods

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The importance of student-centered approaches took on new importance when the COVID-19 pandemic caused a tectonic shift in college instruction in 2020. In Fall of 2021, I reached out to all 13 of the new graduate teaching associates (GTAs: graduate students who were instructor-of-record for undergraduate courses) in the department. Eight of the 13 completed three rounds of survey and two rounds of interview. The goal was to find out what they knew about student-centered instruction and how that changed over time. GTAs spoke of the importance of supporting students in evaluating knowledge claims, learning how to learn, how to collaborate, and how to seek help. Their greatest opportunities for professional growth at the end of the year were with teaching that supported students to: become capable of self-assessment, to be resilient, and in building skills in what to do when they (students) do not know what to do.

Keywords: graduate teaching assistant, graduate teaching associate, GTA, novice instructor, student-centered

Many departments rely on graduate students to teach introductory courses and course-adjacent lab/discussion sessions. Such teaching experiences provide financial assistance to graduate students and reduce the workload of the faculty (Muzaka, 2009). There has been evidence that the work of graduate teaching assistants and associates (GTAs) leads to increased retention of undergraduates (Zehnder, 2016). Also, undergraduates learn more and have higher pass rates in classes that de-center instructors (e.g., where class time is spent on activities, collaborative group work; Freeman et al., 2014; Laursen, et al., 2014). Over the past 30 years more effective support for GTAs to learn about teaching has emerged (Deshler et al, 2015). An additional factor in the development of teaching skills since 2020 has been the COVID-19 pandemic and the formidable challenges of synchronous online instruction (Lopez, 2021).

Activities and discussions about teaching, course-specific instructor interaction, and, more generally, working with graduate student teaching-peers increase GTA confidence and the desire to teach in the future (Ellis, 2015; Stes et al., 2010). Graduate students have little prior experience with instruction that is student-interactive (Oleson & Hora, 2014). Yet, due to changes in K-12 education, today's graduate students are likely to be teaching undergraduates who do have experiences with student-interactive mathematics instruction (Yonezawa, 2015). In analysis and reporting results, I used Goodyear and Dudley's (2015) theoretical perspective that describes types of engagement entailed by student-centered approaches.

This study, at a large master's-granting institution, explored what knowledge about student-centered instruction GTAs built in their early experiences of teaching. The courses taught by GTAs as instructor-of-record were pre-calculus, business calculus, and a statistics co-requisite support course. Each of the courses had established curricula (e.g., materials for activities and assessment) and regular course coordination meetings. GTAs in this study were offered several forms of support for learning about teaching. There was a week of pre-semester workshop sessions, university-sponsored professional learning opportunities, and a 3-hour per week semester-long course in the mathematics department. This course, Mathematics Graduate Teaching Workshop, focused on developing and refining teaching skills for student-centered instruction. Half of the GTAs in this study also participated in one or more university-sponsored "Teaching Squares" – where four instructors agree on a topic (e.g., "making group work work") and commit to meeting for at least ten hours across the semester as they rely on each other to

address the shared topic in their own teaching. The research question driving the study was: *How does GTA knowledge about student-centered instruction develop over time when GTAs are in online professional development for online teaching?*

Methods

Participants

Many GTAs at the study site had little to no experience with active student-centered instruction as either learners or teachers. The new GTAs in the study were also dealing with online struggles. The GTAs were new to synchronous technology for teaching, particularly for generating and maintaining online student interaction. To recruit participants for this research, I sent an email to all of the 13 new GTAs in the mathematics program in Fall 2021. Of these, 9 consented to participate and 8 of the GTAs completed all three surveys and both interviews. The pseudonyms of participants encode some basic information. One syllable indicates a person with no teaching or tutoring experience or professional learning about teaching. A two-syllable name indicates a person with some experience as a tutor or teacher of groups of people but no formal preparation for it. A three-syllable name is used for people with at least some experience in both professional learning for teaching and with tutoring or teaching groups of people.

Instrumentation

The data gathering tools in this study were three surveys and two interviews. There was a survey at the beginning of the Fall 2021 semester with a follow-up interview mid-semester. There then was another survey at the beginning of the Spring 2022 semester with a follow-up interview mid semester. Finally, there was one last survey at the end of Spring 2022. The main survey item for this was repeated across all three surveys: *In a few sentences, please explain what “student-centered instruction” means to you.* Surveys contained other questions. Survey 2 had a set of questions that asked GTAs to consider their teaching from their students’ point of view. Survey 3 asked for GTAs’ reflections on student-centered teaching and what they had learned during their professional activities across the year and a set of questions about personal experiences as learners with student-centered instruction. I conducted two follow-up interviews with each participant using the Zoom web conferencing tool. Each GTA consented to recording of each interview. Interviews were completed by mid-Fall (#1) and end of Spring (#2).

Data Analysis

There were three questions directly about student-centered instruction in survey 1, two in survey 2, and one in survey 3. I used three coding passes through that data to write a summary of each GTA’s progress over time, as reported in the Cases section of the results. Interviews were transcribed into a spreadsheet, one row per utterance (i.e., a complete thought, a new thought or topic was a new utterance). I assigned a code to each row. The initial code ranged anywhere from one word to a sentence and was intended to capture and summarize the essence of the utterance. After this initial coding of each interview, I went through each interview again. The goal of the second coding was to consider each of the other interviews when generating new categories that grouped together initial codes that had something in common. In some cases, the commonality was the topic, like “first week expectations.” In other cases a new category code connected across initial codes. The third pass through the interviews involved noticing themes across the existing codes. I used pivot tables to organize and review utterances and categories (from the second pass). From the interviews there were a total 537 utterances across 19 different themes. The next section includes descriptions of the central, most discussed, themes.

Results

First, I share the main themes that emerged from the interviews. Then I connect the themes and survey findings to directly address the research question through cases that illuminate GTAs' thought processes while they were trying to implement student-centered instruction as a first-time instructor. In what follows, "a few" means two to three, "several" means three to four, "many" means at least five, "most" means six or more, and "all" means all who responded.

Knowing and Doing Student-Centered Instruction

The challenges of implementing student-centeredness. In interview 1, a few of the interviewees had a similar statement to Patricia who said "I'd like to know where the line crosses from student-centered teaching to like babysitting and hand-holding." Many reported struggling with a different teaching style than they were used to themselves. Robert found student-centered instruction challenging because it required more of him than he had expected:

Robert: To be student-centered they (the instructor) need to put a lot of effort into the way they lecture or design the class because you need to have enough activities that need to be engaging enough, it can't be too difficult, but it needs to drive the point (of the lesson).

Patricia also suggested the department's courses had a higher pass rate than first-year courses at other universities because student-centered instruction made the course too easy for students. The following semester, in interview 2, a few GTAs discussed dealing with student push-back. Queenie said, "I felt like every time I tried to implement anything student-centered or group worthy my students would kind of riot a little bit." Also, most of the GTAs reported having a tough time balancing students taking the lead and the demands of keeping "on track." For example Oliver reported, "I might be intervening too early in group work and telling them the answers before they can figure it out, but ... we only have so much time."

Learning without a referent experience. In interview 1, some GTA comments agreed with Queenie's, "Encouraging students to do math in a student-centered way . . . I think it's very difficult for me. I never even experienced it; I don't know how I can implement it." Many of the interviewees weren't sure what they would like to learn, with Oliver saying, "There are things that I don't need to know and I can point to those easily, but the thing is I don't know what I need to know." In interview 2, a few of the GTAs felt it was hard to implement some of the lessons from the workshop, for example:

Tom: I can't say that I always saw the point of what we were talking about [in the workshop] ... We were being taught about a bunch of things without really being told how to actually go and use that knowledge to improve our own teaching.

At the same time, a few female GTAs encountered new experiences (e.g., with male students) that they did not know how to deal with, as an example:

Patricia: I find myself constantly trying to make sure that I'm keeping up a very professional demeanor and the right level of respect and professionalism. I haven't heard any of my male peers speak about that . . . I think it would have been helpful to have a discussion about how to handle something like that.

Student participation, engagement, and communicating with students online. There were many comments about black screens and frustration at trying to get students engaged and not being sure how to change that, for example:

Robert: I was expecting college students to want to get a good grade and be sort of motivated . . . So, on the first day of class, everything [cameras and microphone] was turned off. No people are really talking. Had to overcome that.

Some GTAs talked about reaching out to students who were falling behind. The Graduate Teaching Workshop helped Patricia figure out how, it helped her in “knowing how and when to reach out to students who are not staying caught up on work or showing up to class all the time.” In interview 2, GTA comments focused on disappointingly low attendance and disengagement by students in Zoom class meetings. GTAs noted “fluctuations” and “students seeming lost.” For all the GTAs, arriving in a silent breakout room and eliciting any response was a recurring challenge in their first semester of teaching. Several GTAs echoed Queenie who said “online it was like pulling teeth to get them to share their screen.” Sandra had challenges trying to communicate with students who were not doing the work saying:

Sandra: Students who wouldn’t show up to class and put in effort, they still wanted to pass, but they weren’t doing any work. So having to reach out to them and figure out what was going on was challenging.

This sentiment was shared by most and they all struggled with connecting with students online. All of the GTAs who later taught in person the second semester noted an improvement in communication and student engagement.

Less frequent themes that emerged from interviews. Though not universal, multiple GTAs reported on: learning to be a teacher and what made them feel more like a teacher, giving and receiving peer support, joys and challenges of planning, time management, working with the university’s Learning Management System (Moodle), grades and grading, and balancing the role of teacher with other roles (e.g., graduate student).

Cases: How GTA Knowledge about Student-Centered Instruction Changed Over Time

This section draws on survey and interview data to offer five cases that answer the research question. These cases characterize five ways GTA knowledge on student-centered instruction changed over time. The primary value of the surveys was the snapshots of GTA knowledge at different points in time. In this section, I use the seven touchstones from Goodyear and Dudley (2015) to organize the comparison of the open-ended survey responses across time and link that information to the interview themes. This framework uses seven ways teachers support engaging students in: 1. how to learn; 2. how to collaborate; 3. how to evaluate knowledge claims; 4. how to seek help; 5. how to become (formative) assessment capable; 6. how to be resilient; 7. what to do when they do not know what to do.

For each GTA, I report on the evidence from the survey items and the previously discussed themes to characterize the change in that person’s knowledge about student-centered instruction and indicate theme by #1 through #7. I have grouped the cases where there were large similarities (e.g., the growth for Nicholas was similar to that for Mateo and to save space only Mateo’s case is included). At the end of the section, Table 1 summarizes the results.

Case A: Mateo (& Nicholas). Mateo’s first definition of student-centered instruction was that “it is more about what the student is doing rather than the instructor.” He also mentioned how student-centered instruction “is about conceptual change as opposed to information transmission” and that it “related content to what the student already knows” with a focus on the “development of learning skills.” His definition showed evidence of his knowledge including supporting students in learning how to learn (#1). In survey 2, Mateo said that student centered instruction “means giving up most of the control of what happens in the classroom to the students,” which suggests evidence of attention to supporting students in decisions about how to learn (#1). Mateo noted that he felt that he was effective at providing feedback to students, with a focus on his job of assessing students rather than supporting students to assess themselves. His third definition stated that “running more carefully-designed activities in groups” was important

to student-centered instruction. This suggests knowledge about supporting his students to collaborate (#2). In interview 1 he realized the importance of wording questions to get answers that aren't just a yes or no which would promote critical thinking. This could be considered evidence of him supporting his students to evaluate knowledge claims (#3).

Case B: Oliver. Oliver's first definition stated that a "student-centered approach to instruction focuses on how students learn rather than the material." He also mentioned a need to "give space for students" and to allow for "a hands-on approach to learning" to accomplish this. This showed evidence of knowledge for supporting students in learning how to learn (#1). His definition of student-centered instruction in survey 3 (he did not respond to the prompt on survey 2) included that "student-centered teaching puts more weight on the will of those who lack knowledge [the students]." Meaning that "students create the focus of the course, rather than the teacher." This definition also suggests evidence of knowledge related to students learning how to learn (#1). In interview 1 Oliver noted the value of student-centered instruction saying that "in order to understand something you should be working with your hands." This suggests further evidence related to students learning how to learn (#1). In interview 2 he said he was maybe "intervening too early in group work" This awareness about giving more time for struggle, supporting students to persist in problem solving provides some evidence of his knowledge in supporting his students to evaluate knowledge claims (#3).

Case C: Patricia (& Robert). In the first survey, Patricia said that she thought student-centered instruction was "focused on student interests and needs" and that it included "getting students involved in the direction" of the course. This could be evidence of knowledge of supporting students in how to learn (#1). In survey 2, Patricia's definition of student-centered instruction included "creating a classroom environment in which students have an equal voice with their professor" and "actively doing work rather than passively listening to a lecture." This gave evidence of her growing knowledge about supporting students in how to learn (#1). She said she was effective at "giving helpful feedback" and encouraging "students to ask myself and each other questions." This was evidence of her knowledge expanding to include supporting students in how to seek help (#4) and how to collaborate (#2). In survey 3 Patricia said "the focus is on getting the student actively participating in their own learning" (i.e., supporting students in how to learn, #1). Patricia also said she used group activities instead of lecturing so that "students can explore concepts and learn from each other" (collaborate, #2). In interview 1, Patricia said the orientation workshop helped her be more supportive of students who needed disability resources (knowledge growth related to supporting students to seek help, #4). In interview 2, she said the workshop course helped her "to ask better questions that would lead to more discussion, rather than just like a yes or no answer." This encouragement of critical thinking provides evidence for supporting students in evaluating knowledge claims (#3).

Case D: Queenie (& Sandra). Queenie's definition of student-centered instruction in the first survey mentioned "allowing students the space to form their own understanding and ask questions". This shows evidence of knowledge related to supporting students in learning how to learn (#1) and how to seek help (#4). She also said that student-centered instruction "requires group work and students discussing what they are learning" while giving "the tools to explain back what they are figuring out." These show evidence of knowing to support students in how to collaborate (#2) and how to become formative assessment capable (#5). By survey 2 Queenie was less sure about a definition for student-centered instruction, saying "all teaching has to be student-centered" since teaching students is the focus. She also said that "teaching becomes motivational." In survey 3 her definition of student-centered instruction was mostly the same as

her first definition saying that it included “giving space” and for students to “come to me with their own ideas.” In both interviews, Queenie mentioned implementing group worthy activities – evidence of her knowledge including support for students to learn to collaborate (#2).

Case E: Tom. Tom’s definition in survey 1 stated that student-centered instruction “describes an approach to teaching where each student’s needs and background are considered.” This could be evidence of knowing to support students in a variety of ways in learning how to learn (#1). He also mentioned that it “involves a high level of student feedback and interaction.” This statement provides some evidence of knowledge about supporting students in how to collaborate (#2) and how to become formative assessment capable (#5). In the second survey Tom stated that student-centered instruction puts “students in the driver seat” and makes students “active members in the classroom and in their own learning.” This is more evidence related to how to learn (#1). In interview 1 Tom said, “I’ve tried to be more careful in how I handle student questions... thinking of understanding why something happened, not just what happened.” This showed evidence of him supporting his students in evaluating knowledge claims (#3). In interview 2 Tom said he would like to learn to create activities that will help students discover knowledge on their own. This was evidence of supporting students in learning how to learn (#1).

Summary. Table 1 summarizes, grouped by case, what GTAs described in defining student-centered learning. Notice there was evidence for all GTAs of supporting students in learning how to learn (#1) and, with one exception, learning how to collaborate (#2). Most of the GTAs had evidence of supporting their students in evaluating knowledge claims (#3). For several of the GTAs there was evidence of supporting their students in how to seek help (#4). There was sparse evidence of GTA awareness or use of supporting their students in how to become assessment capable (#5), how to be resilient (#6), and what to do when not sure what to do (#7).

Table 1: Summary of GTA reporting on aspects of student-centered instruction.

Case	Name	1. learn	2. collaborate	3. evaluate knowledge claims	4. seek help	5. become assessment capable	6. be resilient	7. what to do when unknown
A	Mateo	X1, X2	X3	Y1				
	Nicholas	X2	Y1, X3	Y2				
B	Oliver	X1, Y1, X3		Y2				
C	Patricia	X1, X2, X3	X2	Y2	Y1, X2			
	Robert	X1, X2	Y2	Y1	X2, Y2			
D	Queenie	X1, X3	X1, Y1, Y2, X3		Y1, X2			
	Sandra	X1, X2, Y2, X3	X1, X2, X3		X1, X2, X3			
E	Tom	X1, X2	X1	Y1		X1		

Note: X1=survey 1, X2=survey 2, X3=survey 3; Y1=interview 1 and Y2=interview 2.

Discussion

The question driving the study was: How does GTA knowledge about student-centered instruction develop over time when GTAs are in online professional development for online teaching? The short answer: Slowly. The surveys indicated that the majority of the new GTAs at the master’s granting study site in the 2021-2022 academic school year built substantive knowledge about student-centered instruction (as indicated in Table 1). At the same time, consideration of each GTA experience shows differences in the nature and timing of those

changes. In Survey 1, most GTAs' ideas seemed to be based on the literal meaning of the phrase "student-centered." By Survey 2, GTAs had a formal definition and talked about what the goals were for the *students* in student-centered instruction but said little about what the *instructor* did. As time progressed, more GTAs included the teacher, using examples from their own instruction in Survey 3 and some expanding on ideas in Interview 2 with additional classroom examples.

Not only GTA knowledge changed. The GTAs' perceptions of themselves and students changed in many ways. GTAs were not just learning about student-centered instruction for teaching, many were experiencing it as a student for the first time in their own graduate courses. Most of the GTAs had not experienced student-centered instruction as a learner before teaching. Moreover, no one reported they had been a college student in the class they were teaching. Finally, for most, experience of online learning was only under the conditions of the pandemic.

In the surveys and interviews all of the GTAs mentioned supporting students to learn how to learn as a goal, but did not offer specifics about what instructional moves or approaches might achieve that goal in the examples they provided. GTA focus was on "getting" students engaged – a teacher-centered view about having students look at and do the things the teacher and/or curriculum wanted/expected. That is, for #1 in Table 1, all of the GTAs appeared to include learning how to learn as an important component in student-centered instruction, but they were still working on how to accomplish it.

Throughout the surveys and interviews all but one GTA mentioned the use of group work as an important part of student-centered instruction. They all seemed to accept the idea that working with others could be an effective form of learning in addition to or instead of lecturing only. The one GTA, Oliver, who did not mention it was using a curriculum that had activities that required group work, but he did not directly mention using group work in the surveys and interviews. Thus, for #2 in Table 1, the GTAs in this master's granting department were unlike the GTAs in previous studies among doctoral students (Beisiegel, 2012, 2017, 2019).

Directions for future work include:

- Following GTAs who start in a master's program and continue on to a doctoral program; capturing what ways their PD in their master's program may have influenced their knowledge about teaching and how that compares to their peers who went directly into doctoral programs.
- Purposefully examine the future graduate experience and teaching development of today's undergraduates, who are experiencing student-centered instruction (unlike the GTAs in this study).
- What are the benefits and pitfalls of extended PD for master's program GTAs who are instructor-of-record in terms of frameworks in previous work (e.g., Beiseigel, 2019)?

Limitations and Delimitations

The main findings are from a study of a particular GTAs in the specific context of teaching online synchronous courses at the study site and are not intended to be generalizable. Rather, the goal is transferability: giving sufficient detail to support the reader in interpreting the results for a situation similar to that presented here. This small study did not gather or analyze information about societal structures and systemic influences (and consequences) of student and instructor perceptions. Nonetheless, a useful example can anchor future research and GTA development.

Acknowledgments

First, thanks to the participants for their time and energy in doing the surveys and interviews. Also, my thanks to my thesis committee and reviewers for improving the quality of this report.

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