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# Personal Impacts of the Undergraduate Teaching Assistant Experience

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*Abstract: The use of undergraduate teaching assistants (UTAs) has increased in recent years at a number of institutions, especially in active-learning and high-enrollment introductory courses. Currently, there is research demonstrating their benefit to the departments they work in, the students, and the short-term impacts of the experience on the UTAs. However, no study to date has investigated the long-term impacts of the UTA experience on the participants themselves, and a number of studies call for such an investigation. This research sought to fill that gap in understanding by utilizing a Grounded Theory approach to investigate the perceptions of participants who had served as an UTA in the biology department at a large research institution in the upper Midwest. This research found strong consensus among participants that the UTA experience offers overwhelmingly positive personal benefits including improved self-confidence, a sense of personal reward, and a sense of community that resulted from working with faculty members, and the ability to balance and self-regulate a variety of time commitments.*

*Keywords: Undergraduate Teaching, Personal Impacts, Confidence, Rewards, Community, Balance, Self-Regulation*

## Introduction

In recent years a trend has emerged in higher education utilizing Undergraduate Teaching Assistants (UTAs) to fill a variety of instructional roles (Schalk (Schalk, McGinnis, Harring, Hendrickson, & Smith, 2009). In some cases, undergraduates replace graduate teaching assistants (GTAs) in the role of direct instruction and grading (Drane, Micari, & Light, 2014). In other cases, undergraduate students work with graduate students and faculty to augment instruction, especially in active learning environments (Weidert, Wendorf, Gurung, & Filz, 2012). At other times, undergraduate teaching assistants fill the role of peer instructors independent of their graduate peers (Quitadamo, Brahler, & Crouch, 2009). In almost all cases, the undergraduate students have fewer responsibilities and perceived authority than graduate assistants (Chapin, Wiggins, & Martin-Morris, 2014; Drane et al., 2014; Schalk et al., 2009).

The majority of published work surrounding undergraduate teaching assistants examines the short-terms benefits on students (Chapin et al., 2014; Drane et al., 2014). No studies have focused on the holistic long-term effects on the students who work as UTAs themselves. Investigations that have examined impacts generally report an added benefit to all parties including the students served by teaching assistants, faculty, and the teaching assistants themselves. However, the short-term focus and anecdotal reporting represents a gap in understanding relevant to the long-term impacts. Empirical evidence is limited to short-term work. Several studies utilized in literature reviewed here state that

understanding the long-term impacts of the undergraduate teaching experience represent a critical need in the primary literature (Chapin et al., 2014; Snyder & Wiles, 2015; Weidert et al., 2012). In the absence of such work, the extensive body of research on graduate teaching assistants was used to predict that analogous benefits might arise for their undergraduate counterparts (Schalk et al., 2009). The goal of this research was to investigate the perceived long-term impacts of the teaching experience on undergraduate students.

*Undergraduate Teaching Assistants*

Departments often find that the pool of available graduate teaching assistants is not sufficient to meet their needs because graduate students balance other responsibilities such as research and course work of their own. Financial constraints have led many programs to explore alternatives to using graduate students by utilizing undergraduates to augment their pool (Chapin et al., 2014). Undergraduate teaching assistants are financially beneficial, especially within STEM disciplines, because they can be provided a small hourly wage in contrast to graduate students that are generally provided a tuition waiver and stipend that represents larger financial commitments (Chapin et al., 2014).

In the first large-scale work addressing the effect of equally supported undergraduate compared to graduate teaching assistants on student learning, Chapin et al. (2014) found that undergraduate science learners showed comparable learning outcomes regardless of teaching assistant type. Student grades showed no significant difference between labs run by either group. Student attitude toward science was equally positive between students taught by either group, and undergraduate assistants actually had a statistically higher impact on their ability to encourage and respect the students they worked with (Chapin et al., 2014). Based on these findings, Chapin et al. (2014) concluded that undergraduate teaching assistants are an effective alternative.

## Previously Reported Short Term Gains

*Short-Term Effects of Serving as an Undergraduate Teaching Assistant*

Similar to graduate teaching assistants, undergraduate assistants report short-term benefits from the experience associated with their duties that include exploring potential career options, exploring the responsibilities of graduate school, the opportunity to review content and material, financial or monetary gains, and the opportunity to increase their curriculum vitae (Chapin et al., 2014; Weidert et al., 2012; Wheeler, Maeng, & Whitworth, 2015).

*Increased Communication Skills*

Several works present short-term findings that report teaching assistants improve their communication skills through their experiences. Kendal and Schussler (2012) demonstrated that graduate assistants improve their communication skills as a result of the frequent feedback provided by student interaction (Kendall & Schussler, 2012). Philipp et al. (2016a) reported that trained and supported undergraduate assistants improved their communication skills in entry-level STEM courses (Philipp, Tretter, & Rich, 2016a). The same authors showed that both groups improved their communication skills as the result of leading recitation sections in an entry-level general chemistry course (Philipp, Tretter, & Rich, 2016b). Snyder and Wiles (2015) similarly found that peer leaders working in roles analogous to the undergraduate assistants improved their communication skills while at the same time increasing their interest in teaching (Snyder & Wiles, 2015). Significant to this study,

Snyder and Wiles (2015) state directly that no long-term information exists to confirm if these benefits persist, and as a result, cannot be confidently claimed as a result of their work.

*Improvements to Attitude, Confidence, Content Knowledge, and Critical Thinking*

Chapin et al. (2014) reported that serving as an undergraduate teaching assistant improved the attitude of both students and the teaching assistants toward the content and subject for which they were responsible (Chapin et al., 2014). Graduate and undergraduate teaching assistants reported improving their own comfort with content; in addition the peer leaders working in a role analogous to teaching assistants also benefitted in content knowledge, conceptual reasoning and critical thinking while consistently reporting an increase in their own perceived critical thinking, content knowledge, and confidence (Snyder & Wiles, 2015). Previously validated metrics confirm increased content knowledge and confidence. Similarly, Philipp et al. (2016a) and Weidert et al. (2012), both reported perceived increases in critical thinking and metacognitive skills in a mixed pool of graduate and undergraduate teaching assistants.

Schalk et al. (2009), empirically confirmed the acquisition of both content knowledge and laboratory skills. Undergraduate assistants developed professional characteristics such as self-confidence, communication skills, and leadership abilities in addition to an increase in their content knowledge, all while refining and expanding their repertoire of laboratory skills (Schalk et al., 2009).

*Increased Professionalism*

The professionalism of teaching assistants and peer leaders has also been reported to increase as a result of their short-term experiences. Despite the lack of a precise definition for professionalism, many works report that experience as a TA or peer leader improves the professionalism of participants. For example, DeBeck et al. (2010) reported that GTAs perceived that classroom experiences provided effective professional development (DeBeck, Settelmeyer, Li, & Demaree, 2010). Kendall and Schussler (2012) suggest that positive facets of working as a teaching assistant maximizes professional development, specifically including the relatability, engaging, and approachable attributes when compared to faculty members (Kendall & Schussler, 2012). This largely agrees with the work of Snyder and Wiles (2015), who concluded that peer leaders developed personally as a result of their interactions with students (Snyder & Wiles, 2015). Finally, Chapin et al. (2014) also discussed professional development in the context of teaching.

*Increased Self-confidence, Self-efficacy, and Self-perception*

Several studies discuss the positive impact of working as a teaching assistant or peer leader related to the perceptions, efficacy, and confidence of participants. For example, Chapin et al. (2014) suggested that both undergraduate and graduate assistants gain confidence and instructional skills (Chapin et al., 2014). Schalk et al. (2009) reported that the teaching experience offers benefits analogous to participating in undergraduate research, pointing out that the long-term benefits of undergraduate research are well-documented. In their work, the undergraduate teaching experience improved participant teaching experience, communication skills and self-confidence, as well as leadership ability, even though the long-term impacts were an area identified as requiring further investigation (Schalk et al., 2009).

## Statement of the Problem

The purpose of this research was to examine perceptions about the long-term effects of working as an undergraduate teaching assistant by former students with experience in this role. A Grounded Theory approach was utilized to develop an understanding about participant perceptions (Glaser & Strauss, 1967). The research question that guided this qualitative investigation was: "What are the perceived long-term effects of working as an undergraduate teaching assistant?" Semi-structured interviews and subsequent analysis were conducted with 13 voluntary participants to qualitatively explore factors associated with their teaching experiences. The template for these interviews can be found as Appendix 1. Grounded Theory advocates the discovery of theory rooted in the data itself (Glaser & Strauss, 1967; Z. S. Wilson et al., 2012).

## Research Design

Grounded Theory follows a Constructivist epistemology framed within an interpretivist theoretical perspective (Crotty, 1998). To a lay-person or someone without significant formal background, this means that the knowledge gained was constructed by interpreting patterns from within the data. Data was generated through semi-structured interviews that guided a conversation with individuals who had experience working as an undergraduate teaching assistant and had since graduated. The flexible and adaptive nature of these interviews allowed for personalized responses by each interviewee which would not have been possible from a survey or other similar quantitative approach. It also allowed for insightful and adaptive follow-up dialogue between the researcher and the participants to clarify points of interest or probe interesting points that ensured adequate understanding. Such experiences spanned 10-years, allowing for reflective insight about the experience to develop.

Interviews were recorded and transcribed into Word documents. First cycle coding coupled with regular analytic memoing documented emergent codes recorded in associated excel tables (Maxwell, 2012; Z. S. Wilson et al., 2012). Codes were tentatively developed, and their meaning and organization were constantly refined and tentatively organized into themes (Crotty, 1998; De Welde & Laursen, 2011; Eisner, 2017; Fielding & Fielding, 1986; Glaser & Strauss, 1967; Glesne & Peshkin, 1992). Themes were continually refined through a process of continual data sampling, coding, categorizing, comparing, and tentative theory-building that tested emergent concepts (Glesne & Peshkin, 1992; Wilson et al., 2012). All work was continually documented in analytic memos (Saldaña, 2015). Information grounded in the data itself supported the trustworthiness, validity, and reliability of inferences and conclusions that were drawn from the comparison and contrasting process (Crotty, 1998; Maxwell, 2012; Roulston, 2010; Z. S. Wilson et al., 2012).

### *Selection of Participants*

The Biology Department at the Midwestern research university selected for this study acted as a gatekeeper in assisting with this investigation by producing contact information from individuals who worked as undergraduate teaching assistants over the last 10 years who had subsequently graduated. Invitations to participate were sent to all of these individuals asking if they would take part in an interview about their previous involvements in teaching.

*Analysis of Data*

The sample of interview participants included 13 former undergraduate teaching assistants. Data saturation was determined to have been achieved following the 10th interview because no new codes, categories, themes, or relationships emerged after this. Three additional interviews were conducted to confirm that data saturation had been achieved (Crotty, 1998; Z. S. Wilson et al., 2012). This sample is smaller than some Grounded Theory experts advocate. Nonetheless, it is still acceptable because the topic was not considered to be sensitive, there was a clearly defined scope to the research question, and the interviewer was familiar with the topic (Thomson, 2010).

## Findings

All participants perceived that their experience as an undergraduate teaching assistant resulted in significant personal impacts and agreed that these impacts were overwhelmingly positive. Analysis ultimately resulted in 20 codes relevant to the Personal Impacts theme. These were able to be sorted and organized into five categories. These categories included Self-Confidence, Personal Reward, Sense of Community, Balance, and Self-Regulation as illustrated in Figure 1 below, which models how the codes and categories relate, and summarizes the assertions related to these.

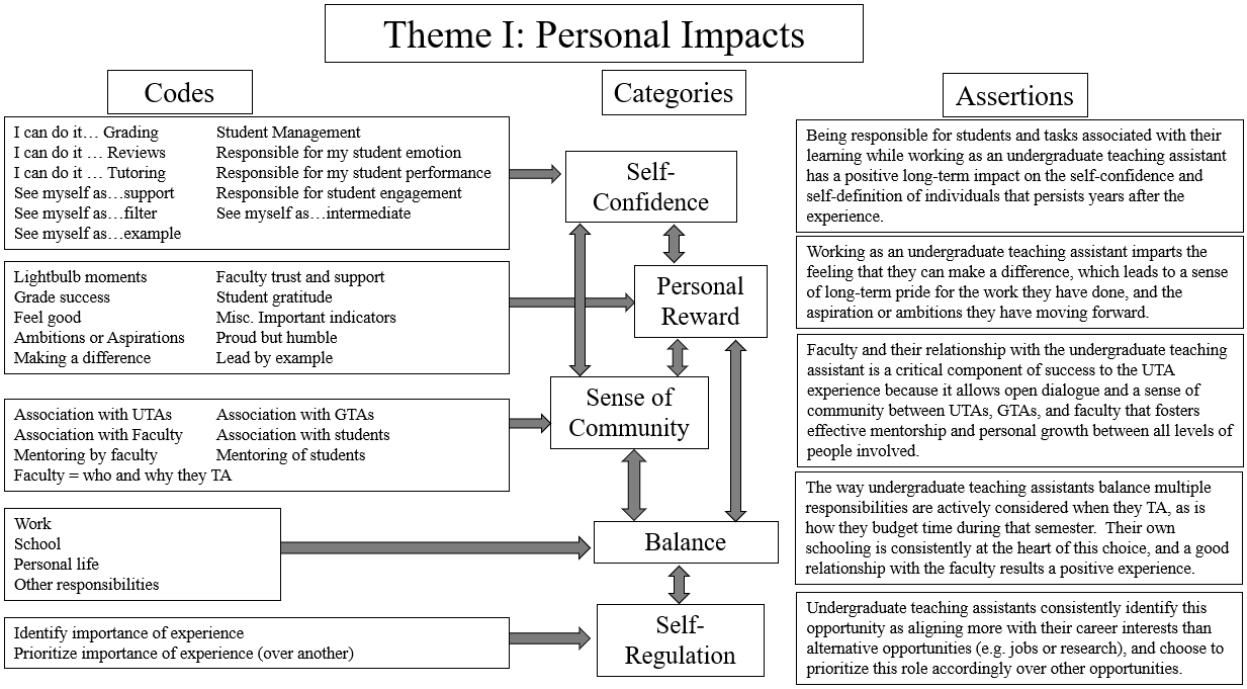


**Figure 1: Codes, Categories, and Assertions of the Personal Impact Theme Related to the Undergraduate Teaching Assistant Experience.**

*Category I: Self Confidence*

The category of Self-Confidence was developed from codes illustrating a participant's expressed ability to accomplish some task or feat which they expressed intimidation with initially. Participants in this study consistently discussed an increased sense of self-confidence as a result of their teaching

experiences. A detailed description of each code is provided in Table 1 of Appendix 2. An illustrative quote for the Self-Confidence category is below:

> Danielle: In the beginning it felt like I had no idea what I was doing but (*chuckle*) I came around to it and I figured it out. I hoped to gain more knowledge about introductory biology because that is really the foundation for the whole major, and if you don't know the foundation, you can't build on it. So it *really* helped solidify my foundation of biology … I started off not knowing what I was doing, as I started teaching more and more and helping the students learn, I was also learning.

Self-Confidence was by far the most complex and inter-twined category in this study. The consistent frequency and volume of such expressions led to the conclusion that being responsible for students and tasks associated with their learning made those who worked as teaching assistants perceive that they had a positive long-term impact on students. This in turn increased their own self-confidence. That sense of self-confidence consistently persisted for years following the experience. One of the most common codes to arise from the entire analysis was the "I can do it…" code in the Self-Confidence category, with more than 210 independent examples of such codes across the 13 interviews by participants. This information is summarized in Appendices 3A-3M. Danielle's quote above is illustrative of such feelings and perceptions, and examples like this could be found in every interview by every participant.

Another illustrative quote from this category of Self-Confidence is below:

> Mabel: When I was a student and taking biology classes, I didn't really have very much self confidence that I knew the material. I could get good grades, and I could do all my assignments, but I think in the back of my mind I was still convinced that I wasn't really a science person. Because I didn't like science when I was in middle school or high school - I had bad science teachers, I had bad experiences with science. So in the back of my mind I still didn't think of myself as a scientist. But once I started teaching, and I realized that I knew these concepts well, and I could teach other people how to do it, it really solidified my self-confidence about biology and I had a new appreciation for my own skill set… I didn't really get that from taking the courses, I got it more so from teaching them.

In addition to coding portions of this quote as "I can do it…", portions of the statement were also coded as "See myself as…" because Mabel's statement is characteristic of many such quotes that illustrate an aspect of self-definition that resulted from participant's experience in teaching. In the majority of interviews, codes of "I can do it…" were directly associated with "See myself as…" codes. In other words, there would not have been the same level of self-definition without the self-confidence. The self-definition was a direct result of the teaching experience that allowed participants to accomplish things and see themselves as capable, competent peer instructors who were an integral part of the learning community. The "See myself as…" code was the second most common code in the entire Personal Impacts theme, with more than 140 examples across the 13 interviews, as shown in Appendices 3A-3M.

The "I can do it…" and "See myself as…" codes were determined to be the axial codes within the category of Self-Confidence because of the interplay they had with each other, and because of their frequent and consistent correlation. Axial codes those important codes that others seem to hinge upon or revolve around because they are the most significant. Of the 11 codes within the Self-

Confidence category, these two were by far the most important based on the consistent impact described by participants relevant to situations or scenarios. Essentially, the undergraduate teaching experience instilled self-confidence that made these individuals more comfortable with how they saw themselves. The interplay of these two axial codes subsequently led participants to be confident and comfortable enough in their roles, with their knowledge, and in their ability to handle a variety of scenarios or tasks that assisted student learning. At the same time, having the confidence to see themselves in the role of a UTA led participants to feel responsible for their student's emotions, which related to increased student engagement and performance.

Mabel illustrated this sense of responsibility by stating:

> I distinctly remember one student who was really frustrated because she wasn't understanding a concept, and I was trying my very hardest to get her to understand it, and I was teaching in all the different ways that I could. But sometimes they just put up this mental block where they can't listen to you anymore. You can be teaching it but they're just so frustrated with not understanding it … I distinctly remember it happening …

George echoed this sense of responsibility, stating:

> I wanted to give the students in the class everything I could offer, you know, my time, anything I knew, help them get the resources that they needed to answer the questions they had. I felt a responsibility come test day or something - I knew what that felt like, going into a big test that was worth a third of your grade or something like that.

Danielle supported this further, also demonstrating her confidence by showing that she was comfortable enough to recognize when she needed help guiding students, and act accordingly by stating:

> I noticed that when I was a TA – I didn't want to give them – to give the students – wrong advice. Or to lead them to the wrong answer either, so I'd make sure to ask him (the professor) if it was something I was confused on, even at that point.

Across all interviews, sentiments such as these were consistently expressed, with the codes for "I can do it…" and "See myself as…" regularly occurring together and in direct relation to each other. Additionally, they were frequently followed by the other codes sorted to the Self-Confidence category. Former undergraduate teaching assistants consistently expressed feeling a sense of responsibility for their students and working as an intermediate in some capacity to help facilitate student success.

*Category II: Personal Reward*

The Personal Reward category was developed from examples where participants expressed personal gratification about some specific aspect of the experience. A quote illustrating the Personal Reward theme as illustrated in Figure 1 is below:

> Danielle: I would give a review session on Sunday before an exam… And I don't know how it happened, but all of a sudden like the whole lecture bowl was full, and people were sitting there and I was like "*okay, well…*" (surprised and happy). *And it*

> *made me feel really good about myself* … A student actually came up to me and told me "*Your review sessions helped me every time on the test. I don't know how I would do as well on these tests without your review sessions*".

This illustrated the personal reward expressed by many of these participants. The category of Personal Reward contained six codes as illustrated in Figure 1, and most of these revolved around participants describing "light bulb" moments by the students they helped, feeling good about aspects of the teaching experience such as getting to interact with faculty and students, how the experience aligned with their aspirations, and how it made themselves feel proud of what they were doing. Full descriptions of these codes can be found in Table 1 of Appendix 2.

Faith illustrated the reward she felt from seeing students "get it" which became representative of the "light bulb" code by saying the following:

> So, watching Jennifer and Lauren (pseudonyms) … just watching them succeed…you get those students who get it, and have that light bulb and are, like, "*wait, does that relate to*…" or they take it one step further. That was just kind of a nice moment.

Kevin expressed similar sentiments in his response to the question by stating:

> (Helping students) makes me…it makes you feel good about yourself, whenever you see the sparkle in someone's eye of like "*oh, I get it now"*… it just made me feel good, and I viewed myself better for having helped others.

Descriptions of helping students varied across all participants, but this variation was largely a function of the course that individual's worked in. Those who worked several times and in different courses consistently described feeling personally rewarded about situations or scenarios that helped students earn higher grades and make connections between content-related ideas regardless of the course. Those who served as a teaching assistant a single time, or multiple times in the same course similarly all described feeling good about how well their students could and would do as a result of their help and expressed a sense of proud humility in being able to help their fellow students. It was clear this made them feel good about themselves, and what they were doing.

Emily summarized this sense of reward based on her experience when she said:

> I honestly wish I could have done it again. I wish that my schedule would have allowed me to do it again. Because I loved it. And if this doctor thing doesn't work out, this is probably, I am probably going to go into being a professor.

Quotes such as this illustrate two things that are critical here. First, within the category of Personal Reward they illustrate that the codes "Making a difference," "Feel good," and "Proud but humble" were the axial codes. Across all 13 interviews, there were more than 80 examples of statements coded as "Feel good", more than 100 coded as "Proud but humble", and more than 60 coded as "Making a difference".

*Category III: Sense of Community*

Personal relationships that developed from these experiences persisted between undergraduate assistants and their students, between undergraduate assistants and their graduate counterparts, and

between the undergraduate teaching assistant and faculty. The category Community included codes assigned to any description that illustrated or exemplified the reliance of one party on another, or the importance of the undergraduate teacher being associated with another party. Illustrative quotes for the Sense of Community category are below.

Noah articulated the sense of community between undergraduate teachers and students by stating:

> There were several students I had in lab where I just had really good interactions with them. And a lot of them, they would stay late and try to really get the material. And they weren't by any means rock star stellar students in the classroom, in the lecture or anything. But I felt I was able to provide them with that kind of individualized attention that they needed.

Noah went on to also articulate the sense of community between undergraduate and graduate teaching assistants, stating:

> …luckily there were some other graduate students - Jimmy, James (pseudonyms), they were also teaching (General Biology I), and they helped me out a lot. They showed up to my first lab just to make sure I had everything taken care of. Whenever I had questions and stuff, I would go ask them.

George articulated the sense of community between undergraduate assistants and faculty by stating:

> So, my very first biology class at (this university) was with Dr. Euphorbia, and I immediately felt I connected with him. … so I think being a TA for him, the *for him part*, was the most impactful part. He provided any type of support I needed, but the key was that he provided enough room to grow as a TA.

Quotes like these were selected to illustrate the importance that a sense of community played in the experience. These included the reliance of students upon their undergraduate assistants, the reliance of undergraduate assistants on the graduate assistants, or the reliance of undergraduate assistants on faculty. There were frequent examples of mentorship within these descriptions, such as by Noah when he articulated how the graduate assistants watched out for him. George's quote illustrates the common association with the importance of faculty mentors. This was the direct result of personal experience as a student in that faculty member's class. The desire for this mentorship was a significant contributor to making the experience so valuable because faculty consistently provided both support and room for undergraduate teachers to grow.

Ultimately the category Sense of Community contained four codes as shown in Figure 1. Unlike the categories of Self-Confidence and Personal Reward, there was ultimately only a single axial code in the category Sense of Community. This code was "Faculty are the primary motivator of community". Interestingly, this code was not the most common code within the category of Community as shown in Appendices 3A-3M. However, it consistently appeared to be the most important. This is evident when examining larger blocks of the transcripts because single examples of the faculty member fostering a positive environment were often followed with multiple examples of subsequent associations with other undergraduate assistants, with graduate assistants, and examples of mentoring between these parties.

Further support for the importance of faculty members in developing a sense of community was presented by Emily when she stated:

> I probably would have done it (undergraduate teaching) without pay because I really wanted the experience of getting to know a faculty member…I saw the value in having a professor in my corner.

*Category IV: Balance*

Participants consistently recalled actively considering course workloads as they selected when they wanted to work as a teaching assistant, realizing that they would have to balance these responsibilities. A straightforward quote illustrating how these students balanced choosing when to work came from Heather, who stated:

> If I had the same amount of credits I was taking in the spring I don't think that (being an teaching assistant) would have happened… I was taking 15 credits or 16. But my spring semester I ended up taking 21 credits, which was a nightmare.

This quote illustrates the straightforward, intentional reasoning expressed by many participants in actively and conscientiously planning when to work as a teaching assistant. Time management and balancing commitments of school with work, personal lives, and other responsibilities were all consistently expressed. Likewise, there was a consistent emphasis placed on prioritizing their own schooling. The category Balance was closely associated with the categories of Personal Reward and Sense of Community as well as illustrated in Figure 1 above.

One quote representative of the relationship between the category Balance with Personal Reward and Sense of Community is below. It is highly expressive of the interplay of the categories Balance and Personal Reward. Emily wanted to teach again because of the personal reward she felt but was never able to because she felt the need to prioritize her own schooling and MCAT preparation. Emily stated:

> I think at the end of being a TA, I was like, *wow, I'm really glad that I did that. It was really fun, I learned a lot, and I met really great people*, and, since then, I've wanted to do it again, and it just unfortunately never worked out. I got really busy - with MCAT and the fall semester I took 18 credits and then in the spring semester I took 16 but I also took my MCAT. So, I was very busy that year, and unfortunately, it (working as an UTA again) just didn't work.

This quote was selected because it echoes the feelings of most participants about balance, and it was highly representative of the relationship that continually arose between the category Community and Balance. Emily illustrated this in her quote because mentorship and communication led her to balance her desire to teach with her own ambitions and other responsibilities. Because balancing their own academics was consistently a priority, and schooling was consistently expressed as balanced against other codes related to work, personal life, and other responsibilities, the code School was determined to be the axial code. It was also the most common code in this category, appearing almost 40 times in the interview transcripts, followed closely by the code "Work", which appeared just over 30 times as shown in Appendices 3A-3M.

*Category V: Self-Regulation*

Participants consistently discussed identifying the importance of this experience and actively working to regulate their other commitments in a fashion that allowed them to devote adequate time and effort to that decision. An illustrative quote for the Self-Regulation category came from Brian who stated:

> I guess the main thing for me was scheduling. I definitely didn't take certain classes just so that I could TA – elective classes. I was fine with that. I was lucky enough to come in my freshman year with 30 – 35 credits. So I had a lot of flexibility with my schedule.

This quote is an illustrative representation for this category for two reasons. First, Self-Regulation contained only two codes focused on why participants identified and prioritized working as a teaching assistant over alternative experiences. Those codes included "Identify importance of experience" and "Prioritize importance of experience" (over another). Brian's quote illustrates both because he first identifies that working as teacher and taking elective courses both had value to him, and he prioritized teaching because he valued the teaching assistant experience more.

The second reason this quote was selected is because it also demonstrates the close correlation between the categories of Balance and Self-Regulation. How and why participants pursued this opportunity, and subsequently budgeted their time and effort were consistently very closely linked by all participants. This relationship is depicted by the arrow in Figure 1 between these two categories. Participants consistently identify this opportunity as aligning more with their career interests than alternative opportunities such as jobs or research, and they chose to prioritize accordingly. These choices subsequently influence the "Balance" category because once that decision was made, it required individuals to budget time accordingly as they worked in the role of a teaching assistant.

The final quote selected to conclude discussion of the theme Personal Impact comes from Danielle who stated:

> I felt really good after TAing… I felt accomplished, and I felt like I knew what I was doing. That impacted me because it reminded me that I should feel that good about my major and my field. At the time I felt like I was struggling with my major and I was like *If I can feel this good about my major and feel this good about teaching students about biology then clearly I really like biology*, So I was like, *This is the major for me*, and I kept going on with it and I still love it.

This quote was selected to conclude this theme for three reasons. First, Danielle articulates some aspect of every category within the Personal Impact theme in this single statement. There are references to her gaining self-confidence. The personal reward she felt features prominently. She implies a sense of community. She also implies that this experience helped bring her balance by seeing passion for her major despite struggle. Her decision to stay in Biology as a result working as a teaching assistant, and subsequently still loving it, support the important role this experience played for her. Finally, self-regulation is demonstrated because sticking with the major required her to identify biology as the major she wanted, and then allocating time, energy, and resources to continue pursuing that goal.

The fact that all categories of Personal Reward are illustrated here in a single quote demonstrates the highly networked nature of the categories that make up this theme. This networked relationship is illustrated by the arrows between themes in Figure 1. Personal Reward features

prominently. That category is central to the network illustrated in Figure 1. Danielle's statement above substantiates the highly complex nature of attempting to understand the perceptions of participants about their teaching experience, and illustrates that the work here has developed a model which successfully aligns with the major features important to that experience by delineating them and categorizing them, constructed by coding experiences which can be identified, isolated, and understood.

## Discussion

Chapin et al. (2014), Snyder and Wiles (2015) and Weidert et al. (2012), and Wheeler et al. (2015) all explicitly identified a gap in the long-term understanding of working as an undergraduate teaching assistant. However, the Wheeler et al. (2015) work provides one of the few references to a theoretical framework related to understanding the undergraduate teaching experience by suggesting that Situated Learning Theory may inform the development and support of undergraduate teaching training programs (Wheeler et al., 2015). It also provides insight into understanding the perceived long-term impacts of the experience investigated here.

Lave and Wenger's early work on Situated Learning Theory later progressed to work focused on communities of practice (Lave & Wenger, 1991, 1998). Their work challenged the prevailing assumptions of the time that learning was an individual process with a beginning and an end that occurred in isolated segments independent from the rest of life, and as the direct result of teaching. Instead, they re-conceptualized learning as the result of experiences situated within an ongoing process of social engagement. According to Lave and Wenger's Situated Learning Theory, over time, learning comes to reflect both the pursuit and the social relations that a learner experiences in a way that ultimately helps them shape their own identity (Wenger, 1998). Situated Learning Theory is more than simply experiential learning because it involves full participation rather than peripheral exposure in order to generate meaning (Tennant, 1997, 2007). This is a process that results in novices developing and progressing through participation that is legitimized by context within a community (Lave & Wenger, 1991).

Coupled with ideas such as those of Vygotsky, Lave and Wenger's works have been highly influential on pedagogical practices within STEM disciplines in the development and promotion of active learning such as the environments that all participants here worked in (Bevan, Gutwill, Petrich, & Wilkinson, 2015). The focus of Situated Learning Theory on groups, networks, and associations align almost perfectly with the codes that were organized into the five categories of this theme, and supports the relationships illustrated in Figure 1.

### *Self Confidence*

Having a sense of confidence in themselves led undergraduate teaching assistants to attempting activities such as tutoring, running reviews, and in some cases assisting with grading. Through becoming comfortable and confident in their roles and with their knowledge and abilities, undergraduate teaching assistants viewed themselves as intermediates between the course content, the faculty, and students. These recollections consistently led to codes within this category related to supporting students, setting an example for students, and filtering information for students. Such regular patterns by all participants led to the assertion that being responsible for students and tasks associated with student learning has a positive long-term impact on the self-confidence of these students. Furthermore, that positive perception persisted years after the experience. It is worth noting that the support of the faculty, graduate teaching assistants, and where applicable, other undergraduate

assistants, all played a role in participants feeling confident and comfortable enough to ask for help when they needed it.

*Personal Reward*

Undergraduate assistants consistently found tremendous reward and satisfaction in helping the students they work with. Participants believed they can and did make a positive difference for their students, and they felt rewarded by that. This reinforced their own self-confidence, yet they consistently remained humble about their abilities. This humility is less obvious in the direct texts of a transcript, but voice inflection and tone in audio recordings consistently imply that participants were aware of their own intellectual abilities but were almost sheepish to admit or acknowledge them. These participants remain proud, yet humble, about how they assisted their junior peers succeed, which led to the assertion that working as an undergraduate teaching assistant imparts the feeling that these individuals can make a difference for the students they work with, which leads to a sense of long-term pride. There were consistent associations between codes in the categories of Personal Reward and Self Confidence because participants developed a sense of confidence in their own ability through assisting students, and the courage to make such attempts, which they found rewarding.

*Sense of Community*

The positive relationship between faculty and teaching assistants was a critical component of success to the undergraduate teaching experience because it allowed open dialogue and trust between both undergraduate and graduate teaching assistants, faculty, and students. This dialogue and trust fostered effective mentorship, making all parties open to the others, and promoted personal growth by the teaching assistants. There was a consistent desire by the undergraduate assistants to model themselves after their graduate counterparts and the faculty, and this desire resulted in the undergraduate assistant doing their best for the students they serve. This led to the assertion that positive relationships with faculty is critical to fostering an environment that promotes the success of teaching assistants. Critical characteristics of this environment are open dialogue and trust, because they make the teaching assistants feel confident enough to try new things while knowing they had the mentorship required to learn and grow.

*Balance*

These participants balanced multiple responsibilities such as work, school, personal lives, and other responsibilities during the semester. These responsibilities, their own class schedule, and personal interests were actively considered in selecting when to teaching and budgeting time accordingly. Their own schooling was consistently at the heart of these decisions. A good relationship with the faculty, selecting appropriate semesters to teach in, and courses that students had experience with and interests in, coupled with appropriate time management consistently resulted in a positive experience. This led to the assertion that teaching assistants actively consider responsible time management while prioritizing their own academics. Having a good relationship with a faculty mentor helps them achieve this balance.

It is worth noting that the category "Balance" was closely related to the next category "Self-Regulation" as illustrated by the arrow between these two categories in Figure 1. They were ultimately separated into different categories because codes assigned to Balance consistently focused on *how* teaching assistants accomplished budgeting their time. Codes assigned to Self-Regulation focused on

*why* teaching assistants identified and prioritized their choices. Further descriptions of these codes can be found in Table 1 of Appendix 2.

*Self-Regulation*

Throughout these interviews, participants consistently expressed how grateful they were that their university offered more opportunities for extra involvement. Several participated in undergraduate research in addition to teaching. All the participants expressed that these experiences beyond the classroom were something they identified as important to their own educational experiences, and that they actively prioritized the teaching experience because they saw value in it. This led to the assertion that undergraduate identify teaching experiences like this as opportunities which align with long-term career interests more than working, and sometimes more than research. In such cases, they prioritize they choices accordingly and use this experience to test future roles as graduate school, patient education, and career goals.

## Conclusions

Educational research has already established the link between teacher effectiveness and the positive impact on student outcomes; with teacher self-efficacy positively associated with student achievement levels (Klassen & Tze, 2014). In the realm of higher education, in which pedagogical expertise is not explicitly required or necessarily fostered, fewer studies examine how self-efficacy is cultivated in professors (Morris & Usher, 2010). Morris and Usher found that professors increased self-efficacy came from mastery experiences in their own teaching development and one mechanism was via structured teaching experiences (2010). Logically, one could argue that the UTA experience provides teaching experiences that build toward the skill development and mastery of future faculty in higher education.

A number of previous works document the benefits to students of peer-leaders, near-peers, and peer-experts, all of whom have similar functions to teaching assistants. These works illustrate that undergraduate peers are effective at facilitating the learning of other undergraduates in a variety of STEM disciplines. Benefits consistently reported include improved achievement, attitude, performance, self-concept, and self-confidence of those being supported (Bowling, Doyle, Taylor, & Antes, 2015; Chapin et al., 2014; Cherestes, 2015; Johnson, Robbins, & Loui, 2015; Pon-Barry, Packard, & St. John, 2017; Rahm & Moore, 2016; S. B. Wilson & Varma-Nelson, 2016). This study demonstrates that benefits are also experienced by those in the UTA role.

Participant consensus was that the teaching experience offered an exceptionally positive opportunity. The experience developed the self-confidence of participants and left them with a long-term sense of personal reward, and a sense of community between themselves and others that they worked including students, graduate teaching assistants, and faculty. Eight of the 13 participants here explicitly stated that they asked the faculty whom they taught for to serve as a reference or provide a letter of recommendation after the experience. Additionally, participants were able to successfully balance the other responsibilities in their lives because they practiced self-regulation by identifying and prioritizing the choices, they made about time management.

Additionally, a significant body of research has documented the impact of teaching on graduate assistants as discussed above. With this in mind, it does not seem unreasonable to conclude that undergraduates would also experience such benefits, or that these benefits would be multi-faceted and highly networked. Such reasoning further supports the proposed structure of Figure 1 which

models these benefits and their relationship to each other because it seems reasonable to conclude that they align with works examining similar situations with peer leaders or graduate assistants.

Previous research has established that undergraduates help augment the pool of available resources for departments by supplementing the pool of teaching assistants. They are generally more cost effective than graduate assistants. Faculty can select undergraduates based on specific interest and personal experience that helps ensure a good fit for the class and personality based on previous experience with individuals as a student, and on that individual's level of interest for the topic or subject. This is often absent in graduate assistants who are assigned to the course. Finally, undergraduates have been shown to benefit students in the classes and labs they serve. But previous work left un-answered the question of whether the teaching experience was beneficial to the participating undergraduates.

Through the lens of Situated Learning Theory, this work established that the teaching experience can be interpreted as fostering personal attributes or characteristics important for success in STEM disciplines for undergraduates. These include benefitting participant self-confidence, a sense of personal reward, an increased sense of community, and the abilities to balance multiple responsibilities while practicing self-regulation. All of these are likely important to the success of participants entering the STEM disciplines, and the undergraduate teaching experience should be viewed as a way to promote and develop these attributes. Additionally, serving as a teaching assistant offers more and varied experiences than what is available simply as a student, or by being involved in undergraduate research. Based on the personal benefits established in this work, it seems reasonable to promote the use of supported undergraduates in teaching because of the benefits likely to be experienced by all parties. More work is needed to investigate if such benefits extend to non-STEM disciplines as well.

## Appendix

### Appendix 1. Semi-Structured Interview Outline.

Purpose of the investigation: The purpose of the proposed work is to examine the perceptions about the long-term effects of working as a UTA by individuals who formerly worked in that role in the Department of Biology at UND.

The Research Question I would like to address through these interviews is: "What are the perceived long-term effects of working as a UTA?"

Aspects I would like to address include:

1) *Did this experience impact you personally in any way?*
*2) Did this experience impact you professionally in any way?*
*3) Did this experience impact you financially in any way?*

I will do an introduction of myself and my project, and then ask for consent to record participants, and outline the interview I would like to do. If the interviewee is not local, I will ask if they have received the Informed Consent Form, if they have any questions, and if I may have their permission to proceed. (I will be happy to mail them a hard-copy, with a return envelope).

Part 1 – General Background and Demographic information – Interviewee will be reminded that participation is completely voluntary, greatly appreciated, and that their open, honest, candid responses are most helpful. For the first part, I just want some basic, general, brief background info on them.

Q: So, in 1 or 2 sentences, can you tell me about yourself and the following points. - *Ask participants to tell a little about themselves – age, gender, profession, SES, race, and anything else they are willing to share.*

1. When did you work as a UTA; approximately how long ago, and what point in your academic career?
2. Why did you TA?
3. What course or courses did you TA in? How or why did you select those courses as one(s) you were interested in TAing?
4. Did you have an undergraduate TA in any classes when you were a student, and did that impact your wanting to TA?
5. What kind of help or support did you get from the faculty member whom you TAd for?
6. Did you get help or support from anyone else, and if so, who? Did it help?
7. Can you tell me about the career goals you had when you were an undergrad around the time you worked as a TA?
8. Did you hope to gain anything from the experience of TAing?
9. At the time, did you see yourself gaining anything from the TA experience?
10. Did TAing change how you viewed yourself?
11. Did TAing change your career interests or goals?
12. Has TAing changed the way you think about problem solving?
13. Were there any positive experiences from your time TAing that really stand out, and can you tell me about them?
14. Were there any negative experiences from your time TAing that really stand out, and can you tell me about them?
15. Do you think that TAing impacted your goals professionally?
16. Do you think TAing impacted your ability to achieve those goals?
17. What was the most rewarding thing about TAing?
18. Are there any drawbacks or downsides that you would be willing to share?
19. Can you think of a time that you had to balance your responsibilities as a TA and as a student? Once I have the basic background info, I want to move into the second part of my interview. Part 2 – Questions based on specific inquiries

**Personal Impact 1**

1. I would like you to try and think of a time since you TAed when you thought back to that experience. Has there been such a time, and if so, can you tell me about it? What caused that thinking, why did it happen, and what caused it?

**Personal Impact 2**

2. Do you think that your time and experience TAing helped you reach the goal, or achieve the objective you were interested in when you started? Would you be willing to share a little about why you TAed, and how or why it did or didn't help?

**Personal Impact 3**

3. Was there anything about the TAing experience that you can think back to and reflect on that you feel like really stands out as having impacted you? Why? What was it about that experience that makes it stick with you?

**Professional Impact 1**

4. Can you tell me a little about what you have done professionally, related to STEM in particular, since you graduated?

**Professional Impact 2**

5. Is there anything from your experience TAing that has impacted this path you have taken since you graduated?

**Professional Impact 3**

6. Do you think you were more prepared to take those challenges on because of your experience TAing, and if so, how or why did TAing help you do that (or not)?

7. Have you ever had an experience that made you think something like "Wow…I am really glad I TAed because…" and if so, can you tell me about it please?

**Perceptions 1**

8. If you could go back in time right now and tell yourself one thing about TAing, especially in relation to where your life and career have gone since that time, would you do it, and if so, what would it be, what would you tell yourself?

**Perceptions 2**

9. Do you have any regrets about TAing?

**Perceptions 3**

10. Is there anything that I haven't asked which you think I should, or is there anything you would like to tell me about regarding your experience TAing and the impact it had on you?

**LAST QUESTIONS:**

**Closing 1**

Is there anything that you feel could be or should be done to have made the TA experience better for you as a TA?

**Closing 2**

Is there anything that you feel could be or should be done to have made the TA experience better for the students you served while you were TAing?

**Conclusion 1**

Thank you for your time today! Is there anything you would like to add, or that you think I should have asked about that I did not?

**Conclusion 2**

I will provide you with a copy of the transcript from this interview that you can verify for accuracy and clarity, and that should take approximately 2 weeks. What is the best way to get that to you?

**Conclusion 3**

And finally, may I contact you again for a follow-up if I have questions, or further clarification or insight based on what my work?

I want to thank you again for helping me, the department, and the college by giving your time, and providing this valuable insight and thoughtful, honest responses. Thank you! Please do not hesitate to contact me if you have any questions, or think of anything else that you would like to add.

## Appendix 2. Summary Description of Codes.

Table 1. Summary and Description of Codes for the Personal Impacts Theme.

| Personal Impacts Theme | |
|---|---|
| Category I: Self Confidence | |
| Codes | Description of Transcript Receiving such Code |
| I can do it… | Tasks that were completed as part of the UTA experience, often associated with *hesitation at the onset, but which participants became comfortable or* |

| | |
|---|---|
| | *confident with*. Included sections of transcript that related to *grading, running reviews, tutoring*, and related tasks. |
| Responsible for students | Expressing *a sense of responsibility for student engagement*, *emotions*, or *performance*. Sections of transcript were assigned codes that corresponded to remarks provided by participants related to their perceptions and descriptions of how they were responsible for these aspects of the students they worked with. |
| See myself as… | Descriptions of *filling a variety of roles* including *support*, *intermediate, filter*, and *example or model* for students they work with, was consistently associated with a sense of self-confidence. Codes for these were assigned to portions of transcripts that related to how they defined or described themselves in their role, along with actions they took in those roles. |
| Student management | Discussing *logistics of a classroom, lab, lecture, or other environment* where UTAs supported student learning by managing or taking control of various scenarios or directing some aspect of that environment to elicit a desired outcome as students completed tasks. |
| Category II: Personal Reward | |
| Codes | Description |
| Lightbulb moments | Descriptions of students who experienced "*ah-hah" moments* or were described as having a "lightbulb" go off as a result of UTA intervention, support, or help. |
| Grade success | Discussion about *students who earned better grades* as a result of UTA support. |
| Feel good | Faculty trust and support, student gratitude, and descriptions of *generally positive* interactions made these UTAs express or describe feeling good, or *a sense of personal reward*, about themselves and their roles. |
| Ambitions or Aspirations | There was also a sense of reward as these UTAs explored their *career aspirations or ambitions* and satisfying *a desire to help other students* as they tested the waters to see if being a graduate student or professor was something they would find personally rewarding. |
| Making a difference | Many expressed that they *felt they had made a difference* for the students they worked with, especially in high-enrollment active learning classes. |
| Proud but humble | All former UTAs felt a sense of *pride about their ability* to assist their fellow students, but *simultaneously were humble* about their abilities to do such things. |

Table 1 continued.

| Category III: Sense of Community | |
|---|---|
| Codes | Description of Transcript Receiving such Code |
| Association with… | Codes for association with other *UTAs, GTAs, Faculty*, and *students* were all applied respectively to text where participants discussed or described the *importance of interactions, associations, and/or relationships with these respective groups* in a way that related to a sense of community between two or more individuals within these groups of people. |
| Mentoring by faculty | This code was applied to any *description of faculty mentoring, guiding, and/or supporting the UTA* during their experience. |
| Mentoring of students | This code was applied to any *description of UTAs mentoring, guiding, and/or supporting the students* they worked with during their experience. |

| | |
|---|---|
| Faculty are the primary motivator of community | Almost every participant described the *importance of the faculty* (and usually an interest in their class) to selecting who they TA with. Sections of transcript that detail or describe the importance of the faculty, and why being a TA for that specific individual were assigned this code. |
| Category IV: Balance | |
| Codes | Description of Transcript Receiving such Code |
| Work | This was applied to any reference in the transcript that described *balancing the responsibilities of a job or work* with any other aspect of their life. |
| School | This was applied to any reference in the transcript that described *balancing the responsibilities of school* with any other aspect of their life. |
| Personal life | This was applied to any reference in the transcript that described *balancing the responsibilities of a participant's personal life* with any other aspect of their life. |
| Other responsibilities | This was applied to any reference in the transcript that described *balancing other responsibilities* of a participant's life with something not meeting the criteria of the above codes. |
| Category V: Self-Regulation | |
| Codes | Description of Transcript Receiving such Code |
| Identify importance of experience | This was applied to sections of text where a participant explained *how or why they evaluated two or more potential options* available for them to pursue, and the relative importance of each. |
| Prioritize importance of experience (over another) | This was applied to sections of text where participants explained how they *assigned value to making decisions about how or why to pursue one opportunity over another*, and why. |

**Appendix 3. Summarized Location and Frequency of Personal Impact Codes by Participants.**

Appendix 3A. Summary of Personal Impact Code Locations for Adam.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 4-14, 5-21, 7-41, 9-58, 9-62, 10-72, 12-85, 12-88, 14-98, 14-101, 14-103, 15-109, 17-122, 18-4, 19-6, 23-35, 23-38, 24-42 |
| | Manage students | 9-60, 14-101, 14-103, 15-109, 18-4 |
| | See myself as… | 4-14, 5-21, 7-41, 9-58, 9-62, 12-83, 12-88, 14-103, 15-109, 18-4, 19-11, 22-33, 24-42, 25-55, 26-64 |
| | Responsibility for student | 9-60, 10-72, 11-78, 12,80, 15-103, 16-117, 21-22, 25-55 |
| Reward | Lightbulbs | 13-91, 15-107, 21-22 |
| | Grade success | |
| | Feel Good | 9-62, 13-91, 15-107, 25-55 |
| | Proud but humble | 8-58, 9-62, 13-91, 15-107, 21-22, 25-55 |
| | Aspirations or ambitions | 4-12, 5-21, 5-27 |
| | Make a difference | 11-78, 12-80, 15-107, 16-117, 25-55 |
| Community | Association with | 6-38, 8-47, 15-107, 16-117, 24-55 |
| | Mentoring by faculty | 6-38, 7-41, 7-45, 24-55 |
| | Mentoring of Students | 7-41, 26-62, 24-55 |
| | Faculty = who and why | 6-36, 7-45, 24-55 |
| Balance | Work | 17-122 |
| | School | 6-38, 17-122 |
| | Life | |
| | Responsibilities | 17-122 |
| Self-Regulation | Identify | 5-21, 8-58, 17-122, 25-55, |
| | Prioritize | 5-21, 8-58, 17-122, 25-55 |

Appendix 3A above shows the location of each individual Personal Impact code, by category, within the transcript for Adam. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 4 in box 14 of the analyzed Personal Impact transcript.

Appendix 3B. Summary of Personal Impact Code Locations for Brian.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 5-19, 6-26, 8-35, 9-51, 11-64, 11-67, 14-85, 15-94, 15-98, 16-102, 16-104, 19-9, 23-37, 25-56 |
| | Manage students | 13-79 |
| | See myself as… | 6-28, 7-30, 8-35, 13-79, 14-85, 16-104, 19-7 |
| | Responsibility for student | 5-21, 7-30, 14-85, 18-5, 19-7, 21-18 |
| Reward (personally) | Lightbulbs | |
| | Grade success | 5-21, 13-79 |
| | Feel Good | 5-19, 6-26, 10-56, 14-89, 20-18, 25-56, 27-74 |
| | Proud but humble | 6-26, 13-79, 20-15, 25-56, 27-74 |
| | Aspirations or ambitions | 6-26, 9-51 |
| | Make a difference | 5-21, 6-28, 10-56, 13-79, 20-18, 25-56, 25-59, 27-74 |
| Community | Association with | 5-19, 6-24, 9-43, 9-45, 12-77, 13-79, 14-85, 19-7, 20-18, 23-43, 24-48, 25-50, 25-56 |
| | Mentoring by faculty | 5-19, 6-28, 7-30, 12-77, 19-7, 23-43, 24-48, 25-56 |
| | Mentoring of Students | 5-19, 5-21, 6-28, 7-30, 13-79, 14-85, 20-18, 24-48, 25-56 |
| | Faculty = who and why | 5-19, 6-28, 23-43, 24-48, 25-56 |
| Balance | Work | 17-111 |
| | School | 17-111 |
| | Life Responsibilities | 17-111 |
| Self-Regulation | Identify | 8-35, 17-111 |
| | Prioritize | 8-35, 17-111 |

Appendix 3B above shows the location of each individual Personal Impact code, by category, within the transcript for Brian. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 5 in box 19 of the analyzed Personal Impact transcript.

Appendix 3C. Summary of Personal Impact Code Locations for Cassandra.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 5-26, 6-42, 7-50, 8-59, 10-71, 10-73, 10-75, 13-99, 14-5, 14-9, 20-34 |
| | Manage students | 6-42, 10-71 |
| | See myself as… | 5-28, 7-50, 8-59, 8-61, 10-71, 10-75, 13-99, 14-5, 14-9, 17-21, 20-34 |
| | Responsibility for student | 6-38, 8-55, 10-71, 18-27, 20-37 |
| Reward | Lightbulbs | |
| | Grade success | |
| | Feel Good | 7-52, 8-59, 14-3, 14-5, 14-9, 18-21, 20-34 |
| | Proud but humble | 7-52, 8-59, 14-3, 14-5, 14-9, 18-21, 19-29, 20-34 |
| | Aspirations or ambitions | 4-8, 7-50, 10-75 |
| | Make a difference | 7-52 |
| Community | Association with | 5-26, 6-42, 21-50, 22-52, 22-54 |
| | Mentoring by faculty | 5-26, 22-56 |
| | Mentoring of Students | 5-26, 22-56 |
| | Faculty = who and why | 5-26, 22-52 |
| Balance | Work | 4-10, 4-12, 5-16, 11-80, 12-95 |
| | School | 4-12, 11-80, 12-95 |
| | Life | 4-10 |
| | Responsibilities | 4-10 |
| Self-Regulation | Identify | 4-8, 7-50, 13-99, 18-21 |
| | Prioritize | 4-8, 7-50, 13-99, 18-21 |

Appendix 3C above shows the location of each individual Personal Impact code, by category, within the transcript for Cassandra. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 5 in box 26 of the analyzed Personal Impact transcript.

Appendix 3D. Summary of Personal Impact Code Locations for Danielle.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 7-19, 9-33, 10-45, 11-50, 12-53, 14-68, 14-70, 15-72, 15-75, 17-91, 21-119, 27-13, 32-45, 35-60, 36-72, 37-75 |
| | Manage students | |
| | See myself as… | 14-70, 15-72, 16-80, 17-91, 17-91, 18-97, 18-92, 18-101, 20-110, 26-5, 26-7, 26-9, 27-13, 33-49, 35-60, 36-70, 37-75 |
| | Responsibility for student | 7-19, 8-29, 9-33, 9-40 |
| Reward | Lightbulbs | 17-91, 22-122 |
| | Grade success | 22-122 |
| | Feel Good | 7-15, 12-62, 17-91, 18-71, 19-103, 19-105, 25-3, 26-7, 35-65, 36-70, 36-72 |
| | Proud but humble | 7-15, 7-19, 12-53, 15-75, 17-91, 18-71, 19-105, 21-116, 22-122, 26-7, 33-49, 36-70, 36-72 |
| | Aspirations or ambitions | 12-62, 16-80, 25-3 |
| | Make a difference | 12-53, 15-72, 20-110, 22-122, 26-7 |
| Community | Association with | 8-9, 8-25, 8-29, 10-48, 11-53, 14-68, 18-97, 24-134, 31-32, 34-55, 36-70 |
| | Mentoring by faculty | 8-29, 10-45, 10-48, 12-53, 24-134 |
| | Mentoring of Students | 10-45, 10-48, 18-91, 36-70 |
| | Faculty = who and why | 6-10, 7-15, 10-48, 24-134, 31-32 |
| Balance | Work | 19-108, 22-125 |
| | School | 19-108, 22-125 |
| | Life | 19-108, 22-125 |
| | Responsibilities | 19-108, 22-125 |
| Self-Regulation | Identify | 24-134, 23-137 |
| | Prioritize | 24-134, 23-137 |

Appendix 3D above shows the location of each individual Personal Impact code, by category, within the transcript for Danielle. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 7 in box 19 of the analyzed Personal Impact transcript.

Appendix 3E. Summary of Personal Impact Code Locations for Emily.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 7-31, 8-37, 9-46, 9-52, 14-93, 14-95, 16-107, 17-121, 19-130, 19-132, 20-134, 21-142, 21-145, 22-148, 34-260, 34-262, 38-268, 41-35, 44-58, 51-132, 55-184, 57-217 |
| | Manage students | 14-93, 14-95, 17-121, 19-130, 19-132, 20-134, 21-142, 34-260, 35-268 |
| | See myself as… | 7-31, 14-93, 14-95, 17-121, 19-130, 19-132, 20-134, 21-142, 21-145, 22-148, 32-243, 34-262, 41-35, 45-68, 51-129 |
| | Responsibility for student | 13-86, 14-93, 14-95, 17-121, 20-134, 22-148, 33-256, 34-256, 34-262, 35-268, 57-209 |
| Reward | Lightbulbs | 42-47, 43-56 |
| | Grade success | 32-246, 35-271 |
| | Feel Good | 8-39, 14-93, 18-124, 30-224, 32-246, 33-251, 35-271, 39-8, 39-17, 46-80, 52-142, 54-158, 54-160, 58-231 |
| | Proud but humble | 8-39, 14-93, 18-124, 26-184, 30-224, 32-246, 33-251, 35-271, 39-8, 54-158, 58-231 |
| | Aspirations or ambitions | 18-124, 26-184, 32, 241 |
| | Make a difference | 30-224, 32-246 |
| Community | Association with | 7-27, 7-29, 8-37, 9-48, 9-50, 9-54, 10-58, 10-60, 10-62, 10-64, 11-69, 11-76, 13-86, 14-98, 15-100, 15-104, 16-107, 23-160, 24-166, 31-230, 39-8, 39-17, 40-23, 48-94, 48-102 |
| | Mentoring by faculty | 7-27, 7-29, 8-37, 9-54, 11-76, 12-82, 16-107, 23-160, 24-166, 25-168, 39-8, 40-23 |
| | Mentoring of Students | 11-76, 12-82, 25-168, 26-187, 48-94 |
| | Faculty = who and why | 7-27, 7-29, 8-37, 11-69, 11-76, 16-107, 23-155, 23-160, 24-166, 31-230, 23-246, 39-8, 55-182, 60-251 |
| Balance | Work | 5-13, 12-82, 36-274 |
| | School | 5-13, 12-82, 36-274, 46-80 |
| | Life | |
| | Responsibilities | 5-13, 12-82, 12-84, 36-274, 37-276, 46-80 |
| Self-Regulation | Identify | 6-13, 7-27, 7-29, 7-31, 8-37, 16-107, 17-113, 25-172, 42-47, 46-80, 47-87 |
| | Prioritize | 7-27, 7-29, 7-31, 8-37, 16-107, 17-113, 25-172, 42-47, 46-80, 47-87 |

Appendix 3E above shows the location of each individual Personal Impact code, by category, within the transcript for Emily. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 7 in box 31 of the analyzed Personal Impact transcript.

Appendix 3F. Summary of Personal Impact Code Locations for Faith.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 7-54, 8-67, 9-77, 12-103, 12-105, 15-134, 15-136, 17-147, 17-149, 17-152, 19-164, 19-167, 21-186, 22-193, 25-236, 30-24, 33-55, 41-118 |
| | Manage students | 7-63, 12-103, 19-164, 28-6, 30-28, 30-30 |
| | See myself as… | 7-53, 7-61, 12-103, 17-12, 21-186, 30-26, 35-68, 41-118 |
| | Responsibility for student | 20-167, 19-160, 19-165, 20-167, 26-243, 37-75 |
| Reward | Lightbulbs | 20-167, 25-231, 30-21 |
| | Grade success | 20-167, 20-172, 30-21 |
| | Feel Good | 7-58, 9-77, 15-134, 16-140, 20-167, 20-172, 20-174, 20-181, 20-183, 25-231, 25-231, 29-17, 30-21, 34-57 |
| | Proud but humble | 6-50, 7-56, 7-63, 12-111, 20-167, 20-181, 20-183, 21-186, 22-193, 25-231, 29-17, 30-21, 34-57 |
| | Aspirations or ambitions | 15-136, 19-164 |
| | Make a difference | 16-136, 18-160, 20-172, 25-231, 30-21, 37-75 |
| Community | Association with | 5-21, 5-23, 5-30, 7-61, 9-77, 9-83, 9-85, 10-87, 10-91, 10-94, 11-96, 11-98, 13-121, 14-123, 18-160, 19-160, 35-68, 36-72 |
| | Mentoring by faculty | 7-61, 9-77, 10-91, 13-121, 14-123, 14-127, 22-19535-68 |
| | Mentoring of Students | 7-6, 10-91, 19-160, 13-21, 14-127, 22-195, 35-68 |
| | Faculty = who and why | 4-9, 7-61, 9-77, 11-103, 13-121, 14-123, 14-127, 14-131, 21-186, 22-195, 25-236, 35-68 |
| Balance | Work | 8-63, 15-136, 21-186 |
| | School | 8-63, 15-136, 21-186, 26, -241 |
| | Life | 15-136, 26-241 |
| | Responsibilities | 8-63, 15-136, 23-204, 26-241 |
| Self-Regulation | Identify | 7-54, 10-91, 11-100, 12-105, 15-136, 17-142, 19-164, 38-81 |
| | Prioritize | 7-54, 11-100, 12-105, 15-136, 17-142, 19-164, 38-81 |

Appendix 3F above shows the location of each individual Personal Impact code, by category, within the transcript for Faith. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 7in box 54 of the analyzed Personal Impact transcript.

Appendix 3G. Summary of Personal Impact Code Locations for George.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 6-29, 7-33, 11-65, 17-22, 18-31, 18-37, 22-46, 23-55, 24-59, 25-71, 28-85, 29-91, 31-105, 35-6, 35-8, 41-37 |
| | Manage students | |
| | See myself as… | 6-29, 7-33, 9-54, 10-60, 11-65, 15-17, 16-20, 17-22, 18-31, 18-37, 25-71, 26-78, 27-82, 28-85, 31-105, 53-98 |
| | Responsibility for student | 23-55, 25-71, 27-82, 29-91, 34-116, 41-48 |
| Reward | Lightbulbs | |
| | Grade success | |
| | Feel Good | 25-71, 30-94, 33-110, 42-48 |
| | Proud but humble | 18-37, 25-71, 30-94, 33-110, 42-48 |
| | Aspirations or ambitions | 9-56, 15-17, 17-25, 37-16, 41-40 |
| | Make a difference | 25-71, 30-94, 33-110, 34-116, 42-48 |
| Community | Association with | 1-4, 6-29, 11-65, 17-22, 17-29, 18-34, 18-37, 23-53, 30-94, 31-100, 34-116, 41-40, 52-98 |
| | Mentoring by faculty | 11-65, 17-22, 18-34, 18-37, 30-94, 31-100, 41-40, 52-98 |
| | Mentoring of Students | 30-91, 31-100 |
| | Faculty = who and why | 17-22, 17-29, 18-34, 18-37, 30-94, 31-100, 41-40, 52-98 |
| Balance | Work | 33-113 |
| | School | 33-113 |
| | Life | |
| | Responsibilities | 33-113 |
| Self-Regulation | Identify | 7-33, 15-17, 18-37, 26-74, 33-113 |
| | Prioritize | 7-33, 15-17, 18-37, 26-74, 33-113 |

Appendix 3G above shows the location of each individual Personal Impact code, by category, within the transcript for George. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 6 in box 29 of the analyzed Personal Impact transcript.

Appendix 3H. Summary of Personal Impact Code Locations for Heather.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 7-53, 8-56, 8-60, 8-63, 10-82, 11-85, 14-14, 15-20, 16-23, 16-27, 17-39, 17-41, 18-45, 18-52, 19-54, 19-58, 19-61 |
| | Manage students | |
| | See myself as… | 11-85, 15-20, 16-23, 16-25, 16-27, 19-54, 19-58, 19-61 |
| | Responsibility for student | 10-82, 12-99, 15-20, 16-23, 19-54, 21-81 |
| Reward | Lightbulbs | 15-20 |
| | Grade success | 15-20 |
| | Feel Good | 10-73, 10-75, 11-85, 15-20, 19-54 |
| | Proud but humble | 9-63, 10-73, 10-82, 11-85, 12-99, 14-12, 15-20, 19-54, 21-75, 23-106 |
| | Aspirations or ambitions | 7-45, 7-51, 14-14, 19-54 |
| | Make a difference | 9-63, 15-16, 15-20, 19-54 |
| Community | Association with | 2-17, 4-23, 4-25, 6-24, 6-39, 9-63, 9-67, 14-16, 16-25, 16-27, 20-61, 21-84 |
| | Mentoring by faculty | 2-17, 6-24, 16-27 |
| | Mentoring of Students | 6-24, 9-63, 16-25, 16-27, 20-61 |
| | Faculty = who and why | 2-17, 6-24, 22-90 |
| Balance | Work | 6-42, 12-102 |
| | School | 6-42, 11-88, 11-90, 12-102 |
| | Life | |
| | Responsibilities | 11-88, 11-90, 12-102 |
| Self-Regulation | Identify | 4-15, 4-20, 5-29, 11-90, 12-102, 21-81 |
| | Prioritize | 4-15, 4-20, 5-29, 11-90, 12-102, 21-81 |

Appendix 3H above shows the location of each individual Personal Impact code, by category, within the transcript for Heather. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 7 in box 53 of the analyzed Personal Impact transcript.

Appendix 3I. Summary of Personal Impact Code Locations for Julia.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 8-37, 10-69, 11-74, 12-93, 12-97, 13-107, 14-125, 16-147, 17-161, 18-170, 19-177, 20-188, 20-190, 20-192, 24-240, 30-307, 37-76, 37-82 |
| | Manage students | 12-93, 28-285, 28-289 |
| | See myself as… | 8-37, 9-57, 14-125, 17-161, 37-82 |
| | Responsibility for student | 8-37, 38-92, 39-98, 39-102 |
| Reward | Lightbulbs | 20-190 |
| | Grade success | 20-190, 22-210 |
| | Feel Good | 7-25, 8-32, 11-72, 13-99, 18-165, 20-190, 22-210, 27-272, 30-3, 32-5, 34-35, 37-82 |
| | Proud but humble | 11-72, 13-99, 18-165, 20-190, 34-35 |
| | Aspirations or ambitions | 7-25, 12-93, 17-161, 25-248 |
| | Make a difference | 20-190, 22-210, 35-47, 38-92 |
| Community | Association with | 8-37, 9-39, 9-55, 14-125, 16-149, 16-151, 17-153, 17-158, 20-190, 22-210, 23-219, 25-248, 26-261, 30-297, 32-3, 38-86, 38-88, 39-95 |
| | Mentoring by faculty | 16-145, 16-147, 16-151, 23-219, 25-248 |
| | Mentoring of Students | 9-39, 16-151, 23-219, 25-248, 32-3, 38-86 |
| | Faculty = who and why | 7-23, 10-63, 10-65, 10-69, 16-145, 23-219 |
| Balance | Work | 7-20, 7-25, 18-161, 26-266, 27-268, 28-279, 30-304 |
| | School | 7-20, 7-25, 26-264, 26-266, 28-279, 30-304 |
| | Life | 7-20, 18-161 |
| | Responsibilities | 7-25, 27-268, 39-95 |
| Self-Regulation | Identify | 18-165, 19-175, 27-268, 27-275, 30-304, 39-95 |
| | Prioritize | 18-165, 27-268, 27-275, 30-304, 39-95 |

Appendix 3I above shows the location of each individual Personal Impact code, by category, within the transcript for Julia. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 7 in box 37 of the analyzed Personal Impact transcript.

Appendix 3J. Summary of Personal Impact Code Locations for Kevin.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 10-47, 13-74, 14-87, 15-93, 19-3, 19-5, 20-7, 22-20a, 22-20b, 24-31, 25-36, 28-62, 29-62, 30-76, 32-80, 33-94 |
| | Manage students | 11-54, 13-74, 15-97, 15-93, 16-105 |
| | See myself as… | 6-10, 9-35, 9-37, 10-47, 11-66, 15-93, 21-13 |
| | Responsibility for student | 10-47, 15-99, 15-93, 24-27, 30-76 |
| Reward | Lightbulbs | 12-71, 13-81, 17-117, 18-117 |
| | Grade success | 23-25 |
| | Feel Good | 6-10, 6-17, 8-29, 9-37, 10-47, 12-71, 13-81, 14-87, 16-105, 28-62 |
| | Proud but humble | 10-47, 12-71, 16-105, 27-51 |
| | Aspirations or ambitions | 10-43 |
| | Make a difference | 6-10, 10-48, 14-82, 14-88, 22-20, 23-23, 24-27, 25-34, 28-62 |
| Community | Association with | 6-10, 7-23, 8-29, 12-71, 20-7, 20-9, 22-20 |
| | Mentoring by faculty | 6-10, 12-71, 13-74 |
| | Mentoring of Students | 6-10, 10-47, 20-7 |
| | Faculty = who and why | 6-17, 11-64, 12-71 |
| Balance | Work | |
| | School | 18-123 |
| | Life | |
| | Responsibilities | 18-123 |
| Self-Regulation | Identify | 20-7, 28-62 |
| | Prioritize | 20-7, 28, 62 |

Appendix 3J above shows the location of each individual Personal Impact code, by category, within the transcript for Kevin. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 10 in box 47 of the analyzed Personal Impact transcript.

Appendix 3K. Summary of Personal Impact Code Locations for Lisa.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 5-17, 5-22, 7-30, 8-38, 9-42, 10-53, 11-58, 11-62, 12-66, 12-69, 13-75, 13-79, 14-81, 14-83, 15-89, 15-92, 16-94, 16-96, 17-101, 18-108, 23-6 |
| | Manage students | 7-30, 8-38, 9-42, 10-53, 13-77, 17-104, 20-124, 26-36 |
| | See myself as… | 4-3, 5-22, 7-30, 8-36, 8-38, 9-42, 10-53, 11-58, 11-62, 12-62, 12-66, 13-69, 16-92, 23-6, 24-21, 27-43, 27-46 |
| | Responsibility for student | 7-28, 9-42, 10-48, 10-50, 10-53, 12-66, 21-126 |
| Reward | Lightbulbs | 29-63 |
| | Grade success | |
| | Feel Good | 4-11, 5-22, 7-30, 27-51 |
| | Proud but humble | 4-11, 5-22, 6-23, 7-30, 10-50, 27-51 |
| | Aspirations or ambitions | 6-22, 6-23, 7-30, 13-69, 24-17, 27-51, 30-73, 30-75 |
| | Make a difference | 6-25, 6-28, 10-50 |
| Community | Association with | 4-11, 5-13, 6-23, 6-28, 7-30, 7-34, 8-36, 8-42, 9-45, 9-48, 10-50, 10-53, 14-89, 19-89, 18-111, 22-3, 24-21, 30-73, 31-82 |
| | Mentoring by faculty | 6-23, 7-30, 8-42, 10-50, 17-104, 18-111, 23-6, 24-21, 30-73, 31-82 |
| | Mentoring of Students | 6-23, 7-30, 8-42, 10-50, 10-53, 17-104, 18-111, 23-6, 24-21, 30-73, 31-82 |
| | Faculty = who and why | 6-23, 6-25, 6-28, 7-30, 8-42, 9-48, 10-50, 18-111, 30-73, 31-82 |
| Balance | Work | 19-116 |
| | School | 5-17, 15-89, 19-116 |
| | Life | |
| | Responsibilities | 15-89, 19-116, 19-119 |
| Self-Regulation | Identify | 5-17, 19-119 |
| | Prioritize | 5-17, 19-119 |

Appendix 3K above shows the location of each individual Personal Impact code, by category, within the transcript for Lisa. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 5 in box 17 of the analyzed Personal Impact transcript.

Appendix 3L. Summary of Personal Impact Code Locations for Mabel.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 5-26, 5-28, 10-77, 11-86, 11-88, 13-92, 13-99, 14-104, 16-118, 17-122**, 18-130, 20-138, 21-151, 24-170, 25-3, 26-14, 27-17, 29-28 |
| | Manage students | 5-28, 16-118, 20-138, 30-35 |
| | See myself as… | 5-28, 6-40, 8-57, 9-63, 10-77, 11-86, 13-99, 14-102, 14-104, 15-112, 16-118, 17-122, 18-127, 20-138, 21-151, 25-3, 29-30, 30-35, 33-60 |
| | Responsibility for student | 5-28, 9-63, 10-77, 11-86, 12-92, 14-104, 15-112, 22-157, 22-159 |
| Reward | Lightbulbs | 5-26, 5-28, 10-77, 11-86, 12-90, 19-133, 20-144, 21-154 |
| | Grade success | |
| | Feel Good | 4-22, 9-63, 9-65, 9-75, 10-77, 11-88, 12-90, 13-92, 15-110, 20-144, 28-25 |
| | Proud but humble | 4-24, 9-63, 9-75, 10-77, 12-90, 15-110, 16-116, 20-138, 20-144, 21-154, 27-20, 28-25 |
| | Aspirations or ambitions | 4-22, 4-24, 9-75, 16-116, 27-20 |
| | Make a difference | 12-90, 13-92, 15-112, 16-116, 20-138, 28-25 |
| Community | Association with | 6-40, 7-47, 9-63 |
| | Mentoring by faculty | 7-47 |
| | Mentoring of Students | 7-47, 9-34, 9-65, 22-161 |
| | Faculty = who and why | |
| Balance | Work | 23-164 |
| | School | 23-164 |
| | Life | |
| | Responsibilities | 23-164 |
| Self-Regulation | Identify | 10-77, 22-159, 29-33, |
| | Prioritize | 10-77, 22-159, 29-33, |

Appendix 3L above shows the location of each individual Personal Impact code, by category, within the transcript for Mabel. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 5 in box 26 of the analyzed Personal Impact transcript.

Appendix 3M. Summary of Personal Impact Code Locations for Noah.

| Categories | Codes | Location of Personal Impact Codes in Analyzed Transcript by Page and Box Number |
|---|---|---|
| Self Confidence | I can do it | 9-60, 9-62, 12-77, 13-79, 13-81, 14-88, 15-97, 16-102, 17-108, 17-120, 24-164, 29-10, 32-21, 34-33, 40-58 |
| | Manage students | 9-60, 15-97, 17-120, |
| | See myself as… | 12-77, 13-78, 13-81, 14-88, 15-97, 16-102, 24-164, 29-10, 31-14, 32-21, 3433, |
| | Responsibility for student | 9-60, 19-120, 33-26 |
| Reward | Lightbulbs | |
| | Grade success | |
| | Feel Good | 34-33 |
| | Proud but humble | 5-31, 16-104, 33-26, 34-33, 41-58 |
| | Aspirations or ambitions | 14-90, 17-108 |
| | Make a difference | 19-120, 33-26, 34-33, 41-58 |
| Community | Association with | 5-33, 6-37, 9-58, 13-83, 14-88, 20-133, 22-148, 22-152, 25-16 |
| | Mentoring by faculty | 5-33, 5-35, 7-43, 7-45 |
| | Mentoring of Students | 20-133 |
| | Faculty = who and why | 5-33, 5-35, 6-37, 22-148, 22-152 |
| Balance | Work | 5-33, 15-97, 25-176, 27-196, 27-198 |
| | School | 5-33, 15-97, 25-176, 27-196, 27-198 |
| | Life | |
| | Responsibilities | 15-97, 25-176, 27-196 |
| Self-Regulation | Identify | 12-77, 14-92, 27-196 |
| | Prioritize | 12-77, 14-92, 27-196 |

Appendix 3M above shows the location of each individual Personal Impact code, by category, within the transcript for Noah. Information can be interpreted as page-box number. For example, in the "Self Confidence" category, the code "I can do it" appears first on page 9 in box 60 of the analyzed Personal Impact transcript.

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