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Changing High School Science Teacher Beliefs on Student Voice Through Action Research

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Changing High School Science Teacher Beliefs on Student Voice Through Action Research

by

Katie Laux

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in Curriculum and Instruction
with a concentration in Science Education
Department of Teaching and Learning
College of Education
University of South Florida

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Dedication

To my parents, Bonnie and Dave, who always support me in my crazy adventures, including the insane yet rewarding decision to pursue my PhD. Thank you for believing in me and teaching me the value of hard work, the necessity of sacrifice, and the importance of following my dreams.

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Although writing this dissertation was often a lonely and isolating experience, I was fortunate enough to have a supportive group of family and friends who helped me get to this point. To my Dad, who is probably grateful to never have to read another thesis or dissertation. Thank you for all of your advice and for keeping it real. To my Mom and my sister, Missy, who both listened to me talk extensively about things they never needed to know about but were always there with supportive words. To my best friend Hawk because through all the minor breakdowns, presentations, ramblings about teacher beliefs and student voice, stress, successes, and failures you have been someone I have consistently been able to count on. I really don't know what I would do without you in my life. And to my other friends who stuck around when I was too busy to breathe and kept me laughing while dealing with the stress of a developing Phil. Finally, to my fellow graduate students, who often kept me sane and believing in myself.

I have also been fortunate to have a supportive group of people I have met in my professional life who helped me throughout my dissertation. To my major professor, Dr. Feldman who has given up so much time to get me through this process. Thank you for believing in me and giving me opportunities to grow. And to the rest of my committee members, Dr. Ellerbrock, Dr. Blank, and Dr. Jung, thank you for your guidance throughout this process. To my international travel partner, Dr. Jeni Davis, who has given me a lot of valuable advice and encouragement throughout the last few years. To the participants in my study who volunteered their time to help a total stranger achieve her dreams. And finally, to all of my former students who helped me see the importance of giving students a voice.

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Abstract

The purpose of this dissertation research was to explore how engagement in action research influenced high school science teachers' beliefs and classroom practices related to student voice and participation. This included exploring any affordances or obstacles they experienced with attempting to increase student voice and participation in their classrooms. I facilitated individual action research projects with the teachers, and they were able to discuss individual action research plans and share ideas with colleagues. Four high school science teachers began this research. While all four teachers were selected as cases, only two of the teachers designed and followed through with their action research plans. The teachers were provided with a hierarchy of student participation and examples of each of the four levels of the hierarchy in order to guide and design their action research. Collected data included transcripts from the action research group meetings, classroom observations, teacher journals, and interviews with teachers. A combination of direct interpretation and thematic coding was used to analyze the data. Direct interpretation involved writing narratives based on what I saw and interpreting events as I experienced them. The teachers either maintained their positive beliefs or formed new beliefs related to the inclusion of student voice. In addition, both teachers successfully used action research as a way to overcome obstacles and increase student voice and participation in their classrooms. This study has implications for teachers who want to use action research to better understand their teaching related to student voice, administrators and teacher educators who want to provide PD opportunities and support to meet individual teacher needs, and researchers who are interested in studying student voice.

Chapter 1: Introduction

The purpose of this dissertation research was to explore how engagement in action research influenced high school science teachers' beliefs and classroom practices related to student voice and participation. This included exploring any affordances or obstacles they experienced with attempting to increase student voice and participation in their classrooms. This study addressed the following research questions:

- How do high school science teachers' beliefs change as they engage in action research in order to increase student voice in their classroom?
- How do high school science teachers' practices change as they engage in action research in order to increase student voice in their classroom?
- What affordances or obstacles do high school science teachers encounter while attempting to include their students' voices in the classroom?

Problem Statement and Rationale

Students do not typically have a participatory role in classrooms (Mitra, 2009; Mitra & Gross, 2009; Yonezawa & Jones, 2009). Failing to include students in educational decisions limits dialogue and inhibits critical thinking that could be expressed if students were allowed a voice (Freire, 1970). However, including students in educational decisions could result in many benefits for students and teachers. Including students in a more participatory role can lead to improvements in relationships between teachers and students (Cook Sather, 2007; Flutter & Rudduck, 2004; Hagay & Baram-Tsabari, 2015; Mitra, 2006; Robinson & Taylor, 2012; Smyth, 2006; Susinos & Haya, 2014). Consulting students about classroom practices and pedagogy is a

way for teachers to get feedback on their teaching and to get new insights into processes of teaching and learning (Bahou, 2012; Cook Sather, 2007; Lodge, 2005; McGregor, 2007; Mitra, 2006; Mitra & Gross, 2009; Wickremesooriya, 2015; Yonezawa & Jones, 2009). Participating in classroom decisions can create engaged learners who find meaning in science education (Basu, 2008; Cook Sather, 2007; Furman & Calabrese Barton, 2006; Hagay & Baram-Tsabari, 2015; Morrison, 2008; Seiler, 2011; Smyth, 2006), gives students a sense of empowerment in the science classroom (Basu, 2008; Calabrese Barton & Tan, 2010; Furman & Calabrese Barton, 2006; Hagay & Baram-Tsabari, 2015), and increases student motivation towards learning science (Ryan & Deci, 2000). Finally, increasing student participation can lead to a more collaborative classroom environment (Apple & Beane, 2007; Flutter & Rudduck, 2004).

If we expect schools to incorporate student voices, then teacher buy in is essential (Bahou, 2012; Fielding, 2004). Research on teacher beliefs has shown teachers possess complicated systems of beliefs that influence how they view students, themselves, and science (Bryan, 2012). Although research supports the idea that teachers approve of student voice efforts, there may be a disconnect between what teachers believe is happening in the classroom and students' beliefs (Ianes, Cappello, & Demo, 2017; Shim & Shur, 2018). However, engagement in student voice initiatives can create or enhance positive teacher beliefs about student voice (Mitra, 2006). Therefore, this study is important because it allowed teachers to participate in action research, which gave them a systematic way to better include their students' voices in the science classroom and to reflect on this process. This reflection allowed me to determine some of the affordances and obstacles teachers' encounter with the inclusion of student voice.

Four teachers began the study with the intent of designing and implementing their own individual action research plans (Feldman, 1998). They also engaged in an action research group

where they discussed their action research and shared ideas with colleagues (Feldman, 1996; Milton-Brkich, Shumbera, & Beran, 2010) in order to support each other throughout the process. The teachers were provided with a hierarchy of student participation (explained in the next section) that I adapted from Fielding (2001) and Lodge (2005) and examples of each level of the hierarchy in order to guide and design their action research. Fielding (2001) created a framework of student involvement focused on students participating in research. Lodge's (2005) model focused on students engaging in dialogue with the teacher. I blended the two models together in order to develop a framework the teachers could use to focus on how they could engage in dialogue with students and work with them to research conditions of teaching and learning.

I used a multiple case study approach (Stake, 2006) to explore how engagement in action research influenced high school science teachers' beliefs on student voice and participation. I used an instrumental case study approach to better understand how student voice could be included in the science classroom by examining the particular cases of four high school teachers engaging in action research (Creswell, 2013; Stake, 1995; Stake, 2006). I collected data in the form of recordings from the action research groups, field notes from classroom observations, pre and post interviews, and bi-weekly journals from teachers. I used a combination of direct interpretation and thematic coding to analyze the data (Stake, 1995). After preliminary interpretations were made, I code the data to look for patterns within cases (Creswell, 2013; Stake, 1995). As this is a multiple case study, I analyzed individual cases and then did a cross case analysis in order to determine themes within and across cases (Creswell, 2013; Stake, 2006).

Participation in this study was limited to high school science teachers who were employed in the same school district located in the southeastern United States. This study

focused on teachers who were employed during the Fall of the 2018-2019 school year. Finally, this study only included teachers who were interested in increasing student voice and participation in their classroom and volunteered to be part of this research.

Background Information and Conceptual Framework

I explored how teacher beliefs about student voice and participation were influenced by engaging in action research as a form of professional development (PD). An assumption of the study was that teacher beliefs influence classroom practices. Therefore, this study also explored how teachers' beliefs about student voice and participation influenced their actions in the classroom and how they gave their students a voice through action research. Finally, I also examined any affordances or obstacles the teachers encountered while attempting to increase student voice.

Teacher beliefs and actions. The term “belief” has been defined in a variety of ways in the literature and used interchangeably with many other terms including attitudes, values, perceptions, and perspectives (Pajares, 1992; Richardson, 1996). Beliefs are formed as a result of teachers' prior experiences (Brickhouse, 1990; Richardson, 1996) and can be established before teachers enter the classroom through prior interactions and knowledge (Mansour, 2009; Nespor, 1987; Pajares, 1992). The relationship between teacher beliefs and their practice is complex and influenced by a variety of factors, which impact teachers' instruction (Bryan, 2012; Chen, Morris, & Mansour, 2012; Mansour, 2009). However, because of this complex relationship, beliefs may not always translate into practice (Chen et al., 2012; Mansour, 2009). Beliefs and practice may influence each other (Chen et al., 2012; Richardson, 1996) or if teacher beliefs are in the process of changing as a result of gaining new knowledge or having a new experience, their practices may not completely align with their new beliefs (Buehl & Beck, 2015; Kang,

2008). Sometimes, beliefs are influenced by aspects related to the teaching environment such as available materials, support systems, and student backgrounds (Lumpe, Czerniak, Haney, & Beltyukova, 2012). These can all act as affordances or obstacles to implementing certain teaching practices; therefore, understanding teachers' experiences and the context in which they teach is important to understanding beliefs and practices (Mansour, 2009).

Student voice and participation. Cook Sather (2006) defines voice as “a term that asks us to connect the sound of a student speaking not only with those students experiencing meaningful, acknowledged presence, but also with their having power to influence analyses of, decisions about, and practices in school” (p. 363). Jenkins (2006) defines student voice as “identifying, encouraging, and expressing the unique self” and “relating to the form, content, and aims of their schooling with a view to promoting dialogue and participation” (p. 50). Therefore, student voice work is related to action, participation, and change (Taylor & Robinson, 2009). Student voice involves listening to students' views about their education while promoting dialogue and participation (Jenkins, 2006) and can also provide new beliefs about issues in education that were previously misunderstood or ignored (Mitra & Gross, 2009). Having a voice means having power, presence, and agency and being able to speak your mind, be heard by others, and have an influence on educational outcomes (Cook Sather, 2006).

Participation can be thought of as voice in action and represents what students do when they take part in the learning process (Cook Sather, 2006; Furman & Calabrese Barton, 2006; Holdsworth, 2000; Lodge, 2005). Some educational researchers use student voice and participation synonymously (Frost, 2008). Participation has been defined in the education literature in many ways. Student participation can range from the most basic level of students sharing ideas, to collaborating with adults, to students controlling their own learning by actively

participating in the school and classroom (Lodge, 2005; Mitra, 2004; Mitra, 2006). It may involve simply just being there; for example, participation in retention rates (Holdsworth, 2000). Students may also be used to communicate adult messages, such as when student artwork is used in a publication, but the student is not consulted about their ideas (Hart, 1997). In addition, it may indicate students engaging in activities they are instructed to take part in (Hart, 1997; Holdsworth, 2000). However, it may also involve students having a say about issues and taking an active role in the classroom. For the purposes of my study, the term participation suggests inclusion in a community where students are valued and respected contributors and are asked for their ideas on teaching and learning (Flutter & Rudduck, 2004; Holdsworth, 2000).

Teachers are a critical aspect to the success of including student voice in the classroom (Beck, Czerniak, & Lumpe, 2000). For teachers to consider their students' ideas and opinions in classroom decisions, they must believe it is important and have a favorable attitude towards student involvement. Although there are a limited number of studies focused on teacher beliefs on student voice, teachers have demonstrated a willingness to give students a voice in the classroom (Cody & McGarry, 2012; Frost & Holden, 2008; Lewis & Burman, 2008; McGregor, 2007). However, research has also shown while some teachers understand the importance of student voice, they have doubts about its implications and some believe students should not have a voice (Cheng, 2012), or they hold beliefs that hinder student voice efforts (Seiler & Gonsalves, 2010). Some of these beliefs include believing students are not mature enough to have a say in the classroom (Lodge, 2005; Seiler, 2011), students and teachers should not share control of classroom decisions (Hagay & Baram-Tsabari, 2015; Robinson & Taylor, 2012), there is not enough time to include student voice (Fielding, 2004; Frost, 2008; Lewis & Burman, 2008), or their administration does not support the inclusion of student voice (Fielding, 2004; Lewis &

Burman, 2008; Morrison, 2008). Furthermore, there can be a disconnect between what students think about student voice and what teachers think (Ianes et al., 2017; Shim & Shur, 2018).

However, some studies have shown that participating in student voice initiatives can positively influence teacher beliefs towards student voice and participation (Lilja, 2012; Mitra, 2006).

The teachers in this study used a hierarchy of student participation to guide their action research. I adapted the levels in the hierarchy from Fielding's (2001) and Lodge's (2005) models of student participation. Fielding (2001) created a framework of student involvement focused on students participating in research. This model includes students as sources of data, students as active respondents, students as co-researchers, and students as researchers. At the lowest level of student participation, students are utilized as data sources, which entails looking at exam score data or administering surveys or questionnaires to determine student attitudes towards learning. In the next level, students act as active respondents and participate in discussions, share lesson objectives with teachers, and communicate how they learn best. Students as co-researchers involves students engaging in teacher-led dialogue, contributing to a deeper understanding of teaching and learning, and co-researching aspects of pedagogy through action research with teachers. Finally, at the level of greatest student participation, students act as researchers by leading dialogue, directing their own research, and suggesting solutions to classroom and school issues. Lodge's (2005) model focuses on students engaging in dialogue with the teacher. This model includes quality control (students as a passive source of information used for evaluation of the school), students as sources of information (students as a passive source of information used for improvement of the school), compliance (acknowledges the potential of young people to participate), and dialogue (a shared narrative where students are active participants in their own

learning. This model extends from students evaluating the effectiveness of the school to students collaborating in meaningful change.

I blended the two models together in order to develop a framework that teachers could use to focus on how they engage in dialogue with students and work with them to research conditions of teaching and learning. The lowest level includes students as sources of information where they are asked for their ideas through surveys or questionnaires, but no dialogue occurs between teachers and students. This level may also include teachers looking at exam scores or other performance data. In the next level of student participation, students act as active respondents where they are consulted on ideas about teaching and learning and participate in dialogue with teachers. The third level of student participation involves students collaborating with adults. This collaboration is teacher-directed but students have input into research processes or pedagogy. Finally, at the highest level of student participation, students lead their own research and direct their own inquiry into conditions of teaching and learning. Figure 1 on page 9 illustrates the levels of student participation that could be included in the secondary science classroom.

Action research. Action research is a way for teachers to improve their practice through analysis and critical reflection (Feldman, 1998; McNiff, 2013). It includes teachers becoming aware of how they learn and sharing this with others (McNiff, 2013). The steps of action research include identifying a starting point, developing a plan of action, collecting data, analyzing and interpreting this data, reflecting, and then sharing knowledge with others (Capobianco, Horowitz, Canuel-Browne, & Trimarchi, 2004; Feldman, Altricher, Posch, & Somekh, 2018). Action research is a natural extension of science teaching and allows teachers to engage closely with their classroom practice in order to explore issues they face daily

(Capobianco et al., 2004). Furthermore, it allows science teachers to inquire, test, and reflect on actions they take in the classroom and can be used as evidence for the improvement of classroom practice and student achievement. Action research provides a way for teachers to engage in a reflective process in order to examine their practice (Bevins, Jordan, & Perry, 2011; Bradley-Levine, Carr, & Smith, 2009; Feldman et al., 2018). Done collaboratively, it can be done in such a way that allows teachers to work together and learn from each other to improve their teaching practice (Feldman, 1996).

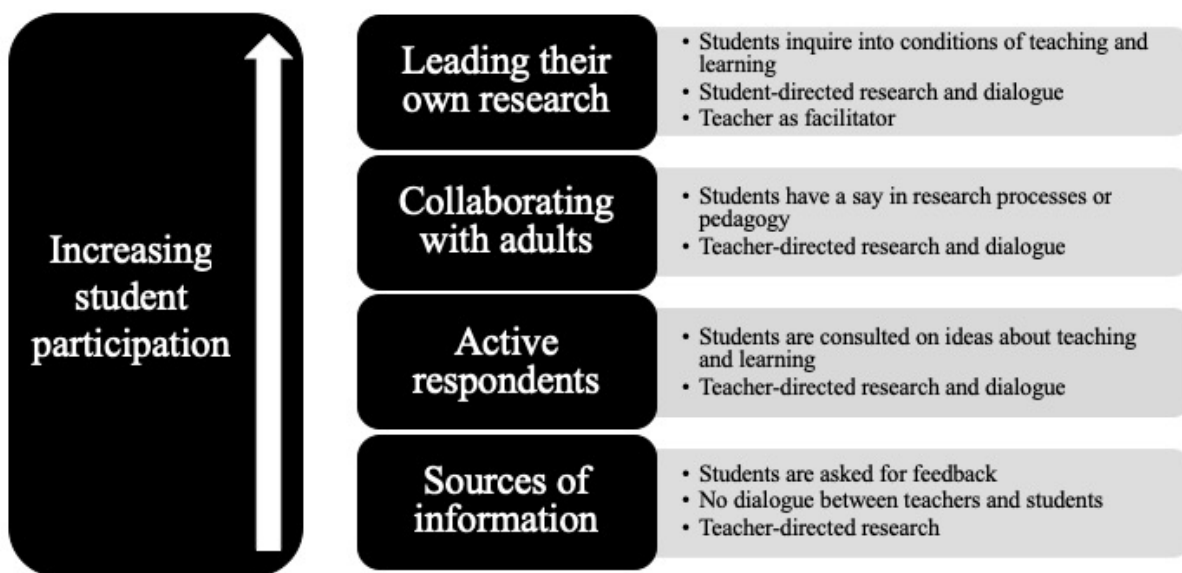


Figure 1. Hierarchy of student participation. This figure illustrates the hierarchy of student voice that was used as a guide for teachers to design their action research projects and to understand how teachers are including their students' voices in the science classroom.

Action research can also be used as an effective approach to PD that is relevant to teachers' individual needs (Feldman, 1996; Milton-Brkich et al., 2010). Action research can help support teachers and strengthen positive beliefs related to new teaching approaches (Vaino, Holbrook, & Rannikmae, 2013). The reflective process characteristic of action research allows teachers to consider their beliefs and values and set specific goals for instructional change related

to these beliefs about teaching and learning (Mitchener & Jackson, 2012). However, teachers must be able to implement these instructional changes consistent with their beliefs, or PD experiences will not be effective in the long-term (Brickhouse, 1990). New beliefs must accurately represent the reality in a teacher's classroom environment to endure after the PD has occurred (Yerrick, Parke, & Nugent, 1997).

Conceptual framework. The purpose of this dissertation research was to explore how engagement in action research influenced high school science teachers' beliefs and classroom practices related to student voice and participation. This included exploring any affordances or obstacles they experienced with attempting to increase student voice and participation in their classrooms. Teacher beliefs on student voice can be influenced by their personal experiences and teaching environments, such as time constraints to implement new initiatives (Fielding, 2004; Frost, 2008; Lewis & Burman, 2008), prior experiences in teaching and learning (Mansour, 2009), willingness to share control with students (Hagay & Baram-Tsabari, 2015; Robinson & Taylor, 2012), perceived maturity of students (Lodge, 2005; Seiler, 2011), level of administrative support (Fielding, 2004; Lewis & Burman, 2008; Morrison, 2008), and the classroom environment (Mansour, 2009). This study aimed to overcome some of the obstacles teachers face by using action research as a way for teachers to include their students' voices in their science classrooms. The intent of the action research was to help the teachers understand that including student voice is possible and to cause changes in their practice related to the inclusion of student voice. I created this conceptual framework from the research literature on teacher beliefs and classroom practices, student voice and participation, and action research as a form of PD. Figure 2 on page 11 illustrates the conceptual framework I created for this study.

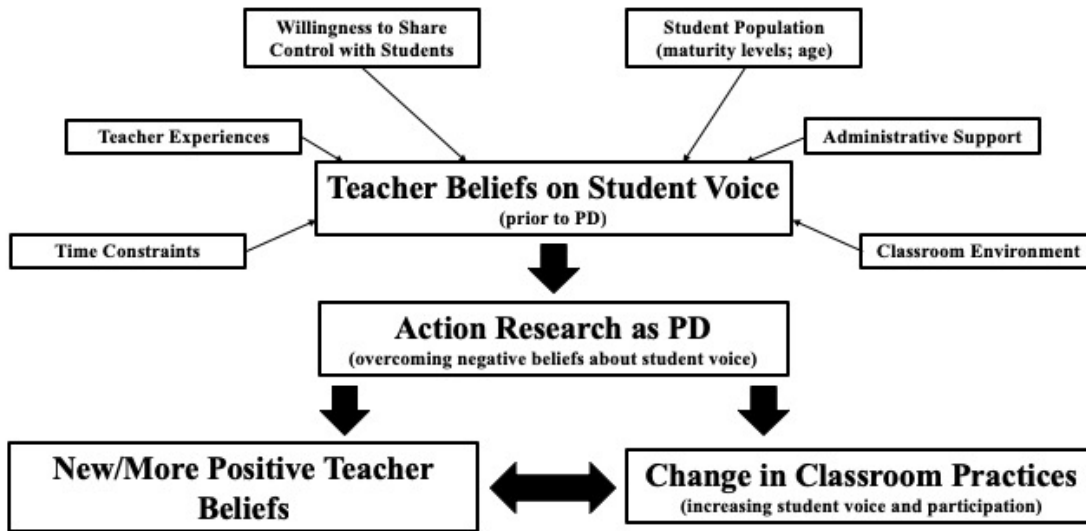


Figure 2. Conceptual framework. This figure illustrates how existing teachers' beliefs can be influenced by participating in action research in order to increase student voice in their classrooms.

The six boxes at the top of the diagram represent potential influences on teachers' existing beliefs about student voice prior to the action research. These influences may contribute to either positive or negative beliefs about student voice. To overcome any potential negative beliefs about student voice and enhance affirmative beliefs, action research was used as a form of PD, as indicated by the arrow. The goal was for this action research to lead to new or more positive teacher beliefs about student voice, which may occur simultaneously with a change in classroom practices as indicated by the double arrow. Teachers may exhibit a change in classroom practices, but not necessarily change their beliefs. Or they may change their beliefs about student voice, but not their classroom practices.

Significance of the Study

This study is significant because it helped understand teacher beliefs about student voice and participation in the secondary science classroom and how these beliefs translated into classroom practice. There is a limited amount of research that includes teacher beliefs and

student voice and even less specific to science education (Bryan, 2012). In addition, there is little research on how to realistically incorporate student voice and participation into secondary science classrooms in a manner sustainable over time. This research contributes to these topics by engaging high school science teachers in action research in order to reflect on the inclusion of student voice in their classrooms. Therefore, this research fills the gaps in the literature and contributes to a greater understanding of teacher beliefs and the incorporation of student voice and participation in the secondary science classroom.

Insight into the affordances and obstacles teachers experience with incorporating student voice into their classroom can help shape future PD programs and student voice initiatives. This study could be beneficial to school employees who are interested in alternative PD models and also increasing student participation. Furthermore, the more we understand about obstacles related to student voice identified by teachers, the better equipped we will be to overcome these issues. By using a multiple case study approach, I was able to get an in-depth picture of how individual teacher beliefs on student voice changed as a result of engaging in action research. Furthermore, each teacher brought unique and common experiences to the study. By comparing within and across cases, this helps to further understand teacher beliefs in different ways.

Researcher Reflexivity

As this is a qualitative case study, reflexivity in this study is important because as the sole researcher, I was responsible for interpreting data from classroom observations, making subjective judgments, and analyzing and synthesizing the data (Stake, 1995). Therefore, it is important to realize what I bring into this qualitative research and to recognize my own subjectivity as a critical element (Stake, 1995).

I was led to the topic of student voice through my experiences as a college student and middle school science teacher. My experiences as a college student, specifically during the time when I was getting my master's degree in environmental science, helped me understand how my voice could be ignored in my education. My experiences as a teacher of middle school science made me realize how my students' voices were repressed in a variety of ways by teachers, schools, and district officials. I also struggled with the idea that I was expected to reflect on my teaching and produce data but lacked a systematic way to do this. In the following paragraphs, I will describe how these experiences helped me understand the importance of listening to students and the process of reflection in the teaching profession.

As I moved towards the completion of my master's degree, there were tensions between myself and my thesis committee. My background is in biology and environmental science. When I was immersed in these science fields, I knew nothing of theoretical perspectives on education even though I was in academia and would eventually get a job teaching middle school. All I had were examples of good and bad teaching. I felt I did not have much control over my master's thesis and I often wished I had more of a voice in the progression of my research. I tried on many occasions to have some input into the project and process, but my voice was almost always dominated by a member of my committee. Eventually, I felt it became their project and I had lost ownership.

I went from graduating with my master's to teaching sixth grade science. I was, as many first-year teachers are, overwhelmed and inexperienced and I also had very little formal training in pedagogy or classroom practices. After my experience with the suppression of my voice in my own educational experience, I entered the teaching profession with plans to give my students opportunities to be more active in their learning. I would do my best to seek my students'

opinions and ideas, but I often felt I could not put into action any plan to include their voices in the classroom. I felt constrained by the content I was required to teach, pedagogical methods I was required to use, and an overall lack of a culture in my school to support student voice efforts. This feeling of helplessness moved me towards my decision to seek a PhD in science education and to eventually discover the concept of student voice.

Because of my lack of a background in education, I was unaware action research existed until my third year as a doctoral student. I also found, in my experience, that action research is not common in schools. Either teachers are not aware it exists, or they do not know where to start. However, I believe giving teachers a method to systematically examine their practice is important and can improve science teaching and learning.

My research interests now include student voice and participation and how teachers' and schools' can realistically implement student voice initiatives. I feel incorporating students' voices into the science classroom will not become a reality if students do not know how to use their voices and teachers do not know how to listen. However, it is possible for teachers to begin a dialogue with students and work together to determine how their voices will be listened to and used (Freire, 1970). In this study, I helped teachers begin this dialogue with their students through action research.

Definition of Key Terms

Many of the following terms can be defined in multiple ways. Therefore, these terms are defined in a way that is relevant to the purpose of this study, which was related to how high school science teachers' beliefs and practices change through engagement in an action research study focused on the inclusion of student voice.

- Action research: A way for teachers to better understand and improve their practice (Feldman, et al., 2018).
- Agency: Students identifying and acting on issues that impact their educational experience (Holdsworth, 2000).
- Empowerment: The extent to which students have control over their educational experience (McGregor, 2007).
- Engagement: Students showing interest in science by communicating in ways that are familiar to them, making sense of science in their own way, and displaying positive emotions towards doing science (Seiler, 2011).
- Meaningful science learning: Giving students the opportunity to relate their own experiences and interests to their education (Fusco, 2001).
- Motivation: To be moved to do something, whether intrinsically because an activity is inherently interesting or extrinsically because of an outside influence (Ryan & Deci, 2000)
- Student participation: Students actively having a say in decisions about their education (Holdsworth, 2000).
- Student voice: The idea that students should have a say in educational decisions (Cook Sather, 2006).
- Teacher beliefs: A teacher's understandings about classroom practices (Richardson, 1996) that includes cognitive, affective, and behavioral components and are inferred from what they say and do (Pajares, 1992; Rokeach, 1968).

Chapter Summary

This chapter provided an overview of my dissertation research, which involved facilitating action research projects with high school science teachers as they explored how to give their students a voice in the classroom. The purpose of the study was presented, along with my research questions. I provided background information and my conceptual framework that guided the study. Researcher reflexivity was important to this research as I brought my own biases and ideas to this research project. A definition of key terms relevant to the research study was also included in this chapter.

Chapter 2: Literature Review

The purpose of this dissertation research was to explore how engagement in action research influenced high school science teachers' beliefs and classroom practices related to student voice and participation. This included exploring any affordances or obstacles they experienced with attempting to increase student voice and participation in their classrooms. In this chapter, I review relevant literature related to teacher beliefs and actions, student voice and participation, teacher professional development (PD), and action research as a form of PD. I review teachers' beliefs as related to the practice of science teaching, in addition to teacher beliefs about student voice. I present action research as a method of PD to help teachers learn to overcome potential issues with incorporating student voice into the science classroom. Finally, I describe examples of teachers engaging in action research that includes their students.

Overview of Teacher Beliefs

Before beginning a discussion about beliefs, it is important to define belief in the context of the study (Pajares, 1992). The term "belief" has been described in a variety of different ways in the literature and used interchangeably with many other terms including attitudes, values, perceptions, and perspectives (Pajares, 1992; Richardson, 1996). For the purposes of this study, beliefs can be thought of as a teacher's understandings about classroom practices (Richardson, 1996) that include cognitive, affective, and behavioral components and are inferred from what they say and do (Pajares, 1992; Rokeach, 1968). I explored teachers' beliefs related to student voice and how these beliefs changed through engagement in action research. Therefore, this

definition reflects teachers' knowledge about and feelings towards student voice and how this translates into classroom practices.

Research on teacher beliefs demonstrates that teachers possess complicated systems of beliefs that influence how they view students, themselves, and science (Bryan, 2012). Beliefs are developed from personal interactions, experiences with school, and formal knowledge (Brickhouse, 1990; Richardson, 1996) and can be established before teachers enter the classroom (Nespor, 1987; Pajares, 1992). Established beliefs can be difficult to change (Buehl & Beck, 2015; Mansour, 2009; Pajares, 1992; Water Adams, 2006) and are unlikely to change unless there is an appropriate replacement for that belief (Rokeach, 1968). There is evidence in the literature that suggests teacher beliefs, even more so than content or pedagogical knowledge, are the most influential elements on teaching and learning (Nespor, 1987). However, research is conflicting on the extent to which teachers act on their beliefs (Bryan, 2012; Buehl & Beck, 2015; Mansour, 2009). Some studies support the idea that beliefs influence actions (Brickhouse, 1990; Bryan, 2012; Buehl & Beck, 2015; Haney, Lumpe, Czerniak, & Egan, 2002; Nespor, 1987). Other studies suggest that practices influence beliefs (Bryan, 2012; Buehl & Beck, 2015; Lemberger, Hewson, & Park, 1999; Rushton, Lotter, & Singer, 2011). However, the majority of studies conclude the relationship between beliefs and actions is complicated (Buehl & Beck, 2015; Chen et al., 2012; Kang, 2008; Kang & Wallace, 2004; Lumpe et al., 2012). Because this study focused on teacher beliefs about student voice and how these beliefs translated into practice, the next section reviews literature on teacher beliefs and how these beliefs translate into actions in the classroom.

Relationship Between Teacher Beliefs and Actions

This study focused on teacher beliefs about student voice and how these beliefs translated into practice. Therefore, it is important to consider the role of science teachers' beliefs when examining their classroom practice (Mansour, 2009; Nespor, 1987; Richardson, 1996; Tsai, 2002). Researchers have come to various conclusions about the relationship between teachers' beliefs and actions (Bryan, 2012; Buehl & Beck, 2015; Mansour, 2009). These conclusions include teachers' beliefs influencing their practice, teachers' practice and experiences influencing their beliefs, teachers' beliefs being disconnected from their practice, and a complex relationship existing between beliefs and practices. However, some educational scholars maintain we still know little about how teacher beliefs and practices in the classroom are related (Bryan, 2012; Haney et al., 2002). These different perspectives on teacher beliefs are reviewed below.

Teacher beliefs influence their classroom practices. Nespor (1987) conducted a seminal study of eight history, language arts, and math teachers over the span of two years to determine the role of beliefs on teaching practice. Through interviews and observations, she determined the teachers' behaviors were influenced by their past experiences as students and/or teachers, which influenced their instruction. For example, one of the teachers based her classroom on what she had experienced as a student and included a variety of activities to avoid boring her students. Another teacher believed, based on his past experiences in classrooms, some students would never be willing to learn and as a result, he grouped all students who were "lazy" in one area of the class and taught to the remaining students.

Other studies have also concluded science teachers possess beliefs about teaching and learning that influence their classroom practices (Ajzen, 1995; Brickhouse, 1990; Bryan, 2012;

Buehl & Beck, 2015; Haney et al., 2002.; Nespor, 1987). For example, Brickhouse (1990) conducted a study to explore science teachers' beliefs on the development of scientific knowledge and their methods of teaching through interviews and observations. She found teachers who believed theories were truths and science was about finding the right or wrong answer typically assigned pages from the book and gave step-by-step labs to complete in class. On the other hand, teachers who had a more developed view of the nature of science and believed theories were tools facilitated more student-centered classrooms focused on inquiry. Therefore, she concluded science teacher beliefs influence their teaching practice and science teacher education will not make an impact unless teachers can align these beliefs with their instruction and classroom practices. In another example, Haney et al. (2002) examined the relationship between elementary teachers' personal agency beliefs about teaching science and their ability to effectively implement science instruction. The teachers participated in a two-week PD to improve science content knowledge and pedagogy. The researchers used surveys to gather data about teachers' beliefs and observations to determine their teaching effectiveness. Haney et al. (2002) also concluded the teachers' beliefs translated into action in the classroom. For example, teachers with a more positive belief towards teaching ability were more effective teachers. Only one teacher did not fit this pattern because teacher reported positive beliefs towards science teaching but scored low on the observation of teaching effectiveness, possibly because of the ineffectiveness of the survey instruments or beliefs towards teaching were reported without proper reflection on the behalf of the teacher.

Classroom practices influence teacher beliefs. At times, engaging in certain practices, such as participating in PD, can influence teacher beliefs (Bryan, 2012; Buehl & Beck, 2015; Lemberger et al., 1999; Rushton et al., 2011). For example, Rushton et al. (2011) examined the

beliefs and practices of seven high school chemistry teachers as they engaged in a year-long PD program. They gathered data through interviews, reflections, and observations to determine how teacher beliefs and actions were influenced by the PD. They determined the teachers had more complete ideas about inquiry, which were evident in their practices during the following school year. However, even though the teachers wanted to improve their teaching and include more inquiry, they needed to believe what was being taught during the PD was effective before implementing it into their classrooms. Therefore, once they saw the improvement in their students' learning, they began to believe inquiry-based teaching was effective. In another example, Lemberger et al. (1999) explored how participation in a teacher preparation program influenced three preservice secondary biology teachers' beliefs about teaching science. At the beginning of the multiple case study, all three of the teachers held positivist beliefs about teaching and viewed science as a series of facts that needed to be taught. Through interviews and classroom observations with the teachers, it was determined by the end of the study, the teachers had developed a more student-centered focus in their teaching practice. In this way, the researchers determined the teacher-preparation program had changed their beliefs about teaching science and how these beliefs translate into classroom practices.

Teacher beliefs are disconnected from classroom practices. Some researchers have determined teachers' beliefs may not be connected at all with their practices (Buehl & Beck, 2015; Jorgensen, Grootenboer, Neische, & Lerman, 2010; Tsai, 2002). For example, Tsai (2002) studied the relationship between Taiwanese science teachers' beliefs about teaching, learning, and nature of science. Through interviews with 37 teachers, he determined the three beliefs systems were interrelated but did not necessarily influence their science teaching practices. This may be the result of the teachers' own experience with school science. In another example,

Jorgensen et al. (2002) explored how math teachers in Australia aligned their beliefs with their teaching practices. Through surveys and the analysis of recorded lessons, they determined the teachers' beliefs did not translate into similar teaching practices, possibly because of their confidence with the subject matter.

Complex relationship between beliefs and practices. Finally, several studies have determined there is a complex relationship between teachers' beliefs and practices (Buehl & Beck, 2015; Chen et al., 2012; Kang, 2008; Kang & Wallace, 2005; Lumpe et al., 2012; Mansour, 2009; Mansour, 2013; Waters Adams, 2006; Yerrick et al., 1997). Beliefs and practice may influence each other (Chen et al., 2012; Richardson, 1996) or if teacher beliefs are in the process of changing, their practices may not yet align with their new beliefs (Buehl & Beck, 2015; Kang, 2008). Beliefs are influenced by many different aspects within the teaching environment and may not always translate into practice because of this (Chen et al., 2012; Mansour, 2009). Sometimes, beliefs depend on the context of a teacher's specific situation and can depend on the teachers' knowledge, experience, or teaching environment (Mansour, 2009). These can all act as barriers to acting on beliefs in the classroom; therefore, understanding teachers' experiences is important to understanding beliefs and practices.

Some studies simply concluded that beliefs and practice influence each other in some way (Chen et al., 2012; Waters Adams, 2006; Richardson, 1996). For example, Waters Adams (2006) explored the relationship between English elementary teachers' beliefs and practice by collecting data through observations, reflective discussions, teacher planning notes, and interviews while the teachers were engaging in action research. At the beginning of the study, there was little connection between science teachers' beliefs about the nature of science and their practice. However, by the end of the action research, the teachers' practices were more in line

with their beliefs about the nature of science. The action research allowed teachers to challenge themselves to modify their teaching. The teachers realized their success in implementing nature of science when they felt confident, which is when their beliefs and actions aligned.

Other studies have concluded if teacher beliefs are in the process of changing, their practices may not yet align with their new beliefs (Buehl & Beck, 2015; Kang, 2008). For example, Kang (2008) wanted to understand the personal beliefs preservice teachers bring to science teaching and how this translates into actions in the classroom. The preservice teachers were enrolled in a secondary science methods course at a university in the United States. Using responses to essay questions, observations, teacher reflections, and lesson plans, he determined there was a great deal of inconsistency between beliefs and actions. This may have been because the preservice teachers were being exposed to new teaching perspectives and their beliefs were still in the process of changing.

Beliefs are influenced by many different aspects within the teaching environment and may not always translate into practice because of this (Kang & Wallace, 2005; Lumpe et al., 2012; Mansour, 2013; Yerrick et al., 1997). For example, Kang and Wallace (2005) explored how science teachers' knowledge beliefs and teaching goals are related to their use of lab activities. They interviewed and observed three experienced secondary science teachers who participated in a summer PD workshop and found the teachers' sophisticated epistemological beliefs were not always clearly connected to their practice. They also determined the teachers' beliefs about knowledge and instructional goals could only partly explain their teaching practices and teachers negotiate beliefs and actions within the context of their teaching environment. Lumpe et al. (2012) also described the impact of a successful PD program, which involved elementary teachers in Ohio. The purpose of the research was to assess the teachers' science

teaching efficacy as they participated in the PD and to determine the relationship of these beliefs to student learning. They used surveys to determine teacher self-efficacy and beliefs and determined participation in a long-term PD program led to increased efficacy towards teaching science but either did not change their beliefs towards teaching science or diminished their positive beliefs about science teaching. They determined this may be due to other contexts that influence teacher beliefs including classroom practices, available materials, support systems, and student backgrounds. Yerrick et al. (1997) studied the change in teacher beliefs through participation in a two-week summer PD institute focused on changing treatment of scientific knowledge and assessment strategies. Data were collected through interviews conducted before and after the PD, videos recorded in small group settings during the PD, and teacher journals. They determined the teachers changed the language used to talk about these concepts but did not change their overall beliefs. In other words, they assimilated the message the PD was sending but did not change their beliefs or practices related to teaching science. Yerrick et al. (1997) concluded this may be due to the context of their teaching environment, including a focus on testing or lack of administrative support. Finally, Mansour (2013) conducted a multiple case study with Egyptian science teachers in order to explore how teacher beliefs and classroom practices were related. Through the use of interviews, observations, and teachers' journals and lesson plans, he determined there was an inconsistent relationship between teachers' beliefs and practices. He hypothesized this may be because teachers are faced with certain situations (such as the Egyptian examination system and class sizes) that prevented teachers from aligning beliefs with their teaching practice.

Based on the reviewed literature, there is a complex relationship between teachers' beliefs and actions that is not yet fully understood. I explored how engagement in action research

influenced high school science teachers' beliefs and classroom practices related to student voice and participation. Therefore, before continuing the discussion about teacher beliefs, it is necessary to discuss student voice. The next section describes student voice and participation, what this could look like in the science classroom, and benefits and limitations to including student voice.

Student Voice and Participation

Student voice can be defined as the idea that students should have a say in educational decisions (Cook Sather, 2006). It involves listening to students' views about their education while promoting dialogue and participation (Jenkins, 2006). Having a voice means having power, presence, and agency and being able to speak your mind, be heard by others, and have an influence on educational outcomes (Cook Sather, 2006). Participation can be thought of as voice in action and represents what students do when they take part in the learning process (Cook Sather, 2006; Furman & Calabrese Barton, 2006; Holdsworth, 2000; Lodge, 2005). Some educational researchers use student voice and participation interchangeably (Frost, 2008).

For the purposes of this study, I use student voice and participation to represent the extent to which students have a say in their education through engaging in dialogue and research with their teachers. An underlying assumption of student voice work is the more we know about students' interests, likes, dislikes, and attitudes towards learning, the better we can get them engaged and interested in science (Jenkins, 2006). Engaging in dialogue with and listening to students can help science teachers develop lesson plans and present science in a way that is relevant and meaningful to students (Hagay & Baram-Tsabari, 2015; Mallya, Mensah Moore, Contento, Koch, & Calabrese Barton, 2012; Seiler, 2011; Seiler & Gonsalves, 2010). If students are provided opportunities to engage in research practices, they can participate in

ways of thinking and doing science that reflect what scientists do and bring their interests and experiences into the science classroom (Fusco, 2001).

Levels of student voice and participation. There are many models and frameworks for student voice and participation proposed in the education literature. This section reviews these models and frameworks. The models are based on the aspects of student voice the authors were focused on in their research. Therefore, the models include a focus on leadership, students engaging in research in order to enact change, students engaging in dialogue to enact change, or meaningful education.

Mitra (2006) and Mitra and Gross (2009) use a pyramid to visually represent student participation related to leadership. This model includes three levels that demonstrate the most common form of student participation to the least common form. Being heard, the most common form of student voice is at the bottom. The middle level consists of collaborating with adults. The least common form of student voice, building capacity for student leadership, is located at the top.

Other models were focused on students researching issues and/or influencing changes based on their research. Thomson and Gunter (2006) provide a framework for student participation focused on students researching educational issues and making changes. At the level of least student participation, students are consulted about educational changes. The next level includes students evaluating changes in schools. The third level, which requires the most participation from students, is students acting as researchers to create change. Fielding (2001) also suggests a framework of student participation focused on students engaging in research. This model includes students as sources of data, students as active respondents, students as co-researchers, and students as researchers. At the lowest level of student participation, students are

utilized as data sources, which entails looking at exam score data or administering surveys or questionnaires to determine student attitudes towards learning. In the next level, students act as active respondents and participate in discussions, share lesson objectives with teachers, and communicate how they learn best. Students as co-researchers involves students engaging in teacher-led dialogue, contributing to a deeper understanding of teaching and learning, and co-researching aspects of pedagogy through action research with teachers. At the level of greatest student participation, students act as researchers by leading dialogue, directing their own research, and suggesting solutions to classroom and school issues.

Lodge (2005) presents a model of student involvement in classrooms and schools focused on students making educational changes through dialogue. This model includes quality control (students as a passive source of information used for evaluation of the school), students as sources of information (students as a passive source of information used for improvement of the school), compliance (acknowledges the potential of young people to participate), and dialogue (a shared narrative where students are active participants in their own learning). This model extends from students evaluating the effectiveness of the school to students collaborating in meaningful change. A big difference in the two ends of the spectrum is students speaking for themselves versus being spoken for.

Fletcher (2003) developed a model of student involvement based on Hart's (1997) ladder of participation focused on meaningful education in which the top of the ladder represents students engaging in the most meaningful participation. The bottom three rungs of the ladder are reserved for degrees of non-participation (tokenism, decoration, and manipulation) (Fletcher, 2003). At the lowest participatory level on the ladder, students are assigned actions and told how the role should be carried out. The next rung of the ladder involves students consulted on and

informed about educational decisions. The top three rungs of the ladder are student-initiated decisions shared with teachers, student-initiated and student-directed decisions, and then teacher-initiated decisions shared with students. Holdsworth (2000) also uses a ladder as a model of participation that includes students speaking out, being heard, being listened to, being listened to seriously and with respect, incorporating views into action taken by others, and sharing decision-making with students.

For the purposes of this paper I developed four levels of student voice based on the literature described above to categorize types of student participation. I wanted the teachers in this study to focus on how they talk to students and work with them to engage in research to improve conditions of teaching and learning. While Fielding's (2001) model focused on students as researchers, Lodge's (2005) model focused on dialogue. Therefore, I used a combination of Fielding's (2001) and Lodge's (2005) models to create the hierarchy of student participation used in this study. The purpose of this hierarchy was to give teachers a way to understand how student voice and participation could be increased and also to help me understand how teachers are including their students' voices in the science classroom. Figure 1 on page 9 illustrates this hierarchy of student participation. Next, I describe the different levels of the hierarchy I developed for this study.

Students as sources of information. The lowest level of student participation is students as sources of information where they are asked for their ideas through surveys or questionnaires, but no dialogue occurs between teachers and students. This level may also include looking at exam scores or other performance data. Surveys and questionnaires are a common way to elicit information from students (Jenkins, 2006). Students may be asked their ideas and opinions about

pedagogy and science content (Jenkins & Nelson, 2005; Jenkins & Pell, 2006; Osisioma & Onyia, 2009; Owen, Dickson, Stanisstreet, & Boyes, 2008).

The disadvantage of using surveys and predetermined questions to understand students' preferences is that they are based on adults' views of what should be meaningful to students (Hagay & Baram-Tsabari, 2015). The majority of research conducted using students as sources of information involves asking them to respond to questions developed and administered by adults (Jenkins, 2006). Surveys also restrict the range of information that could be obtained by another method, such as interviews (Hagay & Baram-Tsabari, 2012). Data retrieved from questionnaires or surveys reflect groupings of opinions and values, not information on specific students (Jenkins, 2006). Therefore, only seeking information from students without engaging in dialogue may not be enough to understand individual students' voices.

As an example, consider the following scenario. A high school marine science teacher decides he wants to give his students some input into the curriculum. He is required to teach certain topics but wants his students to have a say in the content of the course so they can connect science to their lives and interests. He uses a questionnaire with open-ended questions to gather information about his students' interests. After reviewing his students' answers, he realizes many of his students are interested in topics he does not typically teach so he works to include some of these interests into the curriculum.

Students as active respondents. The next level of increasing student participation is students as active respondents where they are consulted on ideas about teaching and learning and participate in dialogue with teachers. Including students as active respondents requires moving from passive to active engagement (Holdsworth, 2000). Student consultation centers on the idea that students can bring something worthwhile to discussions about education (Flutter &

Rudduck, 2004). Consultation offers a means by which students can engage in dialogue about teaching and learning so their role changes from being the object of research to one of more active participation.

Students can participate by contributing to discussions about what science concepts should be taught (Hagay & Baram-Tsabari, 2012; Hagay & Baram-Tsabari, 2015; Seiler, 2011). One way this can be done is to administer open-ended questionnaires where students share science topics they would be interested in learning about and pedagogical techniques that work best for them (Hagay & Baram-Tsabari, 2012; Hagay & Baram-Tsabari, 2015). Teachers then take these topics and ideas on pedagogy and integrate them into the curriculum. Focus groups and interviews can be used to allow students to contribute to pedagogical and content-related decisions, as long as it involves dialogue between teachers and students (Harwell, 2000; Logan & Skamp, 2008; Logan & Skamp, 2013; Osborne & Collins, 2001; Rahmawati & Koul, 2016; Toplis, 2012).

Students will only appreciate the opportunity to share their voices and opinions if they feel like their perspectives are being seriously considered (Cook Sather, 2007). For students to genuinely be allowed to participate in their education, adults need to listen to, respond to, and act on what students have to say. Classroom research can include space for feedback for both teachers and students to benefit from including students' voices (Lodge, 2005). Participation in schools and classrooms is maximized when students are involved in data analysis with their teachers. Therefore, moving beyond listening to students' ideas and allowing them to collaborate on research opportunities in the science classroom promotes participation and a partnership between teachers and students.

Returning to our high school marine science teacher, he decides only seeking his students' interests is not enough. He wants to hear their input into how he can work some of these interests into lessons he is required to teach. He divides his class into small groups and provides them with anonymous responses to the survey and also the list of topics he is required to teach. He has them discuss their answers to the survey and come up with some ways their interests could be incorporated into the curriculum. The ideas are then discussed with the whole class and the most popular ideas are chosen. The teacher makes sure to incorporate these ideas into his lesson plans.

Students collaborating with adults. Moving up to the next level of student participation, students begin to collaborate with adults. This collaboration is teacher-directed but students have input into research processes such as data collection and analysis. When teachers and students make sense of data together, it can lead to improved understandings of teaching and learning for both (Lodge, 2005). However, at this level, teachers still have control over the research process, and this may prevent some students as co-researchers initiatives from being successful (Seiler & Gonsalves, 2010; Yonezawa & Jones, 2008).

Students can be involved in research into the science classroom by participating in data collection and analysis (Frost & Holden, 2008; Lodge, 2005; Thomson & Gunter, 2006). However, students may first need to be taught how to conduct research in order for it to be effective (Carlile, 2012; Fielding, 2001; Frost, 2008; Thomson & Gunter, 2006; Yonezawa & Jones, 2009). Students can develop research questions based on concerns about the classroom environment and conduct research on how to address these issues (Bahou, 2012; Fusco, 2001). Students can also investigate science topics and act as agents of change (Bahou, 2012; Basu, Calabrese Barton, Clairmont, & Locke, 2009; Fusco, 2001; Mallya et al., 2012).

Based on the questionnaire and class discussions, our marine science teacher realizes a lot of his students have opinions about what science topics should be taught. He decides this would make a good project for his students. He presents this idea to his students and asks them to come up with some ideas of how they can investigate this topic. As a class, they brainstorm a list of ideas and the teacher writes all of them on the board. He then helps students determine the best methods on the list to investigate how other students in the school feel about currently taught science topics. The students decide they will interview some students and get their feedback. They will first review literature on required national and state standards and how private schools develop their curriculum to inform their interview questions. Once all data are collected and analyzed, they decide to present their findings to faculty members.

Students leading their own research. Finally, at the highest level of student participation, students lead their own research and direct their own inquiry into conditions of teaching and learning. Students and teachers learn from each other and traditional roles of the teacher and student become less fixed and more interdependent (Fielding, 2004). This level of the hierarchy represents where students have the most control over their education. Students acting as researchers is a way for students to become leaders (McGregor, 2007). At this level of participation, issues are identified and addressed by students and supported by teachers (Fielding, 2004). Students and teachers learn from each other and traditional roles of the teacher and student become less fixed and more interdependent (Fielding, 2004). Students researching conditions of education and influencing changes on teaching and learning builds leadership skills (McGregor, 2007). Leadership can allow for inclusivity and collaboration between students and educators (McKibbin, 2004). The more students participate in student voice activities, the greater the growth in leadership skills, including the ability to run their own research groups and

make changes in their schools (Cook Sather, 2007; Mitra, 2004). Students may also act as leaders in researching the science classroom in order to initiate pedagogical or procedural changes (Carlile, 2012; Fielding, 2001; Frost, 2008; McKibbin, 2004; Mitra, 2006; Robinson & Taylor, 2012; Yonezawa & Jones, 2009).

The high school teacher is approached by his students. The students decide they want to take their research farther and present it to district leaders. With their teacher's support, they seek permission from administration, create an announcement, and invite district leaders to listen to their presentation on student choice in science topics. The students present their research to the district officials along with an argument of why they should have choice in science topics. As a result, the marine science pacing guide for the following year includes time for student-selected activities and topics.

Benefits of including student voice. Incorporating student voice into the science classroom has the potential to positively impact science teaching and learning and increase student participation (Mitra, 2009). There are benefits for both teachers and students, including the improvement of teacher-student relationships (Flutter & Rudduck, 2004), getting and providing feedback on teaching practices (Flutter & Rudduck, 2004; Mitra & Gross, 2009), expressing and hearing new ideas about teaching and learning (Flutter & Rudduck, 2004), creating a more collaborative classroom environment (Apple & Beane, 2007; Flutter & Rudduck, 2004), development of science agency (Basu, 2008; Mitra, 2004), increasing motivation to learn science (Hagay & Baram-Tsabari, 2015), and students experiencing a positive emotional energy leading to empowerment, confidence, and engagement with science content (Seiler, 2011). Because this study focused on teachers including their students' voices in the classroom, it is important to look at the possible benefits that may result from their action research studies.

Improvement of teacher-student relationships. Engaging students in dialogue and research on science teaching and learning can lead to improvements in relationships between teachers and students (Cook Sather, 2007; Flutter & Rudduck, 2004; Hagay & Baram-Tsabari, 2015; Mitra, 2006; Robinson & Taylor, 2012; Smyth, 2006; Susinos & Haya, 2014). Caring is an essential part of building relationships with students that focuses on both giving and receiving care (Jansen & Bartell, 2013; Noddings, 2002) and in order to succeed in school, students need to feel cared for (Schindel & Tolbert, 2017; Wood, Ebenezer, & Boone, 2013). Caring requires a relational piece where caring is given by the carer and accepted by the cared for (Noddings, 2012b; Noddings, 2013). However, such as in the case of a teacher and student, the caring relationship may not be equal even though both parties are involved (Noddings, 2012a).

By promoting student voice and engaging in dialogue with students, teachers can create more respectful relationships, encourage learning as a social process, and demonstrate care for their students (Cook Sather, 2007; Noddings, 2012a; Smyth, 2006). Listening to students and engaging in dialogue with students are fundamental components of caring relationships in the classroom (Noddings, 2002; Sickle & Spector, 1996). Teachers understanding themselves and others through dialogue is part of an ethic of care they can bring to the classroom (Noddings, 2002). Asking students about their interests and including them in decisions about science content to be taught can promote meaningful and supportive connections between teachers and students (Hagay & Baram-Tsabari, 2015). Students can participate in leadership groups in schools to reduce tensions between teachers and students and improve relationships (Mitra, 2006).

Students can also engage in research with their teachers to change classroom dynamics and create a more equitable environment where all voices are respected (Robinson & Taylor,

2012; Susinos & Haya, 2014). Including students in the research process can help teachers see the value in their contributions to the educational process (Fielding, 2001).

Feedback on teaching and learning. Consulting students about classroom practices and pedagogy is a way for teachers to get feedback on their teaching (Flutter & Rudduck, 2004). Students can give new insight into processes of teaching and learning and share what they would like to get out of school when they are given a voice (Bahou, 2012; Cook Sather, 2007; Lodge, 2005; McGregor, 2007; Mitra, 2006; Mitra & Gross, 2009; Wickremesooriya, 2015; Yonezawa & Jones, 2009).

Teachers' knowledge and understanding of students can increase when they listen to what students have to say (McGregor, 2007; Mitra, 2006; Wickremesooriya, 2015). Listening to student voice can provide a new outlook on issues that need to be addressed and new knowledge can lead to positive changes for teachers and students (Mitra & Gross, 2009). Engaging in dialogue about learning and understanding with teachers helps students become better learners (Lodge, 2005). Students are also able to gain a greater understanding of teacher perspectives through dialogue with their teachers (McGregor, 2007; Mitra, 2006).

Including students in research focused on their education can help both students and adults better understand teaching and learning (Cook Sather, 2007; Lodge, 2005). Students acting as co-researchers with adults is a way for students to investigate and provide feedback on issues in classrooms and schools (Yonezawa & Jones, 2009). Teachers can use this data to better determine student needs and classroom practices that best support learning. Students leading their own research can also allow them to inform their teachers about how they perceive their learning conditions, what might help them learn better, how they want to learn, and what kinds of relationships and teacher qualities they prefer (Bahou, 2012). This can create new

understandings and perspectives on teaching and learning and lead to a change in conditions that are less conducive to learning.

Empowerment of students. McGregor (2007) defines empowerment as “the ability to act (or the right to determine action)” (p. 89) and states that when students are given the opportunity to act as leaders, it can lead to a change in traditional power structures present in schools.

Allowing a place for student voice can create empowering opportunities for student learning (Basu, 2008; Calabrese Barton & Tan, 2010; Furman & Calabrese Barton, 2006; Hagay & Baram-Tsabari, 2015; Robinson & Taylor, 2012; Smyth, 2006; Susinos & Haya, 2014; Wickremesooriya, 2015). When students have power to influence what and how they learn, they are able to participate more fully in their education (Seiler, 2011).

When students are able to share their interests with teachers and have an impact on what they learn in science, they can become empowered (Hagay & Baram-Tsabari, 2015). Students sharing interests and ideas with educators leads to empowerment by engaging in science that matters to them (Calabrese Barton & Tan, 2010). If given choices on content, pedagogy, or classroom procedures, students can make decisions about their education that leads to a more empowering educational experience (Furman & Calabrese Barton, 2006). By having a say in education decisions, students are able to balance inequities present in traditional classrooms (Basu, 2008; Smyth, 2006). When teachers listen to students’ ideas, social change can happen through inclusionary practices (Wickremesooriya, 2015).

Students can also engage in research to bring about changes that will improve their experiences in school (Robinson & Taylor, 2012; Susinos & Haya, 2014). Students and teachers engaging in research together can balance unequal power relations in classrooms (Susinos & Haya, 2014). Even small changes, such as teachers placing a greater value on listening to

students as a result of collaborative research, can lead to a change in power relations (Robinson & Taylor, 2012).

Student engagement with science content. Students having a say in the classroom can increase their engagement in school (Basu, 2008; Cook Sather, 2007; Furman & Calabrese Barton, 2006; Morrison, 2008; Seiler, 2011; Smyth, 2006). Seiler (2011) describes student engagement in science in this way, “they relied on ways of communicating that are familiar to them, employed their own ways of being and sense making, relied on shared cultural referents, and often smiled and joked with each other while doing science” (p. 366). She found students were often off-task during teacher-directed activities but when activities were student-suggested or planned, and when science topics emerged from students and science activities are aimed at answering specific student questions, student engagement was improved (Seiler, 2011).

Students expressing their interests and having a say in their learning can have a positive impact on student engagement in science (Basu, 2008; Furman & Calabrese Barton, 2006; Seiler, 2011). Engagement may be increased by incorporating students’ lives, experiences, cultures, and interests into the science classroom (Seiler, 2011; Smyth, 2006). If students have choice and freedom to study what interests them, they became more connected to, and engaged in, their learning (Morrison, 2008). Increased engagement in science can also lead to a better understanding of subject matter (Basu, 2008). Recognizing students as authorities, affording them greater responsibility and a voice in preparing teachers and reflecting on their own education, and inviting them to conduct research on and analyze their classroom and school experiences with the goal of changing these areas all contribute to greater engagement (Cook Sather, 2007).

Meaningful science teaching and learning. Students often do not find science content relevant to their lives because it is based on adults' perspectives of what is important to learn (Hagay & Baram-Tsabari, 2015; Jenkins, 2006). Promoting student voice in science classrooms may help them find a deeper, more meaningful connection with school (Fletcher, 2003; Hagay & Baram-Tsabari, 2015; Jenkins, 2006; Mitra, 2004; Seiler, 2001; Smyth, 2006). Meaningful involvement in school "recognizes the unique knowledge, experience, and perspectives of each individual student" (Fletcher, 2003, p. 5). Teachers who have participated in student voice efforts have described the importance of seeing students as partners in creating meaningful experiences (Hagay & Baram-Tsabari, 2015).

Finding meaning in science may include talking to students about their lives and experiences and incorporating this knowledge into the curriculum (Hagay & Baram-Tsabari, 2015; Seiler, 2001). Including student interests into the science curriculum can lead to a more meaningful connection to science content (Hagay & Baram-Tsabari, 2015). Listening to students' voices can encourage a more learner-centered teaching model (Smyth, 2006). Learning-centered teaching can include voice as it is related to identity, authentic assessment of students, including students in building a meaningful curriculum related to their lives and experiences, respectful relationships between students and adults, and an increase in student engagement. Learning and meaning making can also happen through the process of students and teachers researching conditions of teaching and learning in order to create change (Mitra, 2004).

Collaborative classroom environment. Increasing student voice in classroom decisions can create a more democratic and collaborative classroom environment (Apple & Beane, 2007; Flutter & Rudduck, 2004). Some values of democratic classrooms may include concern for the rights of individuals, concern for others, the belief that people have the ability to solve issues, the

use of critical reflection, and the view that schools should promote a democratic way of life (Apple & Beane, 2007). Teachers and students describe democratic science classrooms as having choices in what they study, assessments, or reading requirements (Basu & Calabrese Barton, 2010). Students see democracy as related to the ideas of “caring and community” (Basu & Calabrese Barton, 2010, p. 78) and have opinions on how teachers should listen to them to ensure their voices are heard (Baroutsis, McGregor, Mills, 2016; Basu & Calabrese Barton, 2010). According to teachers, balancing power and listening to their students are important aspects of democratic classrooms (Basu & Calabrese Barton, 2010).

Allowing students to express their ideas and opinions in order to increase participation is a critical component of a democratic classroom that includes all voices (Baroutsis et al., 2016). Students can participate in decision making related to planning activities that address the concerns and interests of both teachers and students (Apple & Beane, 2007).

Increase in student motivation. Allowing students to voice their ideas about education can increase their motivation towards learning science in school (Hagay & Baram-Tsabari, 2015). Different types of motivation are based on the different reasons or goals that give rise to an action (Ryan & Deci, 2000). Intrinsic motivation, or participating in an activity for inherent satisfaction, indicates people are doing things because they naturally want to or have an interest in the activity. Extrinsic motivation is participating in an activity because of some outside force (such as the desire to get good grades or avoid punishment by parents). Because many of the tasks teachers want their students to perform are not inherently interesting, knowing how to promote extrinsic motivation is an essential strategy for successful teaching (Ryan & Deci, 2000). According to Ryan and Deci (2000), students want to participate in school because they want to be valued by others to whom they feel connected, which is important to the concept of

relatedness. This means it is essential students feel respected and cared for by their teacher (Ryan & Deci, 2000) because achievement and motivation are closely connected (Toshalis & Nakkula, 2012). When students are motivated to learn science, they want to know and apply their science understandings in multiple contexts both inside and outside of school (Mallya et al., 2012).

Asking about and incorporating student interests into the curriculum can motivate students to learn science (Hagay & Baram-Tsabari, 2015; Seiler, 2011). Allowing students to have an impact on teaching can help science learning become more motivating, relevant, and situated in the lives of learners (Hagay & Baram-Tsabari, 2015). Active student involvement and participation in collaborative networks with adults in a variety of forms, including engaging in research, can be motivating for both teachers and students (McGregor, 2007).

Development of agency. Agency can be defined as students identifying and acting on issues that impact their educational experience (Holdsworth, 2000). Science agency includes the learning and development of agency within science as a unique field of study and develops as individuals or groups acquire scientific understanding (Mallya et al., 2012). Agency is relevant to student learning because when students are able to participate in school, they are more likely to become engaged in science (Basu, 2008). Students want opportunities to understand their own agency and how they view issues in schools and classrooms (Rudduck & Fielding, 2006).

Allowing students to engage in dialogue with adults and have their voices heard can encourage students to act as agents of change (Calabrese Barton & Tan, 2010; Mallya et al., 2012). Furthermore, a curriculum that has space for student voice and choice can contribute to students' having greater agency (Seiler, 2011).

Students can develop agency by identifying and acting on issues that impact their educational experience (Holdsworth, 2000). Basu et al. (2009) determined through the research

and implementation of their own lesson plans, physics students could express critical science agency, or content knowledge and education for change. The students were able to choose topics important to them and design their lessons using their background and experiences. For example, one of the students chose to facilitate a debate with her classmates because she wanted to be a lawyer and thought having a debate about science content would help her classmates think more critically about the subject matter.

Limitations to implementation of student voice initiatives. There are also limitations to working with students to increase opportunities to express their voice. By identifying some of the limitations to including student voice, these difficulties can be better addressed and overcome (Holdsworth, 2000). Because this study focused on teachers including their students' voices in the classroom, it is important to look at the possible obstacles they may encounter while engaging in their action research.

Perceived lack of student maturity. Often, teachers and educators think they know better or their students are not mature enough to make a valuable contribution to their classroom (Lodge, 2005; Seiler, 2011). In addition, teachers may be worried that allowing their students a voice will result in a loss of quality learning experiences because of this perceived lack of maturity (Morrison, 2008). This may be due to a lack of trust in students or in conventional ideas of what learning should look like. At the same time, educators need to be careful not to give the students too much responsibility before they are sure of what they can handle (Binkley, 2011; Peterson, 2007). Students need guidance in order to transition from being treated as "mindless sheep" to acting like "responsible human beings" (Peterson, 2007, p. 43).

Sharing control with students. Issues with voice are embedded in educational structures and relations of power (Fielding, 2004). Even though enacting student voice initiatives in schools

can lead to student empowerment, it can also be a form of oppression because students do not often question the implementation of such an effort (Robinson & Taylor, 2012). Schools often have two sides with students on one side and teachers on the other (Fielding, 2004). These sides are often not viewed as equally important in traditional schools; therefore, teachers tend to hold more power than students. Ignoring students' voices maintains adult power relations (Mitra & Gross, 2009) and can perpetuate the idea that aspects of school practices cannot be challenged (Robinson & Taylor, 2012).

Students are not used to having control or challenging power dynamics and teachers are not used to sharing control (Hagay & Baram-Tsabari, 2015; Robinson & Taylor, 2012). In addition, because allowing student voice and choice is not the norm in our society, democratic participation in the classroom may initially be met with resistance from students (Binkley, 2011; Morrison, 2008). Students may not feel school should be personally relevant and teachers should tell them what and how to learn (Brodhagen, 2007; Johnston & Nicholls, 1995) and students may view teachers who ask for input into teaching and learning as unprepared (Morrison, 2008). Students may be hesitant to challenge certain aspects of their education and even when encouraged to use their voice, they still seek teachers' approval (Robinson & Taylor, 2012) because they feel there are limits in terms of the amount of power and authority they can assume (Mitra, 2006). Students often do not trust teachers when they say they want to include them in the educational process because it is difficult for teachers to share power with students (Seiler & Gonsalves, 2010). Adults may also not know how to engage in dialogue with their students (Lodge, 2005).

For student voice to become a reality in schools, traditional power relations between teachers and students need to be broken down and addressed (Brodhagen, 2007; Rudduck &

Fielding, 2006). Students and teachers both need to learn how to share the power in the classroom (Seiler & Gonsalves, 2010), which may involve a lot of patience and practice to accomplish a shared vision of a democratic classroom (Binkley, 2011). Learning how to enable youth to share their opinions and participate in decision-making can be challenging in school settings because teachers are used to being in control and the sharing of power with students can be threatening (Mitra & Gross, 2009). A climate of trust and openness is important in order for student voice to be effectively implemented into schools and classrooms (Rudduck & Fielding, 2006).

Time constraints with incorporating student voice. There is an enormous pressure on teachers to deliver content in a specific amount of time and it is difficult to devote time to dialogue and inclusiveness (Fielding, 2004; Frost, 2008; Lewis & Burman, 2008). Also, because there is a set curriculum, teachers may feel like they are not able to incorporate student requests because of time constraints (Hagay & Baram-Tsabari, 2015; Yerrick et al., 1997). This may be further complicated by teacher evaluations that do not leave room to assess teachers based on their inclusion of democratic practices (Fielding, 2004).

School culture that does not value student voice. Another difficulty is overcoming the culture of a school that does not value student voice (Fielding, 2004; Lewis & Burman, 2008; Morrison, 2008). This type of school culture can hinder teachers' action no matter what their beliefs on student voice (Buehl & Beck, 2015). Teachers may feel pressure from administration to use certain approaches with their students (Eick, 2001). For successful implementation of student participation in classrooms, support is needed from the administration for both teachers and students.

Because this focus of this study is teacher beliefs and practices related to student voice, and teacher beliefs can impact their actions in the classroom (Mansour, 2009; Nespor, 1987; Richardson, 1996; Tsai, 2002), it is important to explore what beliefs teachers have about student voice if we expect them to overcome these limitations and include their students' voices in the science classroom. Therefore, the next section reviews literature about teacher beliefs about student voice and participation.

Teacher Beliefs About Student Voice and Participation

Although there are a limited number of studies focused on teacher beliefs on student voice, teachers have demonstrated a willingness to consult with students to support improvement in conditions of teaching and learning (Cody & McGarry, 2012; Susinos & Haya, 2014; Yonezawa & Jones, 2009). Teachers may also hold beliefs that hinder student voice efforts (Hagay & Baram Tsabari, 2015; Seiler & Gonsalves, 2010). At times, there may be a disconnect between what teachers believe is happening in the classroom and students' perspectives (Ianes et al., 2017; Shim & Shur, 2018). Engagement in student voice initiatives can shift teacher beliefs about students (Lilja, 2012; Mitra, 2006). This section reviews some of the literature that includes teacher beliefs about student voice. However, there is limited literature on teacher beliefs about student voice, especially in science education (Bryan, 2012). Therefore, some of the following examples are not specific to science or high school.

Teacher support of student voice. Some studies have shown that teachers are willing to consult with students to support improvement in conditions of teaching and learning (Susinos & Haya, 2014; Yonezawa & Jones, 2009). For example, Yonezawa and Jones (2009) created students as co-researcher teams and led seminar-like training sessions to help high school students in San Diego learn how to design research, create and use data collection instruments,

analyze data, and present findings. Students selected their own topics and research questions but were guided in their research to make sure their topics were relevant to school communities. This project allowed students to become educational partners by giving teachers qualitative data that enabled them to analyze academic strengths and weaknesses. The teachers stated the projects gave the students a way to think about classroom practices and thought the students should have more control over their education. After listening to the findings, some of the teachers asked the students to suggest ways in which classrooms could be improved. In addition, teachers reported turning power over to the students was easier than in an earlier attempt of this project since students were investigating issues that mattered to them. Teachers continued to encourage students to conduct their own research into conditions in their schools, even after research concluded. In another example, Susinos and Haya (2014) conducted a study involving students as researchers. In this study, middle school students in Spain were trained as researchers. This initiative included the teachers in the process by first interviewing and then working with them to develop ways to increase student voice in the research process. Initial interviews indicated teachers thought students could share their voice and have a say in their education but were not given enough opportunities to do so. As a result of the research, students were able to provide ideas on what to research and implemented projects with the teacher and researcher support. The classroom teachers facilitated the process and provided support to students throughout the research. Both teachers and students provided feedback on the program and teachers noted a much more equal relationship with students and a willingness to work with students in this capacity in the future.

Teacher beliefs as a hinderance to student voice initiatives. On the other hand, teachers may also hold beliefs that hinder student voice efforts (Hagay & Baram Tsabari, 2015;

Seiler & Gonsalves, 2010). In research conducted in Israel, Hagay and Baram-Tsabari (2015) describe a method for consulting high school biology students on science content that involved students writing down questions based on their interests and creating a “shadow curriculum” that included both the required science standards and student interests. This study focused on developing a method for incorporating student interests into the curriculum in order to increase engagement and meaning in science and the development of autonomy, competence, and relatedness. First, five teachers volunteered to implement a strategy to include students’ questions into the existing curriculum. They described the focus of the unit and then students wrote down questions based on what they might want to know about this topic. Teachers incorporated students’ questions into the lessons in a variety of ways, whether they were directly related to the curriculum or not. While all of the teachers developed ways to answer the students’ questions, not all of them chose to answer every question as they did not see some of them as important. In addition, one of the teachers expressed concern over losing control when using this strategy. Despite the beliefs of the teachers, the researchers determined incorporating student interest into the existing curriculum was an effective way to contribute to a meaningful educational experience for students. Students reported an ability to direct their own learning, a sense of success and satisfaction, and improvements in teacher-student relationships. In a second example, Seiler and Gonsalves (2010) report on a study where teachers and high school students in Philadelphia attempted to co-construct a science curriculum. Data were collected through classroom observations, course artifacts, and interviews and used to determine the effectiveness of this curriculum. Although the curriculum was supposed to have been empowering and driven by the students, the teachers maintained control in many ways, which made students distrust their motives. The researchers speculate this behavior exhibited by the teachers may have arisen from

existing beliefs about science teaching and learning such as entering the classroom each day with a plan, adhering to a curriculum framework, having control over what is taught, and other views on how science should be taught.

Disconnect between teacher and student perspectives. Sometimes what teachers believe is happening in the classroom and their students' perspectives about what is happening do not align (Ianes et al., 2017; Shim & Shur, 2018). For example, Ianes et al. (2017) administered a questionnaire to Italian primary and secondary students and teachers to elicit their voices and determine perspectives on how students with disabilities should be included in the classroom. They also observed the classes to verify the results of the survey. They determined students and teachers shared different views towards the integration of students with disabilities. In another study, Shim and Shur (2018) studied middle and high school English Language Learners (ELLs) in the western United States in order to understand student perspectives on their learning experiences. They interviewed students and teachers and found students' perspectives on what they perceive as limiting factors for their learning are different from those of their teachers. The students reported their teachers were "not nice," the classes were "boring," and these were the major limiting factors on their learning. However, the teachers believed it was because their families did not education. Therefore, by listening to both student and teacher voices, the researchers determined the perspectives of each group did not align.

Shifting teacher beliefs. Engagement in student voice initiatives can shift teacher beliefs about students to a more favorable opinion about student voice (Lilja, 2012; Mitra, 2006). For example, Mitra (2006) reports on student voice activities within one high school and found that increasing communication between teachers and students helped them see each other as individuals, and not stereotypes. High school students were asked about their school experiences

and their thoughts on how to improve schools through focus groups, interviews, and surveys in order to include them in the school's change efforts. The students' role evolved from active respondents to co-researchers as they analyzed the focus group data through the use of probing questions to assist with research methods. Teachers worked with students to find themes within the data and students presented the results to the rest of the faculty. As part of the school change effort, the students' role changed again, from co-researchers to leaders as faculty created leadership positions for students. As part of these leadership positions, students were responsible for developing activities that would build a stronger partnership and improve communication between students and teachers. Students participated in PD efforts to help teachers understand how new pedagogical techniques such as inquiry-based labs might be received by students. They also took teachers on a tour of the local neighborhood so they could gain a better appreciation of what their students encountered on a daily basis. As a result of these initiatives, teacher beliefs changed, and they developed a stronger belief in the value of partnering with students. In another example, Lilja (2012) engaged in action research influenced by her beliefs that every student should have a voice. She looked at how her elementary students who were typically excluded during certain types of play could have more of a voice in these experiences. She realized if she imposed her own beliefs and insisted on all students having a say, the students reacted negatively, and it damaged her relationship with them. She concluded she needed to listen to her students in order to create the community she wanted in her classroom.

In summary, for student voice efforts to be possible or successful, adults need to see the value in these types of initiatives and be willing to change (Cook Sather, 2006; McGregor, 2007) because increasing student participation in the science classroom requires us to consider changing our ideas of the educational hierarchy (Fielding, 2004; Lewthwaite & Wiebe, 2014;

Rudduck & Fielding, 2006). Adults who participate in student voice efforts often develop stronger beliefs in the value of partnering with students (Mitra, 2006). Action research can be used as a form of PD to influence teacher beliefs (Lumpe et al., 2012). Therefore, the next section presents characteristics of effective PD and how it can change teacher beliefs and practices.

Teacher Professional Development

Teacher professional development (PD) programs can have an impact on beliefs and practices (Lumpe et al., 2012). This section will present some characteristics of effective PD, PD focused on student voice, how teacher beliefs can be changed through engaging in PD, and action research as a form of PD.

Effective professional development. Teachers engage in a wide range of experiences that could be considered PD (Desimone, 2009; vanOostveen, 2017). However, some authors argue for a framework for effective PD (Desimone, 2009; Garet, Porter, Desimone, Birman, & Yoon, 2001; Loucks-Horsley, Stiles, & Hewson, 1996). Garet et al. (2001) reported on a nationwide survey of teachers who identified the aspects of PD most likely to impact their classroom practice. These aspects included a focus on content, opportunities for active learning, coherence to other learning activities, the type of activity, collective participation of teachers, and the duration of the PD (Garet et al., 2001). Desimone (2009) further discusses these critical features for PD experiences and argues for a conceptual framework to evaluate PD experiences that includes teachers experiencing effective PD, increasing knowledge and skills, changing their instruction, and then seeing improved student learning.

Loucks-Horsley et al. (1996) suggest teacher PD should include a well-defined picture of classroom learning with an emphasis on inquiry-based learning and collaboration, opportunities

for teachers to develop new teaching skills, the improvement of instructional methods used with students, strengthening the existing community of teachers, preparing teachers for leadership roles, initiatives of the school district, and the assessment of participant satisfaction.

Teachers can be given opportunities to interact with colleagues during PD experiences in order to support each other (vanOostveen, 2017). The involvement of teachers in discussion and planning groups with students and ongoing reflection and research related to the process can help alter teachers' negative views of student participation in PD activities (Seiler, 2011).

Professional development focused on student voice. Teacher PD can focus on developing positive perceptions of student involvement and ways to meaningfully involve students in different kinds of activities and experiences (Fletcher, 2003). A study done by Lewis and Burman (2008) demonstrated a lack of teachers' knowledge and experience can inhibit them from including more student voice in the classroom. According to Fielding (2001), teachers can be provided with experiences to help change their beliefs and see that students can bring a valuable insight to the educational process and that engaging in conversations with students can be effective in providing insight into teaching and learning. However, teachers may need training in order to incorporate strategies to include students in a participatory role for a sustained effort with including student voice to occur (Fletcher, 2003; Mitra, 2009; Rudduck & Fielding, 2006; Seiler, 2011).

One way to get teachers to buy in to student voice initiatives is to create a teacher-led PD group that includes their students' input (Cook Sather, 2007; Fielding, 2001; Fletcher, 2003; Frost & Holden, 2008; Mitra, 2004). Effective PD may enable teachers to overcome their constraints to including student voice while at the same time providing resources and support (Cook Sather, 2007). When included in PD, students can help teachers understand how they

interpret changes in pedagogy and offer suggestions on how to make lessons more relevant to students' interests and lives in order to improve learning (Mitra, 2004; Mitra, 2006). Students can also offer their opinions on educational matters, so teachers can learn what works for their students (Cook Sather, 2007). PD that includes students can help sustain student voice efforts in schools (Mitra, 2006).

Changing teacher beliefs through professional development. Teacher PD programs have the potential to impact teacher beliefs and practices. However, it is difficult to change teachers' beliefs, especially those that are deeply embedded (Rokeach, 1968). Teachers are especially resistant to change as they often work alone and are given relatively few opportunities to collaborate with other adults (Grossman, Wineburg, & Woolworth, 2001). If teachers are unable to implement instructional changes consistent with their beliefs, PD experiences will not be effective (Brickhouse, 1990). Therefore, understanding teacher beliefs is important in designing teacher education experiences to help inservice teachers develop their practice (Pajares, 1992; Richardson, 1996; Yerrick et al., 1997).

Teachers may not change their practice until they see positive results in student learning or engagement (Mitchener & Jackson, 2012; Vaino et al., 2013). For example, Vaino et al. (2013), studied how chemistry teacher beliefs may change through participation in a PD program that included action research. The teachers were implementing a new teaching approach. The teachers all held diverse beliefs about teaching at the beginning of the study. The researchers determined that collaborative action research (CAR) helped support teachers' PD and strengthened positive beliefs related to the new teaching approach. They also reported participation in CAR helped teachers address constraints with implementing the new approach,

such as the time it took to incorporate aspects of it into their teaching. Teachers developed new positive beliefs when they saw how well the new pedagogy led to positive student outcomes.

Numerous studies have shown that regardless of the context or length of PD experiences, the process of changing teacher beliefs is complex and not always successful (Bryan, 2012; Richardson, 1996). It may be easier to develop a new belief about something, rather than change an existing belief (Ajzen, 1985). Teachers may assimilate language and beliefs from the PD without understanding how this new knowledge could be used in their own classrooms (Yerrick et al., 1997). Therefore, new beliefs must accurately represent the reality in a teacher's classroom environment to continue after the PD has occurred.

Many studies have shown that certain elements of PD programs are important, such as a focus on subject matter and sustained contact (Bryan, 2012). Success with PD has been seen in circumstances where the teacher and PD facilitator work as co-researchers, such as in action research. The next section describes how action research can address the characteristics of effective PD.

Action research as professional development. Action research can involve a learning community of teachers who work together to identify an issue in their teaching practice and then try to improve it (Feldman et al., 2018; Feldman, 1998; Milton-Brkich et al., 2010). Teachers come together to share stories about their practice, go back to their classrooms to try out new ideas, and then return to the group to reflect on what was done (Feldman, 1998; Feldman, 1996). This enhanced normal practice is a form of systematic inquiry that allows teachers to participate in research with the goal of improving their teaching practice (Feldman, 1996).

Action research groups may involve a university researcher facilitating action research with a small group of teachers to provide an outsider's perspective and support (Fazio, 2009;

Goodnough, 2003; Gordon, 2008; vanOostveen, 2017). University researchers can have many roles including facilitator, challenger, supporter, and teacher (Goodnough, 2003). As a facilitator, they help keep the action research group organized (Goodnough, 2003; vanOostveen, 2017). As a challenger, they can stimulate reflection by encouraging participants to think about issues from perspectives other than their own (Goodnough, 2003). The university researcher can also act as a supporter to encourage participants if they become frustrated with the process. As a teacher, they educate the participants about action research and the topic of the study. This person can also act as a critical friend who can sympathize with the research situation and give feedback as needed (Feldman et al., 2018).

Action research can help meet the goals of effective PD described in the previous section (vanOostveen, 2017). Action research may be considered a “reform” type of PD that takes place during the school day and may be more effective in allowing teachers to make connections with their teaching practice and more sustainable over time (Garet et al., 2001). The type of PD is not as important as the key components listed in the previous section that include a focus on science content; active learning by teachers with the opportunity to develop knowledge, skills, and leadership abilities; coherence with links to the district and other aspects of teaching; collective participation and the building of a community; appropriate duration; and continual assessment of the PD (Desimone, 2009; Garet et al., 2001; Loucks-Horsley et al., 1996).

Research on teacher preferences has found a focus on science content is important in designing high-quality PD experiences (Garet et al., 2001; Loucks-Horsley et al., 1996). According to Loucks-Horsley et al. (1996), an important component of PD is to have an accurate vision of classroom learning that includes knowledge of content students are expected to learn.

Action research allows teachers to explore their own science content knowledge with the goal of improvement (vanOostveen, 2017).

Another aspect of effective PD is active learning by teachers with the opportunity to develop new knowledge, skills, and leadership abilities (Desimone, 2009; Garet et al., 2001; Loucks-Horsley et al., 1996). Participating in discussions within an action research group gives teachers a chance to actively learn by reflecting on their teaching practice and instructional methods and can lead them to different understandings about classroom practices (Fazio, 2009; Feldman, 1996; Lebak & Tinsley, 2010; Loucks-Horsley et al., 1996). It allows teachers to plan for and implement ideas into the classroom and is part of active learning (Desimone, 2009; Garet et al., 2001). Action research groups give teachers an opportunity to immerse themselves in a topic, challenge existing perspectives, and develop new pedagogical approaches and skills they can use in their classroom (Fazio, 2009; vanOostveen, 2017). Supporting other teachers through a CAR experience can build leadership skills as part of the PD (Loucks-Horsley et al., 1996).

Coherence and linking PD experiences to other aspects of teaching is an important aspect of successful teacher training (Desimone, 2009; Garet et al., 2001; Loucks-Horsley et al., 1996). The action research done in this study allows for coherence because it is a way for teachers to collaboratively explore their practice with a connection to personal and district goals (Capobianco et al., 2004).

Collective participation can be achieved through action research with teachers who teach the same subject (Desimone, 2009; Garet et al., 2001). Forming a community is an important aspect of PD (Loucks-Horsley et al., 1996) and action research allows teachers from diverse backgrounds to do this through mutual support and suggestions for improvement (Bevins et al., 2011; Fazio, 2009; Lebak & Tinsley, 2010; Milton-Brkich et al., 2010; vanOostveen, 2017)

across grade levels and subjects (Milton-Brkich et al., 2010). Action research also creates meaningful opportunities for teachers to collaborate and find value in their work (Fazio, 2009).

Teachers report a sustained PD that takes place over time and gives opportunities to try out new practices in the classroom is more effective than shorter PD experiences (Garet et al., 2001). According to vanOostveen (2017), teachers who are participating in action research should be given support over an extended period of time to better meet their goals. Action research also gives teachers a method they can replicate or share with colleagues (Bradley-Levine et al., 2009).

An important aspect of action research is reflecting and continually assessing this action (Bevins et al., 2011), and this has been identified as a characteristic of effective PD (Loucks-Horsley et al., 1996). Action research provides a way for teachers to engage in a reflective process in order to examine their practice (Bevins et al., 2011; Bradley-Levine et al., 2009). This process allows them to reflect on their beliefs and values and set specific goals that relate to these beliefs about teaching and learning (Mitchener & Jackson, 2012). Therefore, action research has the potential to be an effective way to reflect on teacher beliefs about student voice.

Action Research to Increase Student Voice

Students and teachers are not often equal partners in teaching and learning (Fielding, 2004). Therefore, in order to respect all voices, we need new opportunities for dialogue between teachers and students. Action research can provide a way to give students a voice in the classroom (Rogers, Bouck, Anderson, Gordon, Manfra, & Yow, 2007) and to help overcome some of the potential obstacles teachers encounter with increasing student participation (Fielding, 2004; Mansour, 2009; Robinson & Taylor, 2012; Seiler, 2011). Science teachers can engage in action research in multiple ways in order to improve their practice and give their

students more of a participatory role in the classroom (Fielding, 2001; Lodge, 2005). They can use students as sources of information, engage in dialogue with their students, or include them in the research process. Teachers conducting research on their teaching practice allows them to gather data from their students and validate student input into the classroom (Fielding, 2001; Keating, Diaz-Greenberg, Baldwin, & Thousand, 1998; Lebak & Tinsley, 2010). Engaging in dialogue with students about teaching practices can help teachers better understand their learning needs and take action (Lebak & Tinsley, 2010). It can also help to identify and include student interest in content and pedagogical preferences. Students participating in action research can have important effects on teacher beliefs and transforming teaching practices.

Examples of teachers engaging in action research to increase student voice.

Organized using the hierarchy of student participation developed for this study, the examples below demonstrate some ways teachers have included their students' voices in the action research process. As the research literature is lacking in examples of teachers participating in action research to promote student voice, some of the following examples are not specific to science or high school. This study will contribute to this gap in the literature by exploring how high school science teachers can engage in action research to increase student voice and participation in their classrooms.

Students as sources of information. It is most common for teachers to include their students as data sources while engaging in action research. One example is Booth (2001) who wanted to explore the use of inquiry-based labs in his high school science classroom. He administered surveys to determine what type of lab students liked and helped them learn best. He had some classes do an inquiry-based version of a traditional cookbook-style lab and then had other classes do the original lab. Then, the students took quizzes to determine what type of lab

was more effective in helping them learn science concepts. The results showed students did better when completing in the traditional cookbook-style labs, likely because they were never taught how to engage in inquiry activities. In another example, Robins et al. (2009) conducted an action research study to determine the impact of an inquiry-based unit on their high school students' understanding of gas laws. They developed assessments to determine students' competencies on five aspects of gas laws and used these assessments to determine the areas students needed more help in. They determined students were struggling with units and variables, rather than with algebraic equations as they initially thought, and developed a plan to remediate these topics for the students. Finally, Porter et al. (2010) designed an action research study in order to determine how instructional support affects their high school students' data analysis and writing in relation to making conclusions on lab reports. They analyzed student work to determine the effects of various interventions (no intervention, checklist of guidelines, and instructional support). They determined the class who received instructional support did the best writing on lab reports.

Students as active respondents. In order to move from students simply being asked to provide information to including them in a more participatory role, educators need to begin discussing data collection and analysis with their students. Yin and Buck (2015) facilitated a CAR project in which high school chemistry students were given surveys and interviewed about formative assessment practices implemented by the teacher. At first, the data analysis or results were not shared with students; they were only discussed within the CAR group. However, the researchers began to explain the purpose of formative assessments to the students in order to get the students to respond more positively to the action research process. Because several students did not adequately answer the short answer questions on the survey, the researchers spoke to

them about the importance of the research. They eventually had some success with implementing formative assessment strategies in the classroom, with input from the students.

Students as co-researchers. When students act as co-researchers, they work with educators to investigate a problem by collecting and analyzing data. Horn (2014) explored the idea of empowerment in an action research project with his language arts students. He invited his students to participate in the research and they helped with both data collection and analysis. Although the concept of empowerment was chosen by the teacher, the students were allowed to choose their own focus based on what they felt was disempowering in their educational experience. The results of the student-led projects were only shared with classmates because the students were uncomfortable sharing their findings with the administration. However, later in the school year, the students researched, planned, and carried out a fundraising day for people affected by the 2010 earthquake in Haiti while all teachers in the school were able to connect to lessons and subject matter they were required to teach. In this way, students were able to make an impact on what they learned while making empowering decisions in order to help people in need. Bahou (2012) also studied middle school students and teachers collaborating as co-researchers while engaging in three cycles of action research. All student researcher meetings took place during the school day and were scheduled in such a way so the students were not always missing the same class. The first cycle entailed the researcher meeting with students and teachers to elicit views on voice and agency. During the second cycle, students were taught how to be researchers. In the third cycle, the researcher evaluated the students as they conducted research to determine the effectiveness of the action research process. The students acting as co-researchers with their teachers allowed them to develop social and intellectual agency. In a third example, Nelson and Bishop (2013) explored how one teacher in New Zealand engaged in action

research with her students. This project was designed to bring a teacher and her middle school students together to discuss how and what they wanted to learn. The students provided drawings of their perceptions of good teaching to researchers. The teacher and researchers then analyzed the pictures, brought this data back to the students, and then the students had the opportunity to determine what aspect to focus on for the action research project. The class decided to focus on reflection strategies and met once a month to discuss these. As a result, the students became better at reflecting and the teacher gained an understanding of her students as learners.

Some researchers have used action research as a way to create a more democratic classroom community. Binkley (2011) used action research as a way to explore how to create more of a democratic classroom community with his 6th grade students. He held classroom meetings with students and shared that he wished to have a classroom where they worked together to decide what was studied, how it was studied, and included as much freedom as possible. He did not find his intervention as successful as it could have been because he did not know how to help them participate in significant ways; however, students did learn to lead meetings and acknowledged they were given the opportunity to solve problems through collaboration with the teacher. Brodhagen (2007) also described her experiences with developing a more democratic classroom community with her students. Along with another teacher, they began the year by asking the students how they wanted to get to know each other. Teachers and students worked together to create rules and a constitution for the class. Meaningful learning was a focus in the class because the students helped co-construct the curriculum. This was done through the development of student questions and then the creation of themes based on the questions, that were then incorporated into the required subjects. Students were often included in decisions about evaluations, completed self-evaluations, and even led their own parent-teacher

conferences. The result of this effort was a classroom where students were encouraged to participate in their own learning.

Students leading their own research. Students acting as researchers have the freedom to choose their own issue to study as well as what data collection and analysis techniques to use when examining the issue. Bland and Atweh (2007) examined a students as researchers project in Australia where secondary students and teachers were working together to improve conditions in classrooms and schools. In this project, students identified issues in their education, designed a research project to investigate them, implemented some sort of action as a result, and then reported on their findings. The researchers concluded the project allowed students to contribute to issues in school that impact them and increased engagement with their education.

Chapter Summary

The purpose of this dissertation research was to explore how engagement in action research influenced high school science teachers' beliefs and classroom practices related to student voice and participation. This included exploring any affordances or obstacles they experienced with attempting to increase student voice and participation in their classrooms. Therefore, in this chapter, I reviewed relevant literature related to teacher beliefs, student voice and participation, and effective PD. Teacher beliefs were discussed in the context of science education and student voice and also how they relate to classroom practices. Action research was presented as a form of PD that has the potential to change teacher beliefs while including student voice into the science classroom. Finally, I described examples of teachers engaging in action research that includes their students.

Chapter 3: Methodology

In this chapter, I describe my research methodology, including the design, context, study participants, and data collection and analysis methods. As this is a multiple case study, I analyzed individual cases and then engaged in a cross case analysis in order to determine themes within and across cases.

Purpose Statement and Research Questions

The purpose of this dissertation research was to explore how engagement in action research influenced high school science teachers' beliefs and classroom practices related to student voice and participation. This included exploring any affordances or obstacles they experienced with attempting to increase student voice and participation in their classrooms. This study addressed the following research questions:

- How do high school science teachers' beliefs change as they attempt to incorporate student voice and participation into their classroom?
- How do high school science teachers' practices change as a result of attempting to incorporate student voice and participation into their classroom?
- What affordances or obstacles do high school science teachers encounter while attempting to include their students' voices in the classroom?

Research Design

I used a qualitative multiple case study approach to better understand high school teachers' beliefs on student participation in the science classroom, how their teaching practice may have changed as a result of including their students' voices through action research, and also

any affordances or obstacles they encountered while attempting to increase student voice. The teachers in this study conducted their own action research into their individual teaching practices as a way to increase student voice and participation. I examined how their teaching practice and beliefs on student voice changed as a result of this intervention.

Qualitative design. In qualitative research, the researcher is an essential instrument who is involved with not only the collection, but the interpretation of the data (Creswell, 2013; Grbich, 2013; Janesick, 2003; Miles, Huberman, & Saldana, 2014). Therefore, qualitative research is by nature subjective (Grbich, 2013; Miles et al., 2014). The influence of the researcher's personal values, attitudes, and beliefs on the research process is unavoidable (Miles et al., 2014). However, this subjectivity has value and is an essential element of understanding qualitative data (Stake, 1995).

Qualitative research involves data gathered from multiple sources including observations, interviews, documents, and artifacts (Creswell, 2013; Miles et al., 2014). Multiple sources of data allow for triangulation and a greater understanding of the phenomenon being studied (Creswell, 2013).

Qualitative research is focused on the whole picture and coming to an understanding of social situations (Janesick, 2003). This type of research can help to understand people's individual experiences (Grbich, 2013), the meanings people place on events, processes, and structures of their lives, and how they connect those meanings to the world around them (Creswell, 2013; Miles et al., 2014). In qualitative research, the power lies with the researched and they are the experts on the topic being studied (Grbich, 2013).

A qualitative methodology was used in this study because I wanted to understand how teachers' beliefs on student voice and participation influenced their teaching practice and this

gave me insight into their experiences (Stake, 1995). Rokeach (1968) argued beliefs cannot be directly measured and must instead be inferred from what people say and do. Therefore, a qualitative methodology that included observations and interviews was appropriate for this study. I used my own direct interpretations and narratives to analyze participants' experiences and beliefs. By utilizing an action research model and allowing teachers to control the direction of their research, I put the power into the hands of the teachers (the researched).

Multiple case study. I used a multiple case study approach in this research to explore real-life, bounded cases over time using multiple sources of information (Creswell, 2013). I used an instrumental case study approach because I examined particular cases to understand a specific issue (Stake, 1995). The intent of an instrumental case study is to gain a general understanding of an issue by examining specific cases (Creswell, 2013; Stake, 1995; Stake, 2003). Specifically, the issue I wanted to gain an understanding of was how high school science teachers' beliefs and practices related to student voice and participation are influenced by engaging in action research with the goal of increasing student participation in their classrooms. The individual cases were secondary to the understanding of this issue (Stake, 2003); rather they facilitated my understanding of teachers' beliefs on student participation.

The individual cases in this study shared the common characteristic of being high school science teachers participating in action research in order to increase student voice and participation in the classroom. According to Stake (2006), this is the condition being studied. I used multiple sources of information including transcripts of action research group meetings, classroom observations, teacher journals, and interviews in order to gain an in-depth understanding of the cases (Creswell, 2013).

In case study, the emphasis is on particularization of a unique case rather than the generalization of findings (Stake, 1995). Particularity can be determined by gathering data on the nature of the case, the historical background, the physical setting, and other cases (Stake, 2003). Therefore, I used multiple data sources such as action research group meeting transcripts, journals, and interviews to understand the nature and history of each teacher. I also used observations to understand the physical setting where they teach.

Research Setting

The study took place in a large school district located in the southeastern United States. This school district employs over 15,000 teachers with over 200,000 students enrolled and is the eighth largest district in the country (County School District, n.d.).

Data collection took place in various places throughout the district. Interviews and observations took place in the teachers' classrooms. One of the group meetings took place at a public library and the other took place at a local café. Finally, the teachers completed their journal entries in a place of their choosing.

Participants

The teachers who participated in this research were current high school science teachers from various schools in the district who taught during the 2018-2019 school year. These teachers were interested in participating in action research with the goal of increasing student voice and participation in their classrooms.

To recruit participants, I first provided the Supervisor of Secondary Science for the district with a flyer to send out to teachers at the end of the 2017-2018 school year. I then spoke at the district's professional development (PD) day prior to the beginning of the 2018-2019 school year. This session was open to anyone who was interested in action research and student

voice and learning how to implement these concepts in their classroom. I spoke to the teachers about these topics and then presented the opportunity to participate in an action research group as part of my dissertation research. Teachers signed up before they left, and I also provided my email for anyone who might decide they were interested at a later date. Approximately 30 teachers attended the training and I had nine teachers sign up in person and another who emailed me after the session. I lost six participants who were not able to participate because of time constraints and other undetermined reasons. Four teachers began the study, but one stopped responding to emails and did not complete her action research study. Another teacher began the action research but did not finish the journals, attend the second action research group meeting, or respond to emails requesting a final interview. I ended up with two teacher participants who completed their action research and reported results. For this dissertation, I analyzed data from all four of the teachers who began the research. Even though I had incomplete data from two of the teachers, I was still able to answer the third research question and determine the affordances and obstacles these teachers faced related to including student voice in their classroom and participating in action research. As affordances and obstacles can be important factors in how beliefs translate into practice, I felt it was worthwhile to include these teachers in the study. An overview of each teacher is included in Table 1 on page 66.

Case Selection

The case is the unit of analysis in a case study (Creswell, 2013). The case is a “specific, unique, bounded system” that contains certain features to be studied (Stake, 2003, p. 136). In this study, the cases were high school science teachers who participated in action research in order to increase student voice and participation in the classroom.

Table 1. Description of Teacher Participants

<u>Pseudonyms</u>	<u>Education</u>	<u>Years Taught</u>	<u>Grade Level</u>	<u>Subject</u>	<u>School</u>
Sasha	MS in Curriculum and Instruction	6	9-12	Biology and Anatomy	Diverse with a magnet program for performing arts
Ben	BS in Chemistry	7	9-12	Physical Science	Large Hispanic population/ many ELL students
Naomi	PhD candidate in Educational Leadership	20	9-12	Marine Science	IB school within a traditional school
Anna	PhD student	23	10-12	Forensic Science and Anatomy	IB program within the main school; diverse population

Four teachers began the action research process and served as cases in this study. This is a type of convenience sampling because I selected these cases based on the accessibility of the teachers in this study (Miles et al., 2014). I originally intended to select cases based on the level of student participation incorporated into their classroom as this would have provided a diverse outlook and added complexity to the overall study. I hoped to be able to include a teacher who incorporated student voice at each level of the hierarchy presented in Figure 1 on page 9 (students as sources of information, students as active respondents, students collaborating with adults, and students leading their own research). However, I ended up with four teachers at the beginning of the study and only two teacher participants who were present throughout the entire data collection process. Therefore, I ended up with three cases at the end of the study – each

teacher who completed their action research and then the two teachers who did not were combined as one case in order to discuss affordances and obstacles they experienced and what may have prevented them from finishing their action research.

Data Plan and Timeline

Data were collected through action research group meetings, classroom observations, teacher journals, and interviews with teachers. The action research group meetings occurred twice during the semester: once at the beginning of the semester and then once after the action research was completed at the end of the semester. The intent was to have three group meetings but before the second meeting, one of the participants cancelled at the last minute and we were unable to find a time to reschedule before December due to Thanksgiving break and prior engagements. Classroom observations took place once action research projects started. Teacher journaling occurred bi-weekly starting with the week of the first group meeting. Semi-structured interviews took place before the first group meeting and again after the final meeting. The action research group meetings and interviews were audio recorded and transcribed. I took notes during meetings, observations, and interviews and then wrote narratives after these activities that were used for member checking. All data were coded using open and axial coding to look for themes (Grbich, 2013). Table 2 on page 68 lists research activities and the dates during which they were carried out.

Data Collection

Two levels of data were gathered during the study. While I gathered data about the teachers' beliefs and action research by means of audio recordings of action research group meetings, classroom observations, teachers' journals, and pre and post interviews with teachers,

data were gathered also by the teachers from their classrooms (classroom observations, field notes, students' feedback).

<i>Table 2. Dates of Research Activities</i>	
<u>Date</u>	<u>Activity</u>
Aug 3, 2018	<ul style="list-style-type: none"> • I met with teachers during district-wide PD day • I provided an overview of action research, student voice, and expectations of research participants • We brainstormed starting points for action research projects
Aug 2018	<ul style="list-style-type: none"> • Teachers developed action research plans
Sept 2018	<ul style="list-style-type: none"> • I interviewed teachers
Oct 2018	<ul style="list-style-type: none"> • We met as a group to discuss action research plans • Teachers began action research journal
Sept to Nov 2018	<ul style="list-style-type: none"> • I collected and interpreted data and altered plans of action if necessary • I conducted classroom observations and individual check ins • Teachers continued journaling bi-weekly • I developed researcher narratives
Dec 2018	<ul style="list-style-type: none"> • We met for the final group meeting • Final presentations by teachers • I interviewed teachers and transcribed data •
Dec 2018 to Jan 2019	<ul style="list-style-type: none"> • I analyzed data
Feb to April 2019	<ul style="list-style-type: none"> • I wrapped up data analysis • I wrote up results

The format of the teacher data was based on the individual teacher's personal decision as a researcher. Data collected and analyzed by the teacher participants as part of their action research is not included in this dissertation as I was focused on how teacher beliefs change, not student ideas. However, the teacher researchers were able to use the data they collected in order to drive classroom decisions.

Multiple data sources allowed me to triangulate my findings to see if my interpretations were the same on different days, at different times, and during different circumstances (for example, during an interview versus an observation) (Stake, 1995). Data collection began in September 2018 and ended in December 2018.

The purpose of this dissertation research was to explore how engagement in action research influenced high school science teachers' beliefs and classroom practices related to student voice and participation. This included exploring any affordances or obstacles they experienced with attempting to increase student voice and participation in their classrooms. Rokeach (1968) states that beliefs cannot be directly measured and must be inferred based on actions and what is said. Therefore, the qualitative data collected was appropriate for answering the research questions. The data collection instruments were used in order to collect data to specifically answer the research questions. Table 3 on page 70 lists the research questions and how they were answered using different types of data collection instruments and analysis.

One of the limitations of my data collection is that I have incomplete data from two of the teachers in my study. This is because two of the teachers stopped responding to emails and did not report results of their action research. One of the teachers stopped responding to emails before beginning her action research and I do not have data from her aside from the first action research group meeting and her pre-interview. The other teacher began the action research but did not finish the journals, attend the second group meeting, or respond to emails requesting a final interview. Table 4 on page 71 shows the data collected from each teacher participant.

Action research groups. The teachers in this study participated in an action research group that met twice during the data collection process. I facilitated both group meetings. My facilitation allowed the teachers to get feedback from the group throughout their action research.

For a more detailed explanation of my role in these meetings, see the Role of the Researcher section later in this chapter.

Table 3. Data Collection and Analysis Plan

<u>Research Question</u>	<u>Data</u>	<u>Methods</u>	<u>Analysis</u>
In what ways do high school science teachers' beliefs change as they attempt to incorporate student voice and participation into their classroom?	Action research group meeting; teacher journals; pre and post interviews	Audio recording and transcribing; field notes; semi-structured interviews	Analytic memos/narratives; direct interpretation; thematic coding
In what ways do high school science teachers' practices change as a result of attempting to incorporate student voice and participation into their classroom?	Action research group meeting; classroom observations; teacher journals; pre and post interviews	Audio recording and transcribing; semi-structured interviews	Analytic memos/narratives; direct interpretation; thematic coding
What affordances or obstacles do high school science teachers encounter while attempting to include their students' voices in the classroom?	Action research group meeting; teacher journals; pre and post interviews	Audio recording and transcribing; semi-structured interviews	Analytic memos/narratives; direct interpretation; thematic coding

When we met as a group the first time, I provided an overview of action research and student voice. We discussed starting points, how to develop a plan of action, collecting and analyzing data, and what to do with the information learned through action research. We also talked about reflecting on what was learned through journaling and how action research can be a cyclical process. I introduced the teachers to the online journals in Canvas, which is an online platform for teachers and universities where they can organize their classes.

Table 4. Data Collected from Each Teacher Participant

<u>Data Source</u>	<u>Sasha</u>	<u>Ben</u>	<u>Naomi</u>	<u>Anna</u>
Oct meeting	X	X	X	X
Dec meeting	X	X	-	-
Observation	X	X	-	-
Journal 1	X	X	X	-
Journal 2	X	X	X	-
Journal 3	X	X	X	-
Journal 4	X	-	-	-
Journal 5	X	-	-	-
Journal 6	X	X	-	-
Pre interview	X	X	X	X
Post interview	X	X	-	-

I showed them the hierarchy of student participation and provided examples as a guide to better understand student voice and participation. I also told them how they could move from one level of the hierarchy to the next by increasing communication with their students. The teachers then brainstormed some ideas for potential action research projects and discussed their ideas with each other to identify a starting point. Finally, I reviewed data collection methods they could use during their action research. Their next task was to determine their plan for the action research including the issue to be investigated, why it was important, and plans for data collection and analysis.

During the second action research group meeting, the teachers presented their final results and reflected on what they learned. We also discussed the possibility of publishing their action research as some of the teachers expressed an interest in this during the PD day. A

summary of the group meeting agendas is found in Table 5. Samples from the transcripts from each meeting are included in Appendix A.

<i>Table 5. Action Research Group Agendas</i>	
<u>Date</u>	<u>Agenda</u>
Oct 20, 2018	<ul style="list-style-type: none"> • Ice breaker activity • Introduced research journal (introduction to Canvas; bi-weekly prompts/record of research activities) • Discussed and refined action research plans (starting point comments/questions; • Reviewed data collection methods: record in journal, student work, observations, photographs, interviews, focus groups, surveys, triangulation • Action research as a cyclical process • Set next meeting day/time
Dec 6, 2018	<ul style="list-style-type: none"> • Teachers presented findings from action research • Discussed possibility of publishing (IRB; types of journals) • Set up interview times

We met as a group in a place as convenient as possible for the teachers involved. The first meeting took place at a public library. The original four teachers attended this meeting. The second meeting took place at a local café. Only two of the teachers attended this meeting. The group meetings were audio recorded and transcribed. I used these transcripts to look for themes related to how the teachers’ beliefs and practices towards student voice and participation changed as a result of participating in this action research and any affordances or obstacles they encountered while doing so. In between meetings, I corresponded with the teacher via email and they were able to see the progress of other teachers’ research through the online journals.

Teacher journals. Teachers were asked to journal bi-weekly about their experiences with action research. They were provided with prompts posted in Canvas as discussions where they responded to the prompt and were able to interact with their colleagues. Teacher journal prompts are found in Table 6 on page 73. Sample responses from each prompt are located in

Appendix B. These journals allowed me to see how the teachers' beliefs about student voice and practices changed as a result of their action research and any affordances or obstacles they experienced while doing so. The intent of the journals was to allow the teachers to collaborate further in between meetings by sharing research ideas and experiences. However, while the teachers posted their responses, they did not reply to each other. Sasha completed all of the journals, Ben completed four of the journals (but we did discuss his answers to the missing prompts during the last action research group meeting), and Naomi answered three of the journal prompts. Anna did not complete any of the online journals.

<u>Date</u>	<u>Prompt</u>
Oct 2, 2018	Brainstorm some possible starting points for your action research. What do you want your focus to be? For some ideas, think about topics you are interested in or aspects of your practice you want to improve or change. If you already have a good idea of your focus, share your ideas with us.
Oct 8, 2018	Develop your data collection plan. What is the problem you are investigating? What do you need to know to investigate this problem? What types of data will allow to investigate this problem? What types of data do you already have (artifacts such as student work, grades, etc)? What instruments will you need to collect this data?
Oct 22, 2018	Reflect on the action research process so far. What is going well? What are some challenges you have encountered?
Nov 5, 2018	Reflect on the inclusion of your students' voices through this action research. Do you think it is worthwhile to include your students in the learning process? Have your perspectives on student voice changed throughout this process?
Nov 19, 2018	Reflect on the action research process so far. What went well? What are some struggles you are still having? What would you have done differently?
Dec 3, 2018	Reflect on the action research process. What will you do with this new knowledge about your practice? How do you think this will impact your practice moving forward?

Classroom observations. Observations are a key tool in qualitative research (Creswell, 2013) and allowed me to get a sense of how the teachers' practice changed as a result of the implementation of student voice initiatives through action research. Because only two teachers responded to my request to set up observation times, I observed only Sasha and Ben. The teachers decided the best time for me to come in and observe but I asked to observe a class where I could see part of the action research process. Both teachers had me observe part of the data collection process for two periods each. During the observations, I took notes, or jottings (Emerson, Fretz, & Shaw, 2011), to record what was happening objectively (Stake, 1995). The jottings were then developed into analytic memos, or narratives, based on what I observed in the classrooms (Emerson et al., 2011; Miles et al., 2014). The purpose of the observations was to emphasize important features or events (Emerson et al., 2011). Therefore, I focused on how teachers were changing their practice as a result of incorporating student voice through their action research. This focus depended on what aspect of student voice they were specifically addressing in their action research. The jottings I made only focused on the teachers' individual action research goals. For example, one of the teachers chose to focus on her relationships with students so I focused my observation on how she included students in conversations as active respondents, involved them in data collection, and allowed them to provide feedback about what they needed from their teachers. After the observations, I was able to discuss my observational notes with the teachers to help them understand how they could use this data to improve their practice. These conversations were incorporated as part of the data set for each observation. The observation protocol design along with sample field notes are located in Appendix C.

Teacher interviews. I conducted semi-structured interviews with all four participants in September, before the PD began and then with the remaining two participants in December, after

the PD ended. The semi-structured interview approach allowed for research questions to be addressed but also gave flexibility to participants, so they could give their own meanings of events while answering the questions (Galletta, 2013). This method of questioning also allowed room for the possibility of follow-up questions to better understand the participants' beliefs about student voice and participation. These interviews were all held at the individual teacher's school site. The interviews lasted between 20 and 30 minutes. The interviews were audio recorded and transcribed.

The interview questions were designed based on the goals of the research questions. Therefore, the interview questions asked teachers about their beliefs about student voice, how their teaching practice was changed by engaging in action research (either the present action research project or any they may have done in the past), and what affordances or hinderances they have encountered while attempting to increase student voice. The interviews held prior to the action research experience allowed me to gather information about the teachers' educational background, school environment, initial beliefs of student voice and participation, and any experience they have had with action research. The interviews held after the action research were used to collect data to determine how the teachers' beliefs and practices changed as a result of incorporating student voice into their classroom, any benefits or drawbacks they see with allowing students a voice, any affordances or obstacles they encounter while allowing students a voice, how effective the action research was as a way to include student voice, and also how they intend to include their students into the educational process in the future. Both pre and post interview questions along with samples of the transcripts are located in Appendix D.

Data Analysis

Coding process. I used a combination of direct interpretation and thematic coding to analyze the data (Stake, 1995). Data were analyzed using coding processes in order to establish patterns (Creswell, 2013). As data is collected, jottings were made (Emerson et al., 2011) and turned into analytic memos, or narratives, after each piece of data was collected (Miles et al., 2014). The jottings reflected my initial impressions on issues that emerged during data collection (Emerson et al., 2011; Miles et al., 2014). These narratives were a necessary part of telling the stories of the individual cases and what occurred in the study (Janesick, 2003).

After preliminary interpretations were made, data were coded to look for patterns and relationships within and between cases (Creswell, 2013; Stake, 1995). I used MaxQDA as a data analysis software to code the data. Data were coded using a hybrid approach of inductive and deductive coding (Fereday & Muir-Cochrane, 2006). Prior to data collection, an initial a priori codebook was created from the research questions and the research literature on student voice and teacher beliefs. The codes include broad categories focused on teacher beliefs, changing teaching practices, affordances and obstacles teachers encounter while including their students' voices, and any benefits or limitations teachers experience while attempting to increase student participation. Then, data were coded using the initial codebook as a guide and additional inductive codes were added as I read through the data (Fereday & Muir-Cochrane, 2006; Miles et al., 2014). The codebook I used in this study is located in Appendix E.

Data were coded using both open and axial coding (Grbich, 2013). The open coding involved reading through the data to identify concepts and categories. Some of these categories were deductive and based on the research questions and literature on student voice and teacher beliefs. Other inductive categories emerged as I read through the data. I then grouped the codes

into themes through an axial coding process (Fereday & Muir-Cochrane, 2006; Grbich, 2013). The themes were reviewed to ensure they were representative of the initial coded data (Fereday & Muir-Cochrane, 2006). Table 7 below provides an example of how a group of codes were grouped into a theme.

Table 7. Example of Coding Process

<u>Theme</u>	<u>Meaning</u>	<u>Open Codes</u>
Prior experiences	Any prior experience with allowing student voice	Prior experience – student voice
	Any prior experience with action research	Prior experience – action research
	Any background information that could give insight into how teachers have formed their beliefs	Context
	Any information about their background in teaching and learning	Teacher background
	Any information about the classroom/school environment	Classroom description

Finally, the themes were used to answer the research questions and to explain how teachers’ beliefs and teaching practice may have changed as a result of engaging in action research focused on including student voice in the science classroom.

Cross case analysis. Each case was analyzed separately for its own situational issues, and then cross case findings were analyzed to look for similarities and differences across the cases (Stake, 2006). The cross case analysis was conducted in order to deepen understanding about teacher beliefs and practices related to student voice (Miles et al., 2014). It allowed me to compare and contrast findings between the three cases in order to see the similarities and

differences of teacher beliefs and practices. This allowed me to look for patterns and make assertions about the collection of cases in the study.

I first identified themes developed from the codes within each case in order to describe my interpretations of the findings (Miles et al., 2014). For example, Sasha had prior experiences with student voice, and I assigned the appropriate codes to this data. When I grouped these codes into the theme Prior Experiences, I was able to discuss how her prior experience with student voice allowed her to move up the participation hierarchy. The same codes and themes were used to analyze the data from each participant.

I then compared the findings from the individual cases to determine the similarities and differences between all three cases (Miles et al., 2014). To do this, I first looked at the themes for each case to see what they had in common and also what was different between the cases. For example, I coded data from both Sasha and Ben using codes I grouped into the theme Prior Experiences. Even though the theme Prior Experiences applied to both of these teachers, their prior experiences influenced their beliefs about student voice and classroom practices in different ways. Therefore, I compared and contrasted how their prior experiences with student voice, action research, or education in general influenced their approach to the action research and their beliefs about student voice. I also compared similarities and differences across the cases to evaluate my conceptual framework and hierarchy of student participation. I then went back and reviewed the data I had to collected to verify the assertions I was making across the cases.

Dependability and Trustworthiness

Dependability. To address dependability in this study, I triangulated between different data sources (Lincoln & Guba, 2007; Stake, 1995) including action research group meeting transcripts, classroom observations, teacher journals, and teacher interviews. Triangulation

allowed me to verify my interpretations and assertions in order to determine if what I observed and reported had the same meaning in different circumstances (Stake, 1995). I utilized member checking of my narratives from group meetings, observations, and interviews in order to further triangulate my observations and interpretations (Stake, 1995; 2006). I provided these narratives for member checking throughout the data collection process. The narratives were emailed to the participants so they could verify what I wrote was what actually happened. Finally, multiple data sources provided consistency to the findings of the study (Stake, 1995).

Trustworthiness. Trustworthiness involves how accurately the collected data answers the research questions (Creswell, 2013; Grbich, 2013; Thomas, 2016) and depends on detailed description and explanation (Janesick, 2003). Therefore, I used thick description when reporting findings and interpretations in order to accurately represent what occurred during the course of the study (Creswell, 2013). This was further achieved through triangulation and member checking of action research group, observation, and interview narratives (Stake, 1995; 2006). I developed these narratives for member checking as the data was collected. By looking for patterns among different sources of data, I compared information across data sources to provide a greater accuracy to my findings. Member checking of interview, group meetings, and observational narratives were used to solicit participants' views of my data analysis and further contributed to the trustworthiness of the findings. In addition, I discussed the data with another researcher (Stake, 1995), who served as a critical friend to give feedback on my conclusions (Feldman et al., 2018). Finally, I remained reflexive throughout the study and continued to examine my researcher bias that may shape my interpretations in the study, which contributes to the trustworthiness of the results.

Role of the Researcher

Reflexivity is an important part of qualitative research (Creswell, 2013). Therefore, as this is a qualitative study and interpreting the data is the responsibility of the researcher, it is important to consider my personal views on this topic and attempt to define my role in the research study (Janesick, 2003; Miles et al., 2014). I have been conscious of how my bias and experiences may have impacted how I interpreted and presented events that occurred during data collection and analysis (Creswell, 2013).

I had two roles in this research: facilitator of the action research group and researcher studying teacher beliefs about student voice. Goodnough (2003) describes several roles a researcher may play during an action research group. These roles include teacher, facilitator, supporter, and challenger. I encompassed all of these roles at some point during the action research process. As a teacher, I designed the group meetings, so the teachers learned how to do action research from me, while at the same time conducted their own action research in their classrooms. I taught them about the nature of action research, data collection and analysis techniques, and how to share their new knowledge with others. I organized and facilitated the action research group and assisted the teachers in designing and implementing their action research plans. I acted as a supporter by helping the teachers in any way they needed throughout the course of the action research project. Finally, I acted as a challenger by participating in conversations during the group meetings to provide a different perspective on issues that arose during the meetings.

However, as a researcher interested in student voice, I also influenced the focus of the teachers' action research. While they were able to choose what level of student voice they felt most comfortable with and also chose what topic they wanted to explore with their students, they

were asked to include their students in some way. I taught them about different levels of student participation they could incorporate into their classroom, with the expectation that they chose one of these levels as a way to include their students in the action research process.

Ethical Considerations

Ethical issues can surface during any phase of the research process (Creswell, 2013). Furthermore, with the qualitative design of this research, it is important to consider ethical concerns (Janesick, 2003) because “qualitative researchers are guests in the private spaces of the world” (Stake, 2003, p. 154). Therefore, there are several ways that I remained ethical throughout the course of this study.

Prior to conducting any research study, it is necessary to seek approval from the institutional review board (IRB) of the university (Creswell, 2013). I completed the CITI IRB certification course at the University of South Florida (USF) on January 20, 2017 that will expire on January 20, 2020. This certificate is sufficient for conducting Human Subjects Research at the university. I completed the USF IRB process in order to get approval for this study. The IRB approval letter is located in Appendix F. In addition, I followed the school district’s protocols for good research and obtained permission to conduct research within the district. The district approval letter is included as Appendix G.

Prior to beginning the study, I obtained informed consent for each participant in conjunction with the University of South Florida’s IRB, and a signed copy of the informed consent was provided to each participant. The consent form used in this study is located in Appendix H. When obtaining informed consent, I explained to each participant the research is completely voluntary, the purpose of the research, and any benefits they may gain from participating. One benefit of participating in action research may include improvement of

teaching practice (Feldman, 1998; McNiff, 2013). In addition, by incorporating student voice and increasing participation in classrooms, benefits to students may include empowerment, confidence, increased engagement with science content (Seiler, 2011), a sense of science agency (Basu, 2008), and an increased motivation to learn (Ryan & Deci, 2000). I did not anticipate issues with conducting this research study. This study was not considered more than minimal risk. Therefore, I did not foresee any potential risks as no identifying factors (such as teacher and school names) have been included in the data. In addition, care was taken to not coerce teachers into participating in this study.

While collecting and analyzing data, I worked with the participants, so they were aware of every step of my research and I respected the potential power imbalances while conducting observations and interviews (Creswell, 2013). I made sure all teachers understood my observation protocols and how data will eventually be reported to alleviate any concerns about confidentiality (Stake, 2003). In addition, I utilized member checking during the data collection and analysis process to ensure action research group meetings and interview transcriptions are accurate (Creswell, 2013).

While reporting data, I took steps to ensure the confidentiality of the teachers in this study. The following measures were taken to ensure participant confidentiality:

1. Pseudonyms were used for all the participants and their school sites. The action research group audio recordings, observational notes, teacher journals, interview audio recordings, and any additional identifying data will remain confidential and files were saved with the teacher's pseudonym.

2. Data, including action research group recordings and transcripts, observational narratives, teacher journals, and interview recordings and transcripts, are stored on the University of South Florida's Box site.

Chapter Summary

This chapter described my research methodology including data collection and analysis procedures. I reviewed the purpose and research questions for the study and the reasoning behind a qualitative design, specifically multiple case study. I described the setting and participants, including how cases were selected. I reviewed how credibility, validity, and reliability were addressed in this study. I addressed my own role in this research and how I may have influenced the process of this research study. Finally, I explained any ethical considerations I remained aware of throughout this study.

Chapter 4: The Case of a Caring Science Teacher

In this chapter, I present the case of Sasha as a caring teacher who values her students' ideas and feedback related to teaching and learning. The chapter is organized by the research questions that guided this study and then by themes under each research question. The following research questions guided this study:

- How do high school science teachers' beliefs change as they engage in action research in order to increase student voice in their classroom?
- How do high school science teachers' practices change as they engage in action research in order to increase student voice in their classroom?
- What affordances or obstacles do high school science teachers encounter while attempting to include their students' voices in the classroom?

Sasha was an active participant throughout the data collection process for this study. Data I collected on Sasha include two action research group meeting transcripts and narratives, pre and post interview transcripts and narratives, six journal responses, and two periods of classroom observation. All three research questions were addressed during these interactions. Descriptions from Sasha addressed how her background experiences and this action research may have influenced her beliefs about teaching, learning, and student voice; how these beliefs may or may not have influenced her teaching decisions; and the affordances and obstacles she encountered throughout the research process.

Background Information

Sasha is a case of a caring science teacher who believes in the importance of engaging in dialogue in order to form and maintain relationships with her students (Noddings, 2012a). Because of these beliefs, she seeks out opportunities to give students a chance to have experiences they would not normally have in school. She also gives her students opportunities to share their voice related to science teaching and learning because she genuinely values her students' feedback and believes they should have a say in their education.

I first met Sasha at the school district's professional development (PD) day where I presented information about student voice and action research in order to recruit participants for my study. She approached me after my presentation and told me she definitely wanted to be a part of this research and how excited she was to be involved. She talked about the PhD program she was applying to and how she wanted more research experience she could use to move forward with her career. Her face lit up with a smile as she told me, *"I'm excited about increasing student voice, engaging in research, the possibility of publishing, all of it."*

Sasha's background is in education. She holds a bachelor's degree in Secondary Science Education and a master's degree in Curriculum and Instruction. She plans to continue her education and has applied to start a PhD program in Curriculum and Instruction in the next year. Sasha did not have experience with action research prior to this study but did have some qualitative research experience because of her master's program, *"I've done some research in the past with at-risk students, urban students, 9th grade students, pretty much of all of them together."*

Sasha is in her sixth year of teaching. She has only taught Biology and Anatomy as a paid teacher but taught Zoology during her internship. Because she teaches both core and elective

science classes, she has students in all grades, nine through twelve. Her Biology courses are composed entirely of traditional students placed in grade-level classes, but her Anatomy class is an honors-level course. However, she opens this class to any student who is interested in the subject as she describes in the first interview:

But they're not all top tier in that class because I like to open it up to kids who have not taken an honors class before, but they're interested in anatomy. So, I try to get kids in there who wouldn't normally have an honors class.

Even though we exchanged several emails working out logistics, the next time I actually saw Sasha was for our first interview. I met her during her planning period in her classroom. Even though the hallways were full of students passing to their next class, I felt it was an organized calm. No one was yelling or making a scene. Everyone was just talking and walking as a couple or with their friends. I walked through the swarm of teenagers changing classes, up three flights of stairs, and down the crowded hallway to Sasha's classroom. It was propped open with a wedge and I knocked briefly before entering. Her classroom was quiet because it was the beginning of her planning period. We exchanged greetings and small talk before sitting down at the kid desks and starting the interview. Aside from one student who knocked before being invited to enter, we were not interrupted at all while talking.

During the first interview, I asked Sasha to describe the school where she works. She replied:

I would describe this school as interesting and different than most others because it's a magnet school for performing arts and then we are located in a more urban area, so we have a very broad mix. We have students from all over the county and then our local students, so our demographics are very diverse as far as ethnicities, languages that we

have. But everybody kind of meshes well with each other. We don't have that many issues with bullying and other things that other schools have because it is very diverse, and kids have just kind of accepted that.

Based on information from the school's website (County Public Schools, 2019), the student population at her school is approximately 41% black, 27% white, 25% Hispanic, 2% Asian, and the remaining 5% are of mixed race. In the 2017-2018 school year, the graduation rate was approximately 81%, which was about the same as the 2016-2017 school year (Tobin, 2018). The original school was one of two all-black high schools in the area and was closed in the 1970-1971 school year because of desegregation before being reopened the following school year. In 1997, the school moved to a new location and added its performing and visual arts magnet program.

Description of Action Research

Because of her interest and prior experience with at-risk students, Sasha decided to focus her action research on building relationships with her students. She stated during the first action research group meeting:

I think my relationship building is good, but it is something that could be better. It's a little more on the superficial level. It's good enough where my kids respect me, they come to my class because of that relationship but if I could push it further...

As part of her action research, Sasha administered two surveys to collect initial data from her students on what they wanted from their teachers. In the first survey, she asked her students to list five things they felt they needed from their teachers. She analyzed the data, chose the top five teacher characteristics her students had chosen, and then administered a second survey so

they could rate how important they felt they were. She described this process in the second action research group meeting:

I did a couple of surveys to kind of narrow it down. The first survey was very open-ended...I did the initial, I categorized it, their top five. I can't remember exactly off the top of my head. But it was respect, understanding, more interactive and fun activities, clear instructions, and support. So, extra help when they needed it.

She then implemented her students' top three choices, which were extra help and clear instructions for assignments, respect, and understanding. She had weekly conversations about how well she was implementing their choices. She gave them one last survey to determine the overall success of her action research, how they felt she did with implementing their choices, and what she could continue to do to ensure their needs were being met in the future.

Beliefs About Student Voice

Prior to the study, Sasha held beliefs related to her prior experiences in teaching and learning, the context related to the environment in which she teaches, and the benefits she sees with including student voice in her classroom. These beliefs were either strengthened or new beliefs were developed as a result of her action research. Table 8 on page 89 summarizes these initial and final beliefs about student voice.

Prior experiences. Sasha's prior experiences with teaching and also with qualitative research influenced her beliefs about student voice and demonstrated how she cares for her students. She believes her students have important things to say and that asking her students what they want or need from their education is important. She also believed in the value of qualitative research and used this approach in her action research.

<u>Themes</u>	<u>Initial Belief</u>	<u>Final Belief</u>
Prior experiences	Asking students what they need is important	Having conversations with students about teaching and learning is important
	Usefulness of qualitative approach to action research	Maintained belief throughout the study
Teaching context	Her at-risk students need more than just someone to teach them science	Action research could give her students a way to express what they need to feel cared for
	Younger students are not mature enough to contribute to the classroom	The majority of her students could share their ideas in an effective way
Benefits to teachers and students	Importance of teacher-student relationships	Maintained belief throughout the study
	Student voice was important related to choices	Students do not always want choices

Engaging in dialogue with students. At the beginning of the study, Sasha believed that asking students what they need is important because she cares about what they have to say. Throughout the course of the study, she began to develop ideas about the importance of having conversations with students about teaching and learning. During the first interview, I asked Sasha how she gives her students a voice based on the definition I provided during the district-wide PD day. I defined student voice as the belief that students' ideas and opinions matter, they have important things to say, their voices should be heard, and they should have more opportunities to participate in their education. One of the ways Sasha gave her students a voice in the classroom prior to her action research was by giving them choices related to assignments; for

example, by giving them choices in how they want to present information or what they want to work on:

I give them a lot of options as far as, mainly with projects that we do. It's never really a specific type of project. I'll tell them I want this and this information and how they present it is up to them. And especially being a magnet and an arts school, they get very creative...And then I also let them choose sometimes little details about how or when they do things. Give them options like do you want to have an extra day on this assignment, or would you rather speed up?

Asking her students what they wanted or needed was not an unfamiliar idea to Sasha prior to this study. Part of being a caring teacher is listening to students (Noddings, 2012b) and because she cared about what they had to say, she valued communication with her students and maintained this belief throughout the study. She stated in our second group meeting, *"they were really just happy and appreciative that I even asked what they wanted and to be even attempting."* This was mentioned again in a journal response as she reflected on the action research process. *"The students are very excited to have a say in what and how their teacher teaches and treats them."*

She was also very open with her students about her action research and made sure they were aware of what she was doing during every step of the process. She took time away from teaching content in class to have extensive conversations with her students about teaching and learning. She talked about this in one of her journal entries, *"the students really want their other teachers to listen to and value their voice."*

Sasha told me about a conversation she had with her upperclassmen, that lasted the entire 50-minute class period, about the overall state of education and what they thought should be

done about it. She also said her students were more engaged in her class than before the action research and they were having more conversations in general:

They were definitely a lot more bought into the whole process and because they knew I was giving them that choice and listening to their opinion, they definitely were doing more and having a lot more open discussion whether it was about the teaching and learning process or science in general.

Throughout the action research process, Sasha changed her beliefs to include understanding and caring about students requires more than simply asking them what they need or how their day is going, it requires engaging in dialogue with students (Noddings, 2002). If educators value student voice, they need to be prepared to engage in conversations with students to get a better idea of what they want from their teachers (Lodge, 2005). Because Sasha communicated that she cared about her students through her willingness to listen to her students (Noddings, 2012b), they were willing to open up during conversations with her and she was able to understand them better (Cook Sather, 2007; Mitra, 2006). In this way, she was able to move up to the second level of the participation hierarchy and include her students as active respondents in the classroom.

Value in qualitative research. Sasha saw the value in using qualitative research to ask her students more open-ended questions and give them a voice. This belief was maintained throughout the course of her action research. In the second group meeting we talked about her prior experience with qualitative research she did as part of her master's program with at-risk students and some of the challenges she faced interpreting the data:

You can't just run it through a program...That's how I felt with my last one. I was like, 'this is the worst thing ever, I didn't even find anything.' And my professor was like,

'yeah you did. Look you said all of this.' And I was like, *'but their grades didn't improve.'* And she was like, *'yeah but they were coming to class and they did this.'* And I was like, *'well maybe they did improve.'*

Her experience in her master's program with conducting qualitative research on relationship building between teachers and students may have helped her embrace a more qualitative approach to her action research. This is supported by prior research, which says that personal experiences, including academic and professional experiences, can have an influence on teacher beliefs and how they translate into practice (Kang, 2008; Mansour, 2013).

Because she cared about her students, especially students at risk of failing, she was open to communicating with them so they could share their voice in their own words (Noddings, 2012b). This allowed her to collect qualitative data to inform her practice and better meet their needs. She believed her students had important things to say and collecting qualitative data from them in the form of open-ended surveys and conversations helped them express themselves in their own words. In one of her journal posts she stated, *"I believe in education students' involvement is the key to accurate research. They have valid opinions and what better qualitative data then right from the students' mouth."* In this way, Sasha was able to implement student participation at the second level of the hierarchy because the students were able to express their voices in their own words, rather than the teacher controlling student participation as in level one where students are sources of information (Fielding, 2001).

Teaching context. The context in which Sasha teaches influenced her beliefs about student voice. Her prior experience with research focused on at-risk students made her believe those students need more than just someone to teach them science. She also views her younger students as less mature than her older students.

More than just a science teacher. At the beginning of the study Sasha believed her at-risk students needed more than just someone to teach them science, they needed someone who cared about them as individuals. Her previous research helped her to develop this belief, “*and in that research that I did, I found that relationship building, and mentorship was a big part of that.*” After participating in this study, she believed building relationships through action research was a way she could give all of her students a voice and the ability to express what they need from their teachers. In the second action research group meeting, she also reflected on and talked about how conversations with her students reminded her why she became a teacher:

That was really cool to have that kind of conversation and that interaction with them. But it also kind of, in hearing the things that they need, and that their teachers aren't giving them that, kind of made me sad but also made me remember that's why I became a teacher and a high school teacher. I remember having those teachers and I want to make sure I am one less teacher who is just there for that paycheck. I had a teacher say that to me once.

The feedback she received from her students helped her understand they do need more than just someone to teach them science and reinforced her caring attitude, especially towards her at-risk students. Her conclusions suggest that teachers need to do more for their students than they are doing on a day to day basis. Teachers need to care enough to build relationships with students (Noddings, 2013; Sickle & Spector, 1996) and to give them a voice to communicate what they need.

Student maturity. Prior to her action research, Sasha believed her younger students were not mature enough to handle sharing their ideas about teaching and learning. However, because she cared for her all of her students and wanted to ensure their needs were met, she was willing

to give them the opportunity to contribute their thoughts (Noddings, 2002). She now believes the majority of her students can contribute to the classroom in an effective way.

While Sasha believed her students should have choices, she also had doubts about whether her student population was always able to make the right decisions about their education. During the first group meeting, we talked about how she could incorporate student voice into her classroom through action research and while she acknowledged, “*with my Anatomy honors kids I might be able to get them to do some basic research,*” she also thought because of their age and maturity level, her freshman Biology students would not be able to handle that level of responsibility and choice. Therefore, while she believed in the value of student voice, she also admitted she faced some issues with including it in her classroom. During our first interview, she mentioned she did not give her freshman as many opportunities as her Anatomy students:

My low-level freshmen as far as when they do things, they don't have as much choice just cause they technically make the wrong decision or they don't use their time wisely so I am more or less working on their organization and their time management.

After the conclusion of the action research, Sasha mentioned several times she was surprised how serious her students took the surveys and the quality of the survey responses. In the second group meeting, she talked about her feelings towards the first survey:

And they could put whatever and I was expecting to get a lot of crazy ones. 'I want no work' ...And in reality, there was only maybe five tops out of all of them. They had to tell me five things and the silly ones came at their fourth and fifth because they were just trying to pick something. They were being very honest, and it was all 'I want respect.' 'I

want to be cared for.’ ‘I want my teacher to be understanding of what I’m going through.’ ‘I want my teacher to support me.’ ‘I want extra help on my work.’

She also mentioned in one of her journal responses how pleased she was that her students took this seriously:

This was an eye opening and incredibly interesting process. I was expecting students to ask for silly and impractical things. While some students did, the majority of students wanted things they should already be getting from their teachers. Things like respect, care, understanding, and support.

Therefore, Sasha changed her mind related to her students’ ability to share their voice and now believes they can make a valuable contribution to the classroom by contributing ideas on what they want and need from their teachers and other aspects of science teaching and learning. This is contrary to research supporting the idea that teachers and educators may think they know better or their students are not mature enough to make a valuable contribution to their classroom (Lodge, 2005; Seiler, 2011). Sasha’s action research gave her a way overcome this negative belief and allow her students to share their voice. Because she cared enough to give them the opportunity to share their ideas, she was able to move up to the second level of the student participation hierarchy and include her students as active respondents as she engaged in dialogue with them (Fielding, 2001).

Benefits to teachers and students. Sasha appreciated the benefits in giving her students a voice even before she began her action research. She believed that by engaging in dialogue with her students, she could better care for and help improve her relationships with her students (Noddings, 2013; Sickle & Spector, 1996). She also believed in giving students a voice related to choices on assignments.

Teacher-student relationships. Sasha started the study caring for her students and believed in the importance of having good relationships with her students, especially with students who have not been traditionally successful in school. Building relationships through dialogue with students eventually became the focus of her action research. In the second group meeting she described a situation that occurred at her school. “*We did have a full out brawl in the lunchroom yesterday. Like, ten to twelve different boys and jumping off of tables, shirts off.*” She also admitted this was rare to see at her school and involved one of her students who had been making a lot of progress with his behavior and academics. Again, she mentioned her concern for the at-risk students in her classes and her desire to help them overcome some of their struggles.

Therefore, it is not a surprise Sasha ended up focusing her action research on building relationships with her students, which she acknowledged was an extension of the previous research she completed in her master’s program. Maintaining good relationships with her students was important to her and she could see how she could build on existing relationships through dialogue with her students (Wood et al., 2013). Because she worked at a school where many students are considered at risk for failing, she believed her students should feel they can come to her for support or if they had something they wanted to talk about. She wanted to improve communication with all of her students, especially those students who did not feel they were successful in school.

I observed her classroom after she administered the first survey for her action research. When I arrived at her classroom on the day of the observation, she introduced me and reintroduced the action research she was doing. At that point they had already taken one of the surveys and knew who I was and why I was there before I entered the room. While I was there, she asked the students how many of their current teachers were giving them the respect and

support they said they wanted and needed. The most common answer I observed was either 0 or 1. The students had many things to say about how their teachers treated them and this question caused a lot of side conversations about specific teachers and how a lot of them just show up for the paycheck and don't really care about or respect students at all. In our second group meeting, we had a conversation about this. Sasha commented, *"I was like that is crazy. That you've only had that many"* and Ben replied, *"And I think that's why kids have such a negative attitude about school. 'I go there, and teachers are mean to me.' I'm surprised in our profession how many people don't like kids. Why are you in this business?"* Sasha agreed by saying, *"You're not making enough money to hate your life every day!"*

Studies have shown that within a safe and supportive classroom environment, students want teachers to know them and to build personal connections with them and those personal connections can only be developed by fostering actual relationships with their teachers (Cook Sather, 2007). The action research gave Sasha a way to continue her caring teaching practice and to begin a dialogue with her students to promote a supportive classroom environment so she could strengthen her relationships with them (Wood et al., 2013). Because she was willing to have these conversations with her students, she was able to move up to the second level of the participation hierarchy.

Student choice. Prior to the study, Sasha gave her students choices on due dates and the structure of assignments. *"I'm very like whatever you want to do, whatever works. Not necessarily on procedures, but on assignments."*

As a result of asking them what they needed, she determined her students wanted more guidance and structure. She realized that sometimes what she thought was helpful in terms of student voice, was not always what her students needed.

Part of the clear instructions that they wanted, cause I asked them to give me details, 'if this is what you're picking, clear instructions, what do you mean by that?' And so the conversation we had about that was like, 'if I'm going to turn in this assignment, what are you looking for?' So, clear expectations of what I wanted to see in their work.

Because her students requested more structure with assignments, Sasha will be decreasing her students' participation in this aspect of her classroom in the future. This is because she cares about listening to her students in relation to what they need out of their education (Noddings, 2012b).

Classroom Practices Related to the Inclusion of Student Voice

Sasha's classroom practices changed as a result of her action research. Even prior to the study, she held beliefs that students should have a voice in the classroom and some of her practices were a reflection of these beliefs. After the study, she has changed some of these practices to include more student voice or give her students more of what they asked for during her action research. Table 9 on page 99 summarizes Sasha's practices related to student voice.

Prior experiences. Sasha's prior experiences with teaching influenced how her beliefs about student voice translated into practice. She believed student voice was important prior to the study and that students should have choices in their education. However, she also struggled with how to share control with her students.

Student voice is important. Sasha valued student voice and cared about what they had to say prior to study but as her action research progressed, she realized she needed to be even more attentive to what students need on a daily basis. She also mentioned in one of her journal entries how this research made her think about how important it is to listen and pay attention to your students.

<u>Themes</u>	<u>Initial Practices</u>	<u>Final Practices</u>
Prior experiences	Valued student voice	More attentive to asking students what they need on a more regular basis
	Gave students choices on due dates and structure of assignments	More guidance and structure on assignments
Teaching context	Did not feel completely comfortable giving up control to her younger students	Action research gave her a way to share control with students
Level of participation	Students as data sources only	Was able to move up the hierarchy to students as co-researchers (future plans)

Sometimes what her students wanted were things they should have been getting from their teachers already. She talked about what I had witnessed during the observation:

The fact that the students asked for these things means their teachers are not giving it to them. When I informally asked, how many of the ~7 teachers they have this year embody all the things they wanted in a teacher, the responses were between 1 and 3. When asked about all the teachers they had ever had (preK-11/12th grade) they said ~5. This was very sad to hear. Their responses reminded me why I became a teacher and why it is so important for teachers to build relationships with their students and give them a voice in the classroom.

She also mentioned getting unexpected responses from students. She told me about one of her students who had responded and said she did not get support at home and needed her teacher to provide more structure so she would get her work done. Sasha said she would have never expected that type of response from that particular student because she was quiet and did not ask for help. She continued this idea during our second interview and said:

It also kind of reminded me that we really have to be conscious of everything that we're doing and think about it more. We get so busy and we get so caught up in the day to day and other stuff we're made to do and have to do that you kind of forget that I need to make sure my instructions are as clear as possible and that I'm explaining everything and double checking that they all have everything that they need. It takes a lot more work but even just a simple saying, 'how are you doing today?' That caring piece, that respect, that relationship.

We discussed what her future plans were related to this research in her second interview and she stated she wanted to continue checking in with her students to make sure she is giving them the understanding, respect, and structure they said they needed:

I think I will continue to touch base with this same topic. "Am I meeting your needs? Is there something I'm still not doing?" This was something I did before, so I'll probably do that but ask about the specific things they mentioned.

I have not been able to reach her to follow up with this, so I do not know if she actually continued to check in with her students.

Sasha used this action research study as a way to increase communication and strengthen her relationships with students and consistently communicated with her students throughout the action research, so they always knew what she was doing and why. Engaging in dialogue with her students allowed them the opportunity to be active respondents in the classroom and move up to the second level of the participation hierarchy (Lodge, 2005). McGregor (2007) states teachers need to facilitate conditions for students to share their voice and Sasha was able to do that through her action research. This finding is further supported by research that says action research can help build relationships and give students a voice (Rogers et al., 2007). Related to her teaching, she acted as a caring teacher because she was more attentive to her students' needs

and ideas as a result of what she learned through her action research (Noddings, 2002). In her last journal entry, she said:

I'm a lot more conscious of what I'm doing and what I'm saying and the activities I'm doing based on what they told me they wanted and needed. I'm constantly thinking am I meeting that, am I not meeting that, what do I need to do to meet that? And just trying to make as many adjustments towards what they need as opposed to doing the same old thing...I always valued student voice but will definitely be listening a lot more.

Student choice. At the beginning of this study, prior to any action research, she stated in her interview that student voice was important to her and she included her students' voices in a variety of ways, including giving them choices and freedom in assignments, *"I just want this information. But what you do with that, when you do it, that's up to you. I'm not as particular and for them, a lot of them, they have a hard time."*

Based on her students' request for more detailed instructions, Sasha changed her classroom practices related to how much choice to give her students and decided to start giving them more structure related to assignments. In this way, she was able to partner with her students to better understand them (Noddings, 2002) and to make changes in her classroom procedures to better meet student needs (Mitra, 2006). She was able to listen to students needs and feedback on classroom practices to gather data in order to make decisions to best help her students learn (Yonezawa & Jones, 2009). This finding indicates that while some teachers may think they know what is best for their students, they are not doing what their students need.

Giving up control. Sasha did not feel completely comfortable giving up control to her students at the beginning of the study. She initially expressed doubt her freshmen would provide reasonable responses to the survey questions, but she still cared enough and believed they had

something of value to say and could be taught to use their voice so she gave them the opportunity to do so. In her first interview, she stated, *“I do think they could learn and think that they could, but it would take teaching them the right option and then allowing them to have that freedom.”*

During the second interview, we revisited her initial belief that her freshmen might not be able to have input into the class and I asked her if she changed her mind after reading their responses. She replied, *“I would say a bit. Their responses were pretty similar to the upperclassmen, at least for the ones who answered. They did know that what they want.”* She continued this by saying that action research was an effective way to elicit her students’ voices. In this way, Sasha was able to introduce her students to being asked to provide their thoughts about aspects of teaching and learning. She wants to use surveys and conversations in the future with her freshmen in order to elicit their ideas and opinions and better understand their thoughts on science teaching and learning:

It was an easy way to get voices from the freshmen without having too much freedom. I definitely think I will start implementing that a little more with them. Especially now that we’ve been through half a year. They’re getting more accustomed.

Educators need to be careful not to give students too much responsibility before they are sure of what they can handle (Binkley, 2011; Peterson, 2007). Going along with this idea, Sasha was able to ask her students for their ideas in a structured way through the use of surveys and class discussions. Research supports the idea that teachers are not always willing to give up control to their students and may feel threatened when attempting to do so (Hagay & Baram-Tsabari, 2015; Mitra & Gross, 2009; Robinson & Taylor, 2012; Seiler & Gonsalves, 2010). However, action research gave Sasha a way to give up some control over classroom decisions and provide her students with a structured method to share their ideas in order to move up to the

second level of the participation hierarchy. Action research may be a way for other teachers to overcome their hesitation to giving up control to their students and allow them to include student voice in their classroom.

Level of student participation. Sasha initially included her students only as sources of information at the beginning of her action research (Fielding, 2001; Lodge, 2005). However she cared about listening to her students and discussing conditions of teaching and learning with them (Noddings, 2002) so eventually she was able to move up the hierarchy to include students as active respondents where she engaged in dialogue with them about conditions of teaching and learning. Because of her caring nature, she supported the idea that students can bring something worthwhile to discussions about education and her students moved from being the object of research to one of more active participation (Flutter & Rudduck, 2004; Noddings, 2002). Moving forward, she has a plan to move student participation up to the next level of the hierarchy. She wants to collaborate with students as co-researchers (Fielding, 2001) by having them present the results of the research to faculty.

Even though she was willing to increase student participation in her classroom, she was not able to move to the top of the participation hierarchy where her students would have acted as researchers (Fielding, 2001). This may indicate that a more usable model of student participation would include the top level being teachers and students collaborating to investigate conditions of teaching and learning.

Affordances and Obstacles Related to the Inclusion of Student Voice

Sasha encountered both affordances and obstacles with including student voice throughout the course of her action research. Table 10 on page 104 summarizes the affordances and obstacles she experienced during the study.

<i>Table 10. Affordances and Obstacles Sasha Encountered While Attempting to Increase Student Voice</i>		
<u>Themes</u>	<u>Affordances</u>	<u>Obstacles</u>
Benefits to teachers and students	Good relationships with students that strengthened throughout the study	
Teaching context		Time constraints with designing and implementing an action research study focused on student voice Support of other faculty and administration

Benefits to teachers and students. Sasha acknowledged that even before she began her action research, she had good reciprocal relationships with her students (Noddings, 2013), and this made it easier for her to ask them questions during the action research:

I think because I had a good relationship with my students to begin with, that allowed them to be very honest about what they wanted and what they needed. As opposed to if we didn't have a really good relationship, I would just get some really generic answers. But I got some really, very honest answers. I think that probably helped a lot.

Sasha felt her students were more open than they would have been if she had just been going through the motions of collecting data from them. Through these existing relationships Sasha was able to better engage in dialogue with students to continue to build these relationships (Cook Sather, 2007; Smyth, 2006). Furthermore, by engaging students in dialogue and as part of the research process, she could see the value in their contributions to education (Fielding, 2001), which may have strengthened her beliefs even more. These existing good relationships were likely a result of her focus on caring for her students and making sure their needs were met (Noddings, 2013; Sickle & Spector, 1996).

Teaching context. The context in which Sasha teaches presented challenges with implementing student voice. Specifically, she faced issues with the pressure she is under with trying to cover material and complete other responsibilities related to teaching. She also encountered issues with the lack of support from other faculty members and the administration at her school.

Time constraints. One issue Sasha talked about during the first interview with giving her students a voice is the time constraints she has with covering all of the required material:

As well, we have a lot of information to do in a very short time period. We don't have until May, we have until the earliest end of March, beginning of April is when they take their end of course exams. We kind of have to go fast.

Our second and last interview occurred during midterm week, so the students were released early. I went in to the office where the secretary told me there was a training today and Sasha was probably not in her room, but I could look for her in their PD room. I headed up the stairs but did not see her in the large room they used for PD. I then went up the stairs to the third floor to see if she was in her room. Fortunately, she was just heading back to her room for something, so I caught her right in time. She said she had forgotten about meeting me but agreed to do the interview and said she only had about ten minutes (but we ended up taking about 20 minutes).

Because she used a qualitative survey, she spent a lot of time analyzing the data. She mentioned this in one of her journal responses by saying, *“The platform I initially used to get their first survey results was not user friendly. I had to sort and categorize responses by hand.”* She also discussed the time constraints she faced as a teacher and having to collect and analyze data along with her regular teaching responsibilities:

And with all the stuff as teachers we have to do, you get busy and it's hard to constantly be implementing certain things...when I say time, I don't necessarily mean time in class, I mean time for the teacher to prepare.

This does align with research that claims a lack of time to spend on preparing for and listening to student voice can act as a significant barrier to placing beliefs about student voice into action (Lewis & Burman, 2008). This is because of the pressure on teachers to plan for and deliver content in a specific amount of time (Fielding, 2004; Frost, 2008; Lewis & Burman, 2008). While collecting this qualitative data gave her a better insight into what her students were thinking and allowed her to move up to the second level of the participation hierarchy, it may at times be unreasonable to use it in surveys to allow students a voice. This may provide support for taking time to have discussions with students in class to still allow for a dialogue between teachers and students (Lodge, 2005) and also to avoid analyzing time-consuming survey data.

Support of other faculty and administration. Sasha expressed an interest in sharing some of her results with other teachers in the school but admitted there were issues with getting other teachers and the administration to listen to students' ideas about education. She even discussed the possibility of including her students in this:

I definitely think there were a lot of students who would be willing to talk to the teachers and maybe do a little more of the research on their side like what specifically are some of their other teachers doing that is maybe harmful or what are they doing that is helpful? And sharing some of that information...but I like that, and I think that is a way that we could move it up into that next level [of the hierarchy].

However, she admitted there were many teachers who either may not be willing to listen or would not take the time out of their schedules to do so. In the second action research group

meeting she mentioned she had talked to other teachers who also share a belief in the importance of student voice, and they had discussed getting students to attend their faculty meetings to share ideas. *“We’ve been trying to do something like that for a while, but a lot of the teachers don’t care... We can barely get teachers to come to the faculty meetings, let alone sit there with their students.”* But she also described how some teachers at her school did not seem to care and would just get up and leave the faculty meetings if their contract time was up, no matter what was being discussed at the time. She was hesitant to bring students to these meetings only to have them feel as if they were being disrespected even more and the teachers did not care what they had to say. She brought this up again in her second interview and said:

I think there’s some pushback from either other faculty or from administration. Not feeling like faculty is ready to hear some of the criticism or maybe they’re scared but I think maybe...it hurt some of the things, not that there was a lot.

This type of school culture can hinder teachers’ actions no matter what their beliefs on student voice (Buehl & Beck, 2015). However, even with this lack of support, Sasha was able to carry out an action research project to increase student voice in her classroom and has plans to continue to listen to her students in the future. This speaks to her belief about the care she expressed towards her students and the importance of student voice and may indicate that if a belief is strong enough, teachers can overcome some of the challenges they face with including student voice.

Chapter Summary

Sasha’s background and experiences influenced her beliefs about student voice, her classroom practices, and her approach to her action research throughout the course of the study. She did many things that demonstrated how she cared about her students. She valued her

students' ideas and was open to having conversations with them and collecting qualitative data that allowed them to express their ideas in their own words than she was prior to her action research. Because of this caring relationship, she had some prior experience giving her students a voice and was willing to continue to listen to student ideas about their education. This prior experience giving students a voice in her classroom may have allowed her to see how she could progress to the next level of the hierarchy of student participation and begin to collaborate with her students through researching conditions of teaching and learning and presenting findings to faculty.

This action research influenced both her beliefs about student voice and her classroom practices. As a result of eliciting her students' feedback through action research, Sasha changed both her beliefs about student voice and her classroom practices. The action research also caused her to evaluate some of the affordances and obstacles that may influence these beliefs and practices in the future.

Sasha's beliefs influenced her classroom practices in several ways. She believed building relationships with her students is important. Therefore, this was the focus of both her master's research and her action research as part of this study. In addition, prior to this study, she believed students should have a voice and cared about what they had to say. Therefore, this belief caused her to implement student voice at a higher level of the hierarchy as part of her action research by moving from students as sources of information to engaging in dialogue and collaborating with students to share information with faculty. This is evidenced by her desire to get students engaged in the action research process and also present the findings to other faculty in the future. Finally, as a result of the action research, she developed a new approach towards giving her

students choices on assignments. She now realizes that sometimes she needs to give them more structure and direction instead of leaving her assignments open-ended.

Sasha's classroom practices also influenced her beliefs about student voice. As a result of administering surveys to get student ideas, she changed her belief that her students were too immature to provide feedback in a meaningful way and they could handle sharing ideas and opinions. As a result of asking for student feedback through action research, she developed a new belief about giving her students choices on assignments. While she still believes they should have choices, she now believes that sometimes what they want is the choice to have more structure and direction. After engaging in this action research project, she now believes this process is an effective way to improve relationships with her students by increasing dialogue.

Throughout the study, Sasha identified several affordances or obstacles that may have influenced her beliefs and either her current classroom practices or plans for student voice work in the future. She believed that caring for and having good existing relationships with her students helped her when asking for their feedback. This allowed her to engage in dialogue with her students and gather honest answers from them she could use as data to inform her instructional practices. On the other hand, she encountered issues with having enough time to plan, implement, and reflect on her action research. This may have influenced her belief about how feasible it is to do a similar action research project in the future. Finally, working in a school that does not respect student voice may hinder her efforts moving forward.

Chapter 5: The Scientist Who Teaches Science

In this chapter, I will present the case of Ben as someone who identifies as a scientist but teaches secondary science. The chapter is organized by the research questions that guided this study and then by themes within each research question. The following research questions guided this study:

- How do high school science teachers' beliefs change as they engage in action research in order to increase student voice in their classroom?
- How do high school science teachers' practices change as they engage in action research in order to increase student voice in their classroom?
- What affordances or obstacles do high school science teachers encounter while attempting to include their students' voices in the classroom?

Ben was an active participant throughout the data collection process for this study. Data I collected on Ben include two action research group meeting transcripts and narratives, pre and post interview transcripts and narratives, four journal responses, and two periods of classroom observation. All three research questions were addressed during these interactions. Experiences and descriptions from Ben addressed his background experiences and how these may have influenced his beliefs about teaching, learning, and student voice; how these beliefs may or may not have influenced his teaching practices; and the affordances and obstacles he encountered throughout the research.

I present Ben as a case of a teacher who believes he is a scientist first, and a science teacher second. He clearly wants his students to succeed, as evidenced by the innovative ideas he

has about teaching and learning. He includes many ideas in his teaching practice to help his students, especially his English Language Learners (ELLs), be successful in school and likes to collect data on which to base his classroom decisions. Part of his background in science is what makes him a good science teacher and shows he cares about his students. But because his background is primarily in science, he tends to approach his teaching and his students in an analytical way. He believes his students will act a certain way and he will not be able to motivate them or get them interested in science.

Background Information

Ben holds a bachelor's degree in Interdisciplinary Chemistry. When I asked him during our first interview if he had a degree in education, he replied, "*No. I'm a scientist.*" However, he does have some background in education, having completed 40 credits towards a master's degree. He did not finish because the program was cancelled due to low enrollment and he has no desire to go back and complete a similar program. He described this program as a master's in teaching science but that it "*included technical coursework*" in science and one of the reasons enrollment was low was because "*they didn't have enough ed majors who could do it.*"

Because of his bachelor's degree in science, most of his past work experience is in the science field. He mentioned working in hospitals, doing cancer research, and working with the Environmental Protection Agency (EPA). He also worked as the manager of a science learning lab at a university for several years. He described this position in our first interview. "*So, if it was science, I did it. Biology, anatomy and physiology, chemistry, all the medical – nursing, dental hygiene, rad tech. I know a sick amount of science.*" This position allowed him to get some teaching experience before he moved to Florida in 2011 and began teaching public school. When I asked him in the first interview why he wanted to become a teacher, he described this

change in his life and said, *“when I moved down here in 2011, my grandmother was sick. I became her custodial guardian. I had done cancer research and EPA work before that... and I had been teaching, just not officially. And I get summers off. My wife gets mad, but I say I’m semi-retired and this is what I do for fun.”*

Ben currently teaches mostly students in grades nine and ten but does have some students who are retaking Physical Science as upperclassmen. He teaches six sections of this course – the school has 24 sections total because they are in a transition period of switching the grade levels when students take physical science and biology. This is his first year at his current school. This year he is only teaching Physical Science but said he has *“taught almost every science course here in the district. From 7th grade to AP Chemistry.”*

For our first interview, I arrived at the school just before the end of the day and parked in the back parking lot to avoid the parent pick up line. I went to the office and signed in, but they insisted he had to come escort me to his room. So, I waited for Ben to come get me when the bell rang. We walked to his classroom, which is set apart from the main school building. Even at the end of the day, the students were relatively quiet while walking to their cars or buses. I did not observe anyone yelling or playing around. Ben described his school as having a large Hispanic population (approximately 55% of the students) but he says his classes are more like 75% Hispanic and they are lower performing than most ELL groups he has worked with in the past. According to information on the school’s website, the student population is actually 52% Hispanic, 31% white, 7% black, 5% Asian, and 5% are of mixed race. In the 2017-2018 school year, the graduation rate was 95.7%, which was up from 94.7% in the 2016-2017 school year (Tobin, 2018). This was the highest graduation rate out of the three schools represented in this study.

Description of Action Research

During the first group meeting, Ben admitted he was struggling with thinking of ideas for his research. During this meeting, he talked a lot about his ELL students and how to best meet their needs. I suggested he focus his research on those students, but he was concerned about the language barrier issues. He eventually decided his plan was to post a survey online to obtain student opinions about classroom activities in order to increase student buy in and engagement. He described this research in his first journal entry by saying:

I'd like to give my students more voice and say so in the classroom by letting them select the learning activities for each unit. I have a toolbox of classroom activities that I run every year and I'd like to set up polls on Edsby [the school district's online platform] to let the students pick their daily activities.

After Ben completed his action research, he described the types of questions he asked about classroom activities during the second group meeting. “*And I surveyed the kids, ‘hey which of these do you like?’ I got the results. And I also asked a follow up, ‘which one did you learn the most from?’*” After his students completed the first survey and he gathered data to use when making decisions about classroom activities, he decided to investigate student preferences for rewards. He described the thinking behind this survey during the second group meeting and said:

I also did one...in my school we've started a positive behavior system and we're trying to give rewards for good student behavior. And it hasn't been going well...And I surveyed the kids, ‘how do you like to receive rewards?’ And it turns out what we are doing with the positive behavior system, that is not how they like praise. It's like could we reward them in one of these other ways they like, and would it work better...We're giving them Raven bucks and then they can go to the school store and get stuff. Pencils and things.

That's middle school... The most popular thing is they can buy a skip the line ticket at lunch.

In one of his journal entries, he also discussed the rewards they told him they would prefer to get, which included, “*gifts, verbal praise, and individual interaction.*”

Beliefs About Student Voice

Ben held beliefs related to his prior experiences in teaching and learning, the context related to the environment in which he teaches, and the benefits he sees with including student voice in his classroom. Some of these beliefs were influenced by engaging in the action research, but some remained unchanged throughout the course of the study. Table 11 on page 115 summarizes these initial and final beliefs about student voice.

Prior experiences. Ben’s prior experiences in the science field influenced his beliefs going into this study. As a scientist, he has worked in research settings in the past, so he believed in the importance of researching conditions of teaching and learning. He has also worked primarily with quantitative data, so he understood how he could learn from collecting and analyzing this type of data.

Importance of engaging in research. Prior to the study, Ben believed in the importance of engaging in research, collecting data, and learning from the data. This is because he had some prior experience with action research. He described his previous action research study in the first interview on how the position of the instructor in the room influenced student engagement:

I have done action research before. I did an engagement study and it was simply on the position of the instructor. Because you have some who just stand there at the podium and you have some who wander the room. And I had somebody sit in the back of the room with the chart and they

swept the room every six seconds and marked whether people were engaged or not. Of course, positional authority, you come up with when the teacher is over there, they pay more attention.

<i>Table 11. Ben's Beliefs About Student Voice</i>		
<u>Themes</u>	<u>Initial Beliefs</u>	<u>Final Beliefs</u>
Prior experiences	Research experience helped him understand the importance of action research	Maintained belief throughout the study
	Qualitative data is not as useful as quantitative data	Maintained belief throughout the study
Teaching context	Needed to do more for his ELL students	Maintained belief throughout the study
	Students lack motivation to do anything not tied to a grade	Students were able to provide feedback through surveys
	Students are not mature enough to share their thoughts and ideas	Students can share their voices in an effective way, but only with structure
	If a student has something to say, they will say it in some manner	Maintained belief throughout the study
Benefits to teachers and students	Importance of engaging students in activities	Action research was a way to increase student engagement and buy in
	Students are not interested in science or education in general	Maintained belief throughout the study

He also talked about how his practice has changed as a result of the data he analyzed as part of his action research:

I video record myself sometimes and I put that on the board, so it's me. I can also put it online if you've been absent. But it allows me to be two places at once in the room. And

it's a generational thing. If it's me talking to them, they'll chit chat and it's hard to keep their attention. If I put a video on, hypnotized chickens. And positionally, I squat on whoever is the least obedient person in class. Two places at once.

Ben often referred to the usefulness of his action research in giving him an opportunity to collect data in a systematic manner in order to make classroom decisions. He stated during our second interview, *"I think it has been helpful in terms of planning my classroom...this way I have metrics and data to use and that's always fun to trot out for the administrators...and as a science guy, I like collecting data."* After the study, I asked Ben why he wanted to participate in this research in the first place and he said because he was a scientist, he was *"always experimenting on something."*

Ben's prior research experience made him more likely to participate in a research study using action research as a way to explore and reflect on his teaching practice (Mansour, 2009). However, when asked about why he wanted to participate in this research, he never mentioned wanting to participate because he wanted to increase student voice in his classroom. This may be a reason he chose to stay at the bottom level of the participation hierarchy. He was able to gather data from his students to inform his practice (Fielding, 2001), but did not feel the need to give them more opportunities to share their ideas. This demonstrated he cared about his students because he was willing to listen to them (Noddings, 2012b) but because he did not place importance on engaging in dialogue with them (at least during this study), he was unable to move up the hierarchy (Lodge, 2005).

Preference for quantitative data. Prior to and throughout the study, Ben believed that qualitative data was not as useful as quantitative. Ben's background in science led him to have more confidence in statistical analysis over the interpretation of words. Ben chose to use

quantitative survey data in his action research because he said, “*coming from a chemistry background and everything, I’m used to data points and graphs and we had this conversation, but it just feels soft and squishy.*” He had previously mentioned this idea of qualitative data being “squishy” during our second group meeting when Sasha was sharing how she collected and analyzed her data.

After the action research was over, I asked Ben a follow-up question about whether he was more comfortable using quantitative data because of his science background and his answer was “*yes, absolutely.*” This is supported by previous research that claims academic and professional experiences can have an influence on teacher beliefs (Kang, 2008; Mansour, 2013). While Ben understood the importance of collecting data to make decisions about teaching and learning, this resistance to seeing the value in qualitative data may have prevented him from going further with his action research and including his students at a higher level of the participation hierarchy. He administered surveys instead of engaging in conversations with his students so they could share their voice in their own words. This may be another reason of why he chose to stay at the bottom level of the participation hierarchy. Moving up to the next level would have required him to engage in dialogue with his students (Lodge, 2005) and collect qualitative data, which he was not comfortable doing.

Teaching context. Ben’s teaching context, including perceptions about his student population, influenced his beliefs on student voice. He recognized the need to provide his ELL students with resources to succeed. However, he also tended to think of his students in general as lazy or unmotivated.

Needs of ELL students. Ben maintained a belief of needing to do more for his ELL students throughout the study. As a result of his student population being comprised of so many

Hispanic students, he had some language barriers and several students who did not speak any English at all. He often talked about his concern for his ELL students, how the district treats them, and what he can do to help them learn. In the first action research group meeting he stated, *“on the first common assessment, 10% of my students were at the guessing level. They just can’t even read the question well enough to give a coherent answer. So, I feel like I’ve met my match with that this year.”* He also mentioned this during the first interview, *“I’m feeling challenged this year... cause you feel like you’re a good teacher and you’re like this kid cannot even understand what I’m saying.”* During the first interview, he also expressed his frustration with how the district treats the ELL students:

To use a military term for it, they’re using a penny packet approach. They’re trying to take the resources and spread them all over the district. And then you’re spread too thin. It’s supposed to be a safety net, and there are holes in it. They’d be better off concentrating their stuff at one school, have everybody be really proficient, and letting the kids go there for a semester, and then send them to their local neighborhood school.

He shared some resources with me – vocabulary flash cards the ELL students can choose to make in place of the regular class assignment. He told me in the first interview:

This is their assignment. In place of [the regular assignment]. They can either do what I assigned if they understand it and want to do what everybody else is doing, great. If they don’t understand it, they can be doing this. But you got to be doing one or the other...I don’t know what else to do. I’m not going to just let them sit there and fail. I want them to improve.

He further described this flash card activity to the group in the first action research group meeting:

I have come up with an activity that I'm doing with them. I came up with a clever acronym, it's called BASE. Beginning Acquisition of Scientific English. And I ran this by the ELL department, and they are all about it.

He also has a book that explains science concepts in simple terms. The idea of the book is that scientists can write descriptions of science concepts using only the 1,000 most common words in the English language. He encourages his English-speaking students to write descriptions of physical science concepts using only these words in the English language. His hope is that if the ELL students can learn those words, they will be better prepared to learn science concepts using the book.

His belief in the importance of differentiating his instruction for his ELL students initially caused him to think about focusing his action research on what he could do to help these students more. He expressed concern about his ability to help them learn and has several methods he uses to help them do so. A component of caring is a teacher's interest in engaging students in science content (Jansen & Bartell, 2013; Sickle & Spector, 1996). In this way, Ben showed he cared about his ELL students because he attempted to help them learn science in many different ways.

Even though Ben believed he was responsible for providing these students with resources to help them learn, he did not see how it would be possible to ask them for their input on what they needed. For teachers to include student voice, they need to feel that it is possible to do so (Buehl & Beck, 2015). This finding may indicate that teachers with students who cannot share their voice because they do not know what they are being asked, may need more support in order to elicit these voices. This may also be another reason why he did not move up past the first level of the hierarchy to engage in dialogue with his students (Lodge, 2005). He may have felt that

many of his students could better answer scripted survey questions rather than try and answer in their own words.

Student motivation. Although Ben was interested in learning more about his students and willing to participate in a study on student voice, he expressed doubt that his students were motivated to participate in his research at any level without receiving some sort of extra credit. He viewed his students as lazy and unmotivated and expressed his disbelief that younger students would be willing to participate in action research with their teachers. In the first action research group meeting, he shared his belief that his students would not be willing to do more than complete a survey:

I would love to have the students to come up with the question and frame it and do research on it. But who's going to do that? And again, I think that's the level of student you're dealing with. I think an AP Bio student would be all about that. I don't know about regular Earth Science. How do you get them to lead a research project on student voice?

During the second interview, when asked what obstacles he faced when trying to incorporate student voice, he replied, “*initially student participation. Because it wasn't for a grade. And here it is, their voice. You'd think they would want the chance to speak. And I think it depends on what level – is it regular, honors, AP.*” However, while I was visiting his class, he did not explain the survey to his students, he only told them it was for extra credit. It is possible that if they knew he was using that data to inform his teaching decisions to better meet their needs, they may have been more willing to participate.

Even though students were able to share their voice in an effective manner through surveys, Ben's beliefs may have influenced him to stay at the bottom level of the hierarchy

because he believed he could only get his students to act as sources of information (Fielding, 2001). He did not try to encourage student participation in any other way aside from offering extra credit. He also did not try and talk to his students about their participation or ask them if they were interested in contributing to the classroom. However, he did value listening to his students to hear their feedback through surveys, which showed that he cared what they had to say (Noddings, 2012b).

Students always have a voice. Prior to the study, Ben believed that if a student has something to say, they will say it in some manner. He was able to identify these nontraditional meanings of student voice and noted many things could be considered students sharing their voice, such as misbehavior or acting out in class. He stated during the second interview:

I think students always have a voice in their schooling. It's just whether the teacher is aware of what their voice is...if a teacher is listening. Kids have a voice. They will express themselves. Sometimes, bad behavior – that is a kid voicing their opinion.

During the second interview, he also said, “*and you can either ignore them or adapt.*”

This belief may be why he did not feel he had to do more to elicit their voice and move up to the second level of the participation hierarchy. Some research supports the idea that there are many interpretations of student voice and it may manifest in different ways in the science classroom, including expressing appreciation or dissent (Cook Sather, 2006). However, just because a student is able to express their voice in different ways, it does not mean they are being heard by their teacher (Lodge, 2005).

Student maturity. At the beginning of the study, Ben believed his students were not mature enough to handle sharing their voices. Throughout the course of the study, he learned that students can share their voices but only with structure.

He also doubted his students would be able to share their ideas in a meaningful way without the structure of a Likert-style survey, even after listening to Sasha discuss her qualitative data. During the second interview, he described his hesitation to ask open-ended questions on his surveys and justified this by saying:

I think I made it, so it wasn't open-ended enough to get to that point...I wanted to make sure I got something usable. If it is so open-ended, then they can get off track. Like you have a good point there, school lunch sucks.

Ben ended up surprised by his students' honesty on the survey and how willing they were to admit a particular activity helped them learn, even if it was not fun for them to do. He commented during the second group meeting, "*and I was surprised because they were honest, 'yeah, we didn't like it but we did learn a lot.'*" Teachers and educators sometimes think they know better or their students are not mature enough to make a valuable contribution to their classroom (Lodge, 2005; Seiler, 2011). In this case, Ben was able to change his beliefs about his students' maturity as a result of his action research. However, he was resistant to moving up past the bottom level of the hierarchy because he did not think his students would give him usable data if he tried to engage them in dialogue (Lodge, 2005).

Benefits to teachers and students. Ben's beliefs about the benefits of including student voice were influenced through his action research. He saw how student engagement could be impacted by asking his students what they preferred or needed related to activities. He also expressed his ideas about student interest.

Student engagement. Prior to the study, Ben believed in the importance of student engagement in activities and as a result, focused his action research on how to increase this in his classroom. As a result of including his students as data sources, Ben believes he has more student

buy in to the activities he routinely uses in the classroom because he has data he can show them where they identified which activities help them learn best and are most engaging.

Ben acknowledged the benefits of asking about student ideas related to the teaching and learning process. *“I find that the students are more responsive to some of the assignments I give now because I surveyed them, they saw the data.”* He elaborated on this during the second interview by saying that it helped the students see research in action:

Well, I think they were interested in it. I also think it’s real-life science and we’re conducting an experiment and it’s good for teaching my subject matter. And just the idea that you can use it...and this is what I struggle with in science. Kids think that science just happens within four classroom walls and when you breathe in and out, that’s science. They can see this, and they can apply it to their life. We could make our classroom better if we did an experiment. It’s a revelation for them.

Because Ben was willing to listen to his students and let them share their ideas, he increased student engagement with the activities he used in his classroom. He cared about his students because he cared about increasing engagement in his science classes (Sickle & Spector, 1996). While Ben did not increase student participation to the next level of the hierarchy, he did show interest in continuing to use students as sources of information to get their input through the use of surveys (Lodge, 2005). This also demonstrates that he cared for his students because he was willing to listen to them (Noddings, 2012b).

Student interest. When first asked about student voice, Ben mentioned that making science relevant to his students is important to him. Prior to the study, he attempted to connect science to students’ lives outside of school, through his “science news” activity where students

could find and bring in a science article on a topic of their choice. He described this assignment during the first interview:

Every Friday we have science news. And it rotates, one group a week presents to the class, this is what we found...too often they think science is a white lab coat...I just need to get them to see this stuff is useful.

He cared about his students because he cared about increasing their interest in science content (Jansen & Bartell, 2013; Sickle & Spector, 1996) and this made it possible for him to reach the first level of the hierarchy. However, even though he makes efforts to get his students more interested in science, Ben also possesses a belief that students are not interested in science. During the second interview he talked about this belief by saying, “*what do you do when they don’t have any interests?*” An underlying assumption of student voice work is that the more we know about students’ interests, likes, dislikes, and attitudes towards learning, the better we can get them engaged and interested in science (Jenkins, 2006). Contrary to this idea, even though Ben seems to believe that student voice is important, he does not seem to believe his students are interested enough in science to want to share their voice. This belief that students are not interested in school may lead teachers to not even attempt to give their students a voice (Buehl & Beck, 2015) and may be why Ben did not attempt to increase student participation past the first level of the hierarchy (Fielding, 2001; Lodge, 2005).

Classroom Practices Related to the Inclusion of Student Voice

Ben’s classroom practices changed as a result of his action research. Even prior to the study, he held beliefs that students should have a voice in the classroom. Table 12 on page 125 summarizes Ben’s practices towards student voice.

<u>Themes</u>	<u>Initial Practices</u>	<u>Final Practices</u>
Prior experiences	Did not have much prior experience with student voice prior to the study	Continued with limited discussion with students
Level of participation	Students as data sources only: used assessments to gather data from students	Students as data sources only: saw the value of using surveys to gather data from students
Teaching context	Students lack motivation to do anything not tied to a grade	Stayed at bottom level of the hierarchy and assigned extra credit to those who completed survey
	Students are not mature enough to contribute to classroom decisions	Action research allowed him to improve his opinion about his students
	Struggled to share any control with students	Continued limited sharing of power with students by using structured surveys to gather data from students
Benefits to teachers and students	Participated in school-wide behavior support team	Took student feedback to the behavior support team so they could improve their practices

Prior experiences. Ben did not have a lot of experience with student voice prior to the study and continued with limited discussion with students during the course of the study. He gives several tests and surveys at the beginning of the year to establish a baseline for his students. During the first interview, I asked him what these evaluations might look like and he responded:

At the start of the year, they are guinea pigs. I run a battery of tests on them knowing or not knowing what it is for and that's my data set I start the year with...so, I would have a

reading assessment and do a math assessment on them and I also do a learning styles inventory just for giggles but then that is how I set up my groups.

Ben did not give his students a voice in setting classroom procedures because, as he stated during the first interview, “*procedures I pretty much have on lockdown,*” meaning he is comfortable with how his classroom is set up and does not feel like he needs input from his students.

While he did not identify this specifically as a way in which he encourages student voice, he did describe his classroom management style during the first group meeting. He said:

I’m fairly permissive in my room, which means I have classroom management issues. But I don’t want to hammer on them. Because then you’re the enemy. And it surprises me because I have issues with classroom management, but I can get higher order thinking out of them. Because they’re willing to talk to me. But if you’re always like sit down, shut up, sit down, shut up, they don’t want to talk to you.

Possibly because he did not have much prior experience with student voice, Ben was not very open with his students about the action research he was doing. When I arrived for the observation, several students looked at me curiously as I sat in the front of the room, but he did not mention me at all during the first class I observed. During the second class, he introduced me as a doctoral candidate who was there because I was collecting data for my dissertation. One student looked at me nervously and said “uh oh” but I assured him that I was not there to observe them or their behavior. He did not require his students to take the survey during class but gave them extra credit for completing it. After a brief lecture, there were also several other activities to choose from and the survey was not emphasized over these other activities.

While Ben did see the value in listening to his students and attempted to do so through the use of surveys, his limited experiences with student voice may have prevented him from increasing student participation past the first level of the hierarchy (Fielding, 2001; Lodge, 2005). With more time and training, Ben could have learned how to better engage in dialogue with his students, which would have demonstrated caring more than just listening to them (Noddings, 2002). This may have also allowed him to move up the hierarchy and overcome some of his pre-existing beliefs.

Level of student participation. Prior the study, Ben did not include his students at all in the research process, only as research subjects and stated his students are “*only ever guinea pigs.*” As part of his action research, Ben administered surveys to his students but did not discuss the results with them or include them in the data analysis process. Therefore, students remained as data sources (Fielding, 2001) throughout his action research. This still demonstrated he cared about his students as he was willing to listen to them at the first level of the hierarchy (Lodge, 2005; Noddings, 2012b)

When describing the second survey he administered to his students, he stated:

I think in the questionnaire it would say, ‘do you prefer this or this?’ It was always a two-point comparison and then at the end it was like, ‘do you prefer receiving gifts, spending time with people?’ It was very specific. So, they were like, ‘I think I like that one.’

While he was able to get information from his students about their preferences, surveys do have some disadvantages. One of the disadvantages of using surveys and predetermined questions to understand students’ preferences is they can be based on adults’ beliefs of what is important to students (Hagay & Baram-Tsabari, 2015). Data retrieved from questionnaires or surveys reflect groupings of opinions and values, not information on specific students (Jenkins,

2006). Therefore, only seeking information from students without engaging in dialogue may not be enough to understand individual students' voices. He could have used this survey as an opportunity to ask some open-ended questions of his students that would have allowed them to share more of their thoughts. For example, he could have asked them if there were activities they have done in other classes he could incorporate as part of his physical science lessons. He could have also attempted to move up to the next level of the hierarchy by sharing the data with his students and discussing his findings (Lodge, 2005).

Teaching context. Ben's teaching context, including perceptions about his student population, influenced his practices towards including student voice. He proceeded with his action research with the idea that students were not motivated enough to do anything without extra credit. He also tended to think of his students as immature and not able to share their ideas in an effective way.

Student motivation. Ben generally believed his students were unmotivated to learn science or participate in his action research. During the first interview, he stated, "*On the one hand you have the administrator saying "you gotta teach this stuff!" But they don't want to know it, they don't want to.*" As a result of this belief, he always assigned credit to all activities in his class.

Because Ben believed his students would not do anything not tied to a grade, he offered extra credit for the completion of the surveys. He justified assigning extra credit in the second interview and said, "*regular students won't tie their shoes if it's not for extra credit.*" Ben believed his students would not be interested in sharing their voice or motivated to participate in research and view it as yet one more thing they had to do. However, he told them little about why they were being asked to complete the survey, other than it was for extra credit. When I

arrived for the observation, they were seemingly unaware of who I was or what I was doing in the classroom.

Engaging in dialogue in a model of student participation has been suggested as something that will contribute the most towards improvement of the inclusion of student voice (Lodge, 2005). It also demonstrates how a teacher cares for their students (Noddings, 2002). Even though Ben demonstrated he cared for his students by listening to students (Noddings, 2012b) and attempting to get them engaged in science content (Jansen & Bartell, 2013; Sickles & Spector, 1996), it is possible that Ben could have increased his students' motivation if he had taken the time to explain the purpose of the survey to his students, rather than assume they would not be interested at all. Instead, he did not give them the chance to discuss this opportunity or fully understand how they could have contributed to the classroom and simply offered them extra credit for completing the survey.

Student maturity. At the beginning of the study, Ben viewed his students as too immature to share their voice. The action research allowed him to slightly improve his opinion about students because they were honest in their survey responses. He admitted he was surprised at times by their honesty on the survey. In one of his journal responses he said:

My students expressed a preference for activities done on their phones. This is not entirely surprising...one surprising result from the data was the Word Filter activity. Students candidly admitted that while they do not prefer this activity, they learn a lot from it. I was surprised by their honesty and I agree with their assessment. At the conclusion of a Word Filter students demonstrate a surprising mastery of the subject matter.

According to his response in a second journal response, the Word Filter activity is a “*reading summary activity...most students grudgingly admitted they saw the merits of doing activities they may not prefer.*”

At first, Ben communicated his doubts that students had the ability to share their voice in a productive way and did not believe his freshmen could handle sharing their ideas. This belief may have resulted in the structured survey he administered to his students and his hesitation to make any of the questions open-ended to allow for more thought and feedback from his students. However, truly accepting student voice may require adults to accept hearing things they do not agree with or do not want to hear (Cook Sather, 2006; Flutter & Rudduck, 2004). Ben’s resistance to moving up the hierarchy and giving his students more of a voice aligns with research that shows that often times, teachers believe their students are not mature enough to make a valuable contribution to their classroom (Lodge, 2005; Seiler, 2011). So, while he was able to give his students a voice through a structured survey, if he had also engaged in dialogue with his students, he could have given them the chance to demonstrate if they were mature enough to share their voice at a higher level of participation (Lodge, 2005).

Sharing control. Ben believed in the value of collecting data from his students in order to elicit their voices to drive his classroom decisions and increase engagement and plans to continue to do so in the future. At first, Ben was hesitant to give up any control as the classroom teacher. Through his action research he determined his students were honest about which classroom activities helped them learn and provided them with useful feedback. He resisted asking open-ended questions of his students because he was concerned they would not take it seriously and as a result, their responses would not be useful. When I asked him about drawbacks to giving his students a voice, he responded:

I think I made it, so it wasn't open-ended enough to get to that point. I was concerned about the other participant where she was like what can I do with my practice? I mean, you could go off track there.

Ben was concerned that if he gave his students more of a voice, the data he collected would not have been useful. Research supports that learning how to enable youth to share their opinions and participate in decision-making can be challenging in school settings because teachers are used to being in control and the sharing of power with students can be threatening (Mitra & Gross, 2009). This may have caused Ben to remain at the bottom level of the participation hierarchy and include his students only as data sources (Fielding, 2001). Just as students need to be taught to use their voice (McGregor, 2007), teachers need practice in giving up some control to let their students share their ideas (Bahou, 2012; Fielding, 2004).

Benefits to teachers and students. Ben believed in the importance of giving his students a voice and understood how it could benefit his classroom practices in the future. During the second interview, I asked him about his future plans related to giving his students a voice, and he does intend to continue these practices in his classroom decisions by collecting data through surveys:

I feel like this was kind of a starter and there are other questions I have for them...I think I would include these. It's something I have been trying to develop over the years. 'What am I doing that they like? What am I doing that they hate? What can I do more of?' And just doing it more formally. And I think there are always questions you can add as you're looking around at things kids say you're like maybe I should add more of that. And it does change from year to year...So, I think you keep some of the stuff, but you always have to update and modify it.

Moving forward, he is interested in getting student views on school climate so he can share these results with the administration.

Prior to the study, Ben was already participating in his school's behavior support team. He discussed the second survey he administered to his students and his plans for the data in the future. In the second group meeting he stated, *"because it's kind of like, so we have this thing and it's supposed to reward behavior and it doesn't, what's going on? And the kids are like, 'well, we don't care about the rewards.'"* Then during our second interview, he revisited this topic by saying, *"not great to reinforce behavior with a reward they don't care about...we'll see if we can get different rewards they like better."* As a result of this action research, he was able to bring student data to the team so they could improve their practices. They are interested in implementing rewards students like better, such as more privileges. However, when I contacted him a couple of months after the study ended, these changes had not yet been put into place because they are being held up at the administrative level.

Ben now sees action research as an effective way he can collect data from his students and give them a voice and will continue to do so in the future. Even though he remained at the first level of the hierarchy throughout the study, it could be possible for him to move up to the second level and start having conversations with his students once he gets more comfortable with giving them a voice (Lodge, 2005). While he already demonstrates care for his students by listening to them (Noddings, 2012b), moving up the hierarchy and beginning a dialogue about science teaching and learning with them could reinforce this caring even more (Noddings, 2002).

Affordances and Obstacles Related to the Inclusion of Student Voice

Ben encountered both affordances and obstacles while attempting to increase student voice. Table 13 below summarizes some of the affordances and obstacles he encountered while trying to increase student voice.

<i>Table 13. Affordances and Obstacles Ben Encountered While Attempting to Increase Student Voice</i>		
<u>Themes</u>	<u>Affordances</u>	<u>Obstacles</u>
Teaching context		Language barriers with ELL students Lack of support from other teachers and administration
Barriers to including student voice	Surveys allowed him to quickly gather data from students and give them a voice	

Teaching context. Several aspects of Ben’s teaching environment acted as obstacles to implementing his action research project and student voice. At times, he was able to get around these obstacles, but others prevented him from fully implementing student voice in the way he wanted.

Language barriers with ELL students. Ben believed in the importance of helping all of his students succeed but faced challenges with communicating with his ELL students. Initially, he wanted to focus his research on how to improve their educational experience but was concerned about the language barrier. This prevented him from doing what he really wanted to do for his action research project, which was asking his ELL students what they needed from their educational experience.

He initially mentioned he was interested in the concept of voice related to his Hispanic students. He talked a lot about his ELL students and determining what activities helped his

students learn best. *“I am interested in the concept of voice, especially with my Hispanic kids. What do you have to contribute and say and how can we get you to contribute and say it?”*

However, he decided not to focus on his ELL students because he felt there would be too many obstacles in doing so. While he did say, *“if we had my ELL department’s buy in, we could do it,”* he doubted he could get their assistance. Eventually he determined he would not be able to and stated, *“the problem with ELL students and doing any type of research is how would I communicate with them.”*

Ben was unable to overcome this obstacle in this study. This indicates that more support is needed when attempting to increase student participation with certain populations.

Lack of support from administration or other faculty. Ben believed it was important to include other teachers in promoting student voice but questioned whether many teachers would want to take more time out of their day to do this. He mentioned that although he had the ELL department’s support in his initiatives to help students who speak English as their second language in his classroom, he was not sure they would want to help translate surveys for the students to take. When discussing how to include student voice at a higher level, he discussed possibilities for future collaboration with other faculty members in order to increase voice. However, he again doubted whether this could become a reality because of the time constraints and the lack of willingness to go beyond typical teaching responsibilities. During the second interview he stated:

It would be nice to have a town hall or a coffee meeting and sit around and talk. I think you’d get a wider voice but again, I don’t know how you’d crunch the data, I don’t know how you’d fit it in a school day. It would have to be an elective club. And then you’re also

getting a coalition of the willing. Because only the people who are willing to participate are giving you data.

He also mentioned the issues his school has with keeping assistant principals. He said there were issues with getting other people at the school involved with research on student voice, including the administration. During the second group meeting he stated, *“The other problem we keep having at my school is that we keep losing assistant principals. It has been a revolving door. It’s the workload. It’s just not worth it.”* One major barrier to placing beliefs about student voice into action could be a lack of administrative support (Lewis & Burman, 2008), which is difficult to achieve when there is little consistency in this position. High faculty turnover can negatively impact student voice initiatives because these take some amount of administrative and teacher stability to be effective (Yonezawa & Jones, 2009). When I followed up with Ben after the study was completed, he told me that the front office was changing yet again, and it was preventing the positive behavior team from implementing any changes they wanted to make until the next school year. As he put it, *“progress is being slowed by a lack of continuity.”*

Overcoming time constraints. Though Ben believed in the importance of allowing student voice, he faced a major barrier with moving past students as data sources and the time he believed it would take to increase student participation. He also mentioned that he has little time to incorporate student voice in an extensive manner. *“I’m struggling because I need to go warp speed. And my kids are crawling like turtles.”* He also struggled with time outside of school to design surveys or analyze data. He rushed to our second interview because he had to turn in testing supplies (we did the interview during midterms week) and got caught in traffic trying to leave school. He also had a limited time to spend on the interview because he had to return to the school and participate in a training.

The way in which Ben administered his surveys made it easy and quick for him to incorporate student voice into his teaching practice and therefore avoided the issue of not having enough time to implement yet another thing into his teaching practice. At the same time, he did talk about how this process could be time consuming at a higher level of student participation. Ben has approximately 150 students, six classes a day, and seven complex physical science topics to cover each semester. It is not surprising he expressed concern about the time it would take to move up to the next level of the hierarchy. A lack of time to spend on preparing for and listening to student voice can act as a significant barrier to placing beliefs about student voice into action (Lewis & Burman, 2008) because of the pressure on teachers to plan for and deliver content in a specific amount of time (Fielding, 2004; Frost, 2008; Lewis & Burman, 2008). However, Ben was able to recognize these constraints and conducted his action research in a way that could overcome the obstacle of not having enough time so he could still collect data on his students. This suggests that in order to include student voice on a regular basis, surveys may be a more realistic option.

Chapter Summary

Ben's background influenced his beliefs about student voice and the action he took in the classroom as a result of these beliefs. Ben viewed himself as a scientist and believed his background in science caused him to be more likely to use quantitative over qualitative data. He used statistical data in his action research and expressed his doubt about the importance of qualitative data. His prior action research experience may have influenced him to take part in this study because it was a process with which he was familiar. His student population influenced some of the decisions he made in the classroom. He wanted to focus his action research on his ELL students but felt he lacked a way to communicate with them. He also believed his students

were not mature or motivated enough to engage in action research, so he limited his students' participation to data sources only. However, even though he remained at the first level of the hierarchy throughout the study, he still demonstrated caring for his students by being willing to listen to their ideas.

This action research influenced both his beliefs about student voice and his classroom practices. As a result of eliciting his students' feedback through action research, Ben was able to reflect on his beliefs about student voice and his classroom practices. The action research also caused him to evaluate some of the affordances and obstacles that may influence these beliefs and practices in the future.

Ben's beliefs about student voice influenced his teaching practice in many ways. He believed student engagement and buy in was important and chose to focus his action research on this topic. Helping students become engaged in science content shows that he cared about his students and their learning. He has more plans to continue surveying his students in the future. This shows he placed importance on listening to his students. However, because he believed his students were not interested in sharing their voice or were not mature enough to do so, he chose to administer a survey they could complete with minimal effort. In addition, this perceived lack of interest and motivation may have been the reason he chose not to help them understand how they could share their voice in a productive way through class discussion or helping with data analysis. Finally, Ben recognized there were many ways students could share their voice, including acting out through bad behavior. This may be another reason why he did not try to show them how to communicate effectively, because he believed they were sharing their thoughts in their own way.

Ben's classroom practices throughout the study influenced his beliefs. This action research allowed him to ask his students for feedback on classroom practices. Through this process, he saw his students being honest in their answers, which surprised him but also made him realize he could ask them questions and get good feedback he could use to inform his teaching.

The action research also prompted Ben to evaluate some of the affordances and obstacles that may influence these beliefs and practices in the future. Related to affordances, administering surveys was a quick and easy way for him to collect and analyze data. However, he did say one of the issues teachers face is the lack of time they have to implement new initiatives in the classroom. He also encountered obstacles with his ELL students because of language barriers. Finally, he anticipated issues with faculty and administrative support if he were to continue doing this in the future.

Chapter 6: A Paradox in Science Teaching and Learning

In this chapter, I present both Naomi and Anna as a paradox in teaching and student participation. They had many ideas about teaching and learning that required hands-on labs and students constructing their own learning. They are both PhD students who expressed a desire to grow as teachers. Naomi and Anna both work at the same school that supported student voice by actively making efforts to ask students what they needed from their education, so they were familiar with the concept of student voice prior to the study. Prior to the study, they had support from their administration and the background and experiences to be successful with this action research. They mentioned that building relationships with students was important but did not seem to be willing to engage in dialogue with students to show they cared about them. They eventually dropped out of the study midway through for unknown reasons. Therefore, only one of the research questions is addressed in this chapter and the data is used to determine what affordances could have allowed these teachers to succeed with this research and what obstacles potentially caused them to drop out.

Naomi was an active participant through only about half of the data collection process for this study. Data I collected on Naomi included one action research group meeting transcript and narrative, a pre interview transcript and narrative, and three journal responses. Experiences and descriptions from Naomi addressed her background experiences and how these may have influenced her views on teaching, learning, and student voice; how these initial beliefs may or may not have influenced her teaching decisions; and the affordances and obstacles she encountered throughout the research.

Anna was an active participant only at the beginning of the data collection process for this study. Data collected on Anna included one action research group meeting transcript and narrative and a pre interview transcript and narrative. Experiences and descriptions from Anna addressed her background experiences and how these may have influenced her beliefs about teaching, learning, and student voice; how these beliefs may or may not have influenced her teaching decisions; and the affordances and obstacles she encountered throughout the time she participated in the research. Because I have limited data on Anna, I have limited details about her background and what experiences may have influenced her decision to drop out of the study.

Background Information

Both Naomi and Anna expressed a willingness to participate in this research study because they are also PhD students and know how important it is to get participants for a dissertation study. They both seemed interested in learning more about student voice and how they could grow as teachers by incorporating it into their teaching practice.

Naomi has a bachelor's in Interdisciplinary Science and a master's in Educational Leadership. She is close to finishing her PhD in Educational Leadership. She only needs to complete her dissertation but because of some health issues, she has not begun her data collection. The first time I saw her, she had just had surgery on her foot and could not walk without assistance from a scooter. She also mentioned her history of breast cancer when I was there for her interview. She has been teaching for over 20 years, home schooling her own children first and then teaching in public schools. Naomi does not have prior experience with action research but because she was beginning to think about her own dissertation research, she wanted to participate in my study. *"I know how important it is to get someone to help you with*

your research.” She describes her intended focus for her dissertation research as “on perception and how perception affects outcomes.”

I first met Anna during the district-wide PD day. She sat in the front row and appeared attentive throughout the presentation. She expressed her interest in participating to me after I was done presenting information. She told me she was interested in getting more research experience to prepare her for her dissertation. We talked for a moment about the PhD process and she assured me she would be part of my research study. Anna told me she is working toward her PhD in an educational field but has not yet taken her comprehensive exam. In the first group meeting she mentioned some of the barriers she has faced with this process, including her mother passing away and caring for her grandson. She described this to me by saying, *“I’m not completing this semester because my mom passed and getting used to the baby, this is new.”*

Naomi currently teaches marine science to traditional students, in grades nine through twelve and is the head of the science department. This is the first year she has been able to teach the same course for the second year in a row because, as the department head, she usually takes on the courses no one wants. She says being able to teach a course for the second time allowed her to focus on different ways of teaching and giving her students choices and a voice to express what they need from their education. *“It is hard to come into a new year and say okay what can I do to try and get it that way. But at the beginning, see cause ideally, if I could, I would have it all.”*

Anna has worked as a classroom teacher for 23 years in her current school district. Before this, she was a coach in a district in the northern part of the state. She currently teaches anatomy and forensic science to students in grades ten through twelve. She said she typically teaches biology, and this is only her third year teaching forensic science.

According to information on the school's website, their school opened in 1960 and is a combination of a traditional and magnet school (County Public Schools, n.d.). It has one of the four International Baccalaureate (IB) programs in the county. Even though there is an IB program at their school, neither of them teaches IB classes. According to the district website (County Public Schools, n.d.), "IB graduates are considered to be ahead of their peers across the country, garnering the attention of some of the most affluent universities. Often a graduate with an IB diploma will find great mobility, transferable credits, and scholarship opportunities." In the 2017-2018 school year, the graduation rate was 84.7%, which was down from 87.3% in the 2016-2017 school year (Tobin, 2018). In comparison, the graduation rate from the IB program was 97% in the 2017-2018 school year. The overall student population (both traditional and IB students) is 44% black, 18% Asian, 17% Hispanic, 16% white, and 5% are of mixed race. However, Naomi described her school and student population during the interview by saying:

We have an IB school within a traditional school. Most of our students, I'd say 99%, are free and reduced lunch. And the overwhelming majority, I think 60%...I think 60-70% are African-American. I think, a large amount of them, are Hispanic. So, a large majority of them are socioeconomically challenged.

Anna described her school as "*we have a school within a school. We have an IB program and I don't teach on the IB side... It is a pretty diverse population.*" She also mentioned she was happy to be teaching there because this was where she attended high school.

The next time I saw Naomi after the PD day was when I arrived at her classroom for the interview. She had planning the last period of the day, so we were able to meet before school ended for the day. When I arrived at the school, I was a few minutes early, so I waited outside of her classroom for the bell to ring. I could hear students in some of the other rooms yelling and

playing around. Finally, the bell rang, and students came streaming out of the surrounding classrooms talking loudly, pushing each other, and shouting for friends. The classrooms and hallways were significantly louder and more active than either Sasha's or Ben's school. I waited for the students to exit the classroom before attempting to enter. One student was still in the classroom finishing up a conversation with Naomi. Two more students came in because they needed to turn in the bellwork as that conversation was finishing up. A female student asked to stay because she was leaving in a few minutes – the student sorted papers as we started the interview.

Description of Action Research

Naomi believed in the importance of students thinking for themselves, discovering information on their own, and using their voice to express what they learned. This caused her to consider this as the focus of her action research. She said her focus for the school year was increasing student participation in science content by having them construct their own knowledge, rather than telling them all of the information they needed, and this is one of the reasons she wanted to participate in this study. According to Naomi, students constructing their own knowledge requires them to use their experiences and apply it to the learning of science content and then connect this to their own lives. She wanted them to be able to use their voice to share their prior knowledge and display the information they are learning in their own way:

We need to move away from that in education. Where it's not, the teacher stands up and imparts this knowledge on kids. People need to construct their own knowledge, so it is more facilitating. If I were to give you these things, how could you pull them together? What do you already know about it? How does it relate to in your life? Where might you use it? Why do you care? And then, what can you learn more about it? And what can you

tell me about it? Rather than me saying, this is how I know you got it. You'll pass this test, you'll fill out this worksheet, you'll complete this Venn diagram... they're so used to filling out worksheets, finding the answer in the bold print in the book, that constructing their own knowledge is so foreign to them. And they squawk about it a lot. They think I'm not a good teacher because I'm not telling them what to do, I'm not giving them the answers. So, it's a paradigm shift for most of my students.

During Anna's interview, we talked about some ideas for her action research. Previously, she had done research related to the relevance of science to students' lives outside of school:

And we found that, as girls found it relevant in their lives, if they found it could help them in their everyday life, then they tend to be more participatory and pay more attention to the science. And I was working with the Biology department so they found what they were learning, they would be able to apply later, or to their lives at the moment, they tend to pay more attention.

Because of her experience with connecting students' lives outside of school to required science content, we discussed how she could include her students' interests and experiences into the curriculum by incorporating their questions. Anna expressed that she really liked the idea of having students create questions, condensing them to match with required topics, posting them on a board, and moving them to an "answered" section as they are addressed.

Her pre-existing belief of connecting students' lives to science content is likely why she was interested in incorporating student questions into her action research. Hagay & Baram-Tsabari (2015) determined that asking students about their interests and including them in decisions about science content promoted meaningful and supportive connections between teachers and students. Finding meaning in science may include talking to students about their

lives and experiences and incorporating this knowledge into the curriculum (Hagay & Baram-Tsabari, 2015; Seiler, 2001). Therefore, her choice in focusing on student interest in science content for her action research reflects her beliefs on making science meaningful and relevant to students.

Both Naomi and Anna demonstrated academic caring for their students by attempting to engage them in science content (Jansen & Bartell, 2013; Sickles & Spector, 1996). Both indicated a desire to move up to the third level of the participation hierarchy where they would collaborate with their students in the learning process. However, because they both dropped out of the study before the end of the action research, they were not able to do this.

Prior Experience with Student Voice

Naomi told us in the first group meeting about a panel of students her school had assembled so they could learn about what students wanted from their teachers and the school in general. She said:

They said the kids said that they really did want the relationship. It was nice when teachers recognized that they were having a bad day and sometimes their friends don't care or are the reason they're having a bad day so it was nice to have teachers who would check on them.

Naomi's prior experience with student voice may have made her more willing to participate in this research. She told me in her first interview:

That's part of why I was happy to be part of your research study. I would like to find more ways to do that. I would like to find more ways for the kids to construct their own knowledge and display it to me rather than me scaffolding it so much that it just zaps the creativity.

Prior to the study, Naomi talked about several things she includes in her classroom procedures to give students a voice. She has students reflect on science content presented in class to make sure they actually learned it. She also has student-led conferences so they can identify what is going well for them and what is not. Finally, she has them create rubrics. Initially, for her action research, she wanted to understand how to increase their participation by having them construct their own knowledge.

Naomi said that she gives her students a voice by encouraging self and group reflection in her science classes:

So, what went right, what went wrong with this unit. I try to do some tickets out the door where they tell me I really got this, I didn't get this. I really like this, I didn't like this...I do student-led conferences which is basically a paper where they, it has questions, guided questions where they answer this is I do well in this class, what I like in this class, this is what my grade is, here's why my grade is that way, here's what I can do, here's what the teacher can do to make the grade better.

She says she includes students in creating rubrics for assignments and gives them choices after the first semester. *"I try to have them create rubrics...they try and help design what would that project look like. They tell me that. I have two activities where they can pick either this or this."* Part of the reason for waiting until the second semester is because she believes she needs to teach her students how to properly act in the classroom and to have more self-control before she gives them more freedom.

Since Anna's school values listening to student voice, she also held some beliefs related to those experiences. She talked about how she has spoken to Naomi about this in the past:

My department head and I, we talk a lot about relationship building and how key it is to student success...we had some of the kids get up this morning and tell us some of the things they liked about our classes and some of the things they didn't.

Prior to the study, Anna believed students should have a voice related to assignments and like Naomi, consulted them on the rubrics used to grade their assignments. She also talked about how she is willing to listen to her students to determine what they want and need from their educational experience:

I'm open to hearing them...I would allow them to participate in creating a rubric. We've done that a lot. Giving feedback on why they answered a certain way after something was presented and they were asked about it.

By consulting students about classroom practices and pedagogy, Anna demonstrated her pre-existing belief that obtaining feedback on classroom practices was important (Flutter & Rudduck, 2004).

Although she said she was open to listening to her students, Anna mentioned she feels she already knows what works in her classroom. *"But I know what works. Especially when it comes to what we should do first, second, and third. And for content-wise, we have a pacing guide that we have to keep."* However, during the interview, she talked about how she wants to participate in this research so she can change some of her classroom practices, *"I'm just kind of open to some other ways and that's why I'm participating...to give these students an opportunity and to expand, just to give me more tools in my toolbox."*

Anna has done some action research before in her former school district, studying what motivates girls to participate in science and found when they see the connection between science and their lives outside of school, female students want to engage more in the subject. She

described this by saying, “*and what I did with my department, we were trying to find the relevance of how girls learn science. What made them want to learn?*” As shown by this previous research related to the relevance of science to female students’ lives, she believed in the importance of connecting students’ lives with science content knowledge.

Naomi and Anna had discussed building relationships with students and their school had started a dialogue with students to hear their voice. They seemed to care about students by engaging in dialogue with them (Noddings, 2002) in order to get them interested in science (Sickles & Spector, 1996) and collaborate with them on classroom activities. However, because they dropped out of the study before it was over, this caring may not have been enough to put their beliefs into practice.

Affordances and Obstacles Related to the Inclusion of Student Voice

Both Naomi and Anna experienced affordances that could have helped them include student voice in their classrooms. However, they both had obstacles they needed to overcome that prevented them from participating for the duration of the study. Neither of them ended up completing their action research and stopped responding to emails midway through the study. Table 14 on page 149 summarizes these affordances and obstacles.

Willingness to change. Anna expressed her desire to be open to different ways of teaching, “*I can get stuck in my ways so I’m open to this so I can expand a little.*” This indicates a belief in the importance of growing as a teacher and being open to different ways to approach education.

Naomi also mentioned she also wanted to improve her teaching and try some different approaches. She wanted her students to make more decisions about their education and change how they participate.

<i>Table 14. Affordances and Obstacles Naomi and Anna Encountered While Attempting to Increase Student Voice</i>		
<u>Themes</u>	<u>Affordances</u>	<u>Obstacles</u>
Teaching context	Willingness to change	Student population
	Teacher student relationships	Maturity level
	Support of other faculty and administration	Time constraints

Naomi stated, *“this is kind of my focus to improve upon...I would like to find more ways to do that. I would like to find more ways for the kids to construct their own knowledge and display it to me rather than me scaffolding it so much that it just zaps the creativity.”*

For student voice efforts to be possible, adults need to see the value in these initiatives and be willing to change (Cook Sather, 2006; McGregor, 2007). In addition, increasing student participation in the science classroom requires us to consider changing our ideas on what it means to be a student and what it means to be a teacher (Fielding, 2004; Rudduck & Fielding, 2006). This belief in the importance of change may have encouraged her to agree to participate in a study on student voice. This may also have meant she would have been able to embrace this research and change her classroom practices.

Teacher student relationships. Anna believed in the importance of building relationships with her students in order to better appreciate their voice prior to the study. She mentioned how she and Naomi discussed the importance of building relationships with students in the past, *“my department chair and I, we talk a lot about relationship building and how key it is in student success.”* Building relationships with students was also something that was brought up at the student forum during their faculty meeting. Because Naomi and Anna worked in an environment that supported student voice and already believed this was important, it seemed they had the support they would have needed to be successful with including student voice (Bahou,

2012). Their willingness to build relationships with students, it indicated they did care about their students (Noddings, 2002). Instead, these affordances did not help them succeed.

Support of other faculty and administration. The fact that their school was already initiating efforts to include student voice may have given Naomi and Anna the support they needed to initiate this action research in order to become more inclusive of student voice. Research claims support is needed from the administration for both teachers and students for student participating to be successfully implemented into classrooms (Eick, 2001) and as discussed by Nespor (1987), the school environment can influence teacher beliefs. However, in this case, both Naomi and Anna dropped out of the study even though they had support from their administration and were already familiar with the concept of student voice. This indicates that even in a supportive environment, teachers may encounter other issues that prevent them from including student voice. As demonstrated by their discontinuation of the research, having support of the administration does not necessarily translate into success with including student voice or participating in action research.

Time constraints. Although I never received any explanation for her dropping out of the study, Naomi made several comments that indicated she did not have enough time either to include student voice or complete her action research. From the beginning of the study, she was vocal about doing the minimal amount of work. When I was explaining the journals to her, she said outright, "*I might not write a lot.*" As department head, she may have just been overwhelmed with other responsibilities and discovered she did not have enough time to participate.

Naomi said her focus for the year was students constructing their own knowledge and participating more and wanted to use action research as a way to explore this. However, by the

time the first action research group meeting occurred, Naomi had changed her mind about what she wanted to do for her action research. She arrived at the meeting an hour late because she got “*stuck at school.*” She said she did not have any concrete ideas for research, even though we had discussed some possibilities during the interview. Unfortunately, she also missed the part of the meeting where I had the teachers brainstorm starting points for their research. After listening to what the other teachers were doing for their research, she decided to also give a survey on the same topic as Ben.

I could do a survey of what we've done so far in class. Which activity did they like the best and which one did they like the least? And I could make it a little open-ended...But like the one of the one that you like the best, what do you remember learning from that and see if it was anywhere close to what they were supposed to learn.

Naomi also discussed the amount of content that must be covered for required standardized tests. “*Some of that comes from the standardized testing that we do because ultimately they all gotta take that standardized test. And the fact that there's lots of standards that have to be covered.*” A lack of time spent on preparing for and listening to student voice can act as a significant barrier to placing beliefs about student voice into action (Lewis & Burman, 2008). Therefore, as part of participating in this research required the teachers to plan and implement an action research study and then collect and analyze data, these time constraints could have a reason why she chose to first change the focus of her research and then chose to not continue with the study.

Anna seemed to be too overwhelmed with new personal changes in her life to make the professional changes she wanted for herself and her practice. She had personal responsibilities that prevented her from investing the time required to design and implement her action research

project. She struggled with finding time to meet both as a group and one-on-one with me. I was surprised when she showed up to the first group meeting because even though she had expressed interest during the PD day, she had not reached out to me prior and did not respond to my requests for an interview. Anna arrived late and brought her grandson because she did not have any other place to leave him for two hours. She asked if she needed to stay because she was concerned about him making noise, or if she could just grab some information and leave, *“I don’t want to be a distraction... I will let him eat his brownie and he’ll be quiet and then we’ll leave.”* I gave her the materials I had distributed to the other two teachers already and told her she could leave if she needed to. She ended up staying for about 20 minutes while Ben and Sasha fed her grandson crackers and brownies and talked about their responses to the prompts I gave them. We made plans to meet for an interview the following Monday and she assured me she would have time to talk. However, she ended up needing to leave to be somewhere and the interview was rushed. I gave her an example of a student voice initiative that involved students creating questions and the teacher answering them as required content was covered. She immediately accepted that as her plan for her action research without giving much consideration to any other ideas. This also indicated that she may have not had time to plan for this action research.

This limited time may be why she did not complete her action research. And although I never received any explanation for her dropping out of the study, her actions such as arriving late to the action research group meeting and then leaving early, bringing her grandson because she had no other choice, and cutting our interview short indicated she did not have a lot of free time in which to design and set up an action research project. This may have prevented her beliefs about the importance of allowing students a voice from being put into action in her classroom.

Student population. As far as obstacles, Naomi clearly believes the demographic of her students is a barrier to implementing her ideal vision of teaching and learning. She stated during our first interview, “*we have such a gap in just basic classroom etiquette that I spend the first semester [teaching them how to act in the classroom]...one of the things is that I like to do a lot of hands on labs but my demographic doesn't always [act appropriately in the classroom].*” She noted more than once the students she teaches could not handle responsibility or being more active in their learning. She seemed to believe she has the wrong students to teach the way she wants to. While her focus on collaborating with students to help them learn and give them a voice indicated she cared for her students (Noddings, 2002), she held these negative perceptions of her students that may have held her back from actually caring for her students. Teachers’ beliefs about a particular population of students can influence the extent of the care they are willing to exhibit in their classrooms (Rolon Dow, 2005) and perceptions of students can prevent teachers from turning their beliefs into actions (Nespor, 1987) so this may be the reason why her belief that students should participate more in their learning was not evident in her teaching practice.

Naomi’s experiences with the Black and Hispanic students at her school seem to have caused her to develop the belief that she cannot give them as much responsibility as she would like. Her school environment was significantly different from what I observed at Sasha’s school, which has similar demographics. Her school seemed louder and disorganized. Students could be heard yelling in classrooms to the point it was hard to figure out how any learning was happening. Several people, both students and teachers, stopped by Naomi’s classroom during our interview but did not seem to be bothered or apologetic they were interrupting us. These

experiences with her student population may have influenced her beliefs about the extent to which her students could handle sharing their voices (Mansour, 2013).

Maturity. Naomi believed her students were not responsible enough to handle sharing their voice. She gives an example of this perceived lack of maturity and how her students were responsible for maintaining the classroom aquariums, *“the first two weeks of school, my kids killed every living thing. I had coral, I had crabs, I had two fish in every tank...and they’re dead. So those had to be drained.”*

She also mentioned projects and how she believed students should be doing them, but her students couldn’t handle them:

The other thing is long-term projects. And that’s what they should do a lot of. But they don’t remember to...like I do bellwork every day and I tell them you keep it until Friday. They lose it. I can’t tell you how many kids turn in a separate sheet for every day.

Initially, Naomi expressed that she thought science should be hands-on and project-based but again, she did not believe her students were ready for this when they first entered her classroom at the beginning of the year:

One of the things is that I like to do a lot of hands on labs, but my demographic doesn’t always allow it... and I like that, but it requires a little bit more self-control, self-guided than I see in some students.

This may be due to her perceptions of her student population. Naomi believed they were not responsible enough to know how to act properly in a classroom environment. She expressed her frustrations about their lack of responsibility as related to projects and keeping track of different class assignments, such as bellwork sheets. She wants them to be responsible for their own knowledge and be able to be independent thinkers who use their experiences to make sense

of science content. Naomi may have been worried that allowing her students a voice will result in a loss of quality learning experiences because of this lack of maturity (Morrison, 2008).

Anna did not seem to think the same way as Naomi. When asked about her school she described it as diverse and that she was, “*enjoying the diversity.*” Because she dropped out of the study before she did her action research, I did not have a chance to talk to her about her student population and whether she sees them as a hindrance as Naomi did.

Level of student participation. Naomi did not finish her action research but likely would not have increased student participation past the first level of students participation due to the fact she administered a Likert-style survey. While she believed students should have a voice, and her school was doing things to include students in educational decisions, she was unable to put this belief into action because of the difficulties she had with her student population. This is evidenced by her lack of participation in the study after the initial data collection for her action research project.

Naomi seemed to hold a lot of beliefs about how she wanted her ideal classroom to look related to hands-on activities and students constructing their own knowledge. However, at the beginning of the study, she had yet to put these beliefs into practice. This may be due to her past experiences with the behavior and perceived ability of the demographic of students she teaches. She may not have been able to care enough about her students to respect their ideas and give them a voice (Newcomer, 2018). It also may have been why she decided not to focus her action research on constructing knowledge, and instead decided to only give her students choices through a survey. However, this action research could have provided an opportunity to try and implement some of these beliefs about students’ constructing their own knowledge through hands-on activities.

Chapter Summary

Both Naomi and Anna had several affordances that would have helped them to be successful with their action research. They seemed to value building relationships with their students and based on what they said about students' engagement in science content and building relationships, it appeared they cared about increasing student voice (Noddings, 2002). Despite these apparent affordances, they were unable to complete their action research and offered no explanation for not continuing with the study. In this manner, they became a paradox in science teaching and learning.

Naomi's background and prior experiences influenced her beliefs and actions in the classroom. First, her educational background as a PhD candidate made her understand the importance of a study on student voice and how she could implement this in her classroom. Second, her administration was supportive of student voice initiatives and this may have influenced her belief that student voice is important and made her more likely to participate in this study. Third, she was able to list several ways in which she allowed her students a voice prior to the study. She was able to see how she could continue these practices and increase student participation through action research. However, her beliefs about the ability of her student population may have prevented her from putting these beliefs into action. She does seem to believe in giving students a voice, but not necessarily the students she currently teaches.

At the beginning of the study, Naomi's beliefs influenced her classroom decisions. Unfortunately, because she did not finish her action research or participate in the entire data collection process, I do not know how her beliefs or practices would have changed as a result of the action research. On one hand, she believed in the importance of students constructing their own knowledge, rather than the teacher lecturing and telling them information without any

thinking on the part of the student. On the other hand, she questioned her students' maturity and how much they were able to handle in the classroom. Therefore, even though she believed in the importance of hands-on projects and inquiry-based assignments, she did not always include these in her classroom because she did not think her students could handle this.

Naomi experienced both affordances or obstacles that may have influenced her current beliefs and practices. Unfortunately, because she did not participate throughout the entire study, I am unable to determine any new affordances or obstacles she encountered and can only speculate on why she dropped out of the study. Related to affordances, she had the support of her administration, who supported student voice efforts, and this may have strengthened her belief in the importance of student voice. However, time constraints were an obstacle for her. She clearly believed she did not have enough time to participate fully and was outspoken about her intentions to do the minimal amount of work. In addition, even though she said some things that made her seem caring, her student population was an obstacle for her, and this may have prevented her from implementing an action research study focused on what she really wanted to know more about.

Anna's background impacted her beliefs and practices in several ways. First, her prior educational experience as a PhD student may have influenced her belief in the importance of this research. This may have also made her more likely to participate in this research. Second, having an administration that supported student voice may have made her more likely to see the significance in giving students a say in their education.

At the beginning of the study, Anna's beliefs influenced her classroom decisions. However, because she did not do the action research or participate in the entire data collection process, I do not know how her beliefs or practices would have changed as a result of the action

research. Even before the study, she saw the importance in connecting science content to students' lives outside of school. This may have had an influence on her action research if she had gone through with the study. She also believed in the importance of having respectful relationships with her students, which seemed to show she cared and could have caused her to see the importance in listening to their ideas and opinions. Finally, she mentioned she was open to change and to try new things in her classroom. This belief that teachers should be open to growth and change may have influenced her decision to participate in this action research.

Anna experiences both affordances or obstacles in her current classroom that may influence her current or future beliefs and practices. Again, because she did not participate throughout the entire study, I am unable to determine any new affordances or obstacles she encountered and can only speculate on why she dropped out of the study. First, related to affordances, her administration was supportive of student voice efforts, which may have made it easier for her to implement this in her classroom. Second, related to obstacles, she faced many time constraints in her personal life that may have made it difficult to design and implement an action research study, and may have been the reason she dropped out of the study before the end.

Chapter 7: Cross Case Analysis and Conclusions

In this chapter I provide an analysis across the three cases developed from high school science teachers attempting to increase student voice and participation through action research. I compare and contrast how their prior experiences with student voice, action research, or education in general influenced their approaches to action research and their beliefs about student voice. I also compare similarities and differences across the cases to evaluate my conceptual framework and hierarchy of student participation. I discuss the implications of my findings on the conceptual framework and hierarchy of student participation designed for this study. I also consider the strengths and limitations of the study. Finally, implications for teaching practice and future research are presented.

Cross Case Analysis

Because Naomi and Anna were only participants in the first half of study, I do not have data from these teachers to answer the first two research questions, which asked how teacher beliefs and practices changed through action research. Therefore, only data from Sasha and Ben are presented for research questions one and two. For the most part, the action research gave both Ben and Sasha an effective way to listen to their students' voices. They either maintained their beliefs about student voice or developed new positive beliefs about listening to their students. Overall, the biggest influence on their beliefs seemed to be their prior experiences, not the action research. Engaging in action research also gave Sasha and Ben a way to make small changes in their teaching practices, just in different ways. This may have been because of pre-existing beliefs about the importance of student voice or new beliefs they developed throughout the

course of the study. It could also be because engaging in the action research influenced their beliefs about student voice because they had the opportunity to put new ideas about teaching and learning into action. For research question three, data from all three cases are presented as much as possible. The teachers encountered affordances and obstacles related to doing action research and including student voice. This may have caused a conflict between what they wanted to do and what they actually did in the classroom. For example, while Naomi believed in the importance of student voice initiatives, she had many reasons not to give her students voice and freedom in her classroom and this was apparent through her action research plan. Anna also communicated a willingness to grow and change as a teacher but was unable to follow through with the action research project. Ben believed in the importance of student voice but chose to stay at the lowest level of the hierarchy because of the obstacles he saw with increasing student participation. Because Sasha put her vision for student voice into action, she was the only teacher in the study who was able to overcome the obstacles she identified as barriers to implementing student voice.

The chapter is organized by the research questions that guided this study and then by themes under each research question. The following research questions guided this study:

- How do high school science teachers' beliefs change as they engage in action research in order to increase student voice in their classroom?
- How do high school science teachers' practices change as they engage in action research in order to increase student voice in their classroom?
- What affordances or obstacles do high school science teachers encounter while attempting to include their students' voices in the classroom?

I also discuss how the findings relate to both the conceptual framework and the hierarchy of student participation. For Sasha and Ben, I found similarities and differences related to all of the themes. While all themes were found within the data from both Ben and Sasha, they manifested differently for each teacher. For Naomi and Anna, not all of the themes were represented in the data collected. Table 15 below shows the themes found across the three cases.

<u>Theme</u>	<u>Sasha</u>	<u>Ben</u>	<u>Naomi and Anna</u>
Barriers to including student voice	X	X	
Benefits to teachers and students	X	X	
Teaching context	X	X	X
Prior experiences	X	X	
Level of participation	X	X	

Beliefs about student voice. Sasha’s and Ben’s beliefs throughout the study were influenced by their prior experiences and teaching contexts. Sasha believed in the importance of building relationships with her students through dialogue while Ben believed in the importance of listening to his students to hear their voice but did not seem to place as much importance on having conversations with them.

Prior experiences. Sasha demonstrated throughout the study her beliefs that having conversations with students about teaching and learning is important. She based her action research on engaging in dialogue with her students in order to improve relationships with them and give them a voice. She mentioned specifically focusing on her students that were at-risk for failing, although she eventually expanded her focus to include all students. Sasha may have decided to focus on this because of her prior research with at-risk students. She stated, “*I could*

build that relationship more with them to get them out of the failing spot.” Dialogue is an important part of building caring relationships (Noddings, 2002; Noddings, 2012a), so in this manner, Sasha believed caring for her students was important. Possibly because of his background in science rather than education, Ben did not place as much importance in having conversations with his students. He believed in eliciting student voice in order to collect data and improve his teaching practice, but he was resistant to how much voice he gave them. This may be because he believed that “*students always have a voice in their schooling.*” He also may have thought his students could not handle being asked about their ideas. He made comments such as, “*I felt I kept it in a box pretty well*” when asked about how much voice he gave his students through his action research. However, just listening to students can indicate a level of care as well (Noddings, 2012b; Sickle & Spector, 1996). As Ben believed listening to his students was important, he also demonstrated he believed caring about them was important.

Sasha was identified as the caring teacher in this study because of her beliefs about building relationships with students through dialogue. However, Ben also demonstrated he believed caring for his students was important because he was willing to listen to them. Based on the findings from these two cases, caring is a necessary part of allowing student voice in the science classroom.

Teaching context. Both Sasha and Ben faced different challenges with their teaching practice. Sasha had more at-risk students than Ben based on the graduation rates of their school (81% at Sasha’s school and almost 96% at Ben’s school – and his school does not have an IB program). She initially wanted to focus her action research on her at-risk students because she felt she needed to do more to help them than simply being their science teacher and wanted to give them a voice in telling her what they needed to succeed in school. She mentioned, “*reaching*

those kids who are repeat Bio kids, who are failing, failing every class.” Although Sasha appeared to be more willing to care for her students by building relationships with them, there are reasons Ben may not have been able to do this with his students. He faced a different challenge with his ELL students and struggled with how he could give them a voice. He may have felt he could not overcome these language barriers in order to engage in meaningful dialogue with his students. During the first interview he stated, *“I have monolingual students...they just had their first test this week and about 10% of my population is scoring at the guessing level.”* This demonstrates how the particular context in which a teacher must work can influence their beliefs and how well these beliefs are put into practice (Mansour, 2009). While both Sasha and Ben cared about their students, this may not have been enough for Ben to change his beliefs about how much voice he could give his students.

Benefits to teachers and students. While both teachers saw the benefits with allowing students a voice, they approached their problem of practice related to student voice in different ways. There was a significant difference in the way Sasha and Ben viewed their students and approached challenges in their teaching. Sasha seemed to view her students as people that she needed to work with to overcome challenges. Ben seemed to view his students as a construct or part of a problem to overcome. This is evidenced by Sasha’s belief in the importance of maintaining relationships with her students and how she viewed her action research as important in promoting dialogue with her students to increase their voice. I witnessed her asking her students about their educational preferences and what they needed from their students during an observation. She also mentioned in one of the journals, *“my students and I have had many discussions on what they really need from teachers and why those needs aren’t being met.”* Ben did not place the same belief about talking to his students. He questioned their interest in science

yet did use his action research as a way to elicit their voice to increase student engagement and buy in to the activities used in science class. While he wondered if they even had any interests, he still believed it was important to, “*get them to see how science applies to their life*” and “*when I start showing them science in the everyday world, sometimes they are curious and want to know more.*” Because talking to students is an essential part of caring (Noddings, 2002; Noddings, 2012a), this indicates Sasha believed in caring for her students by building relationships with them through dialogue. However, teachers understanding their content area in order to teach their students can contribute to building relationships in science classrooms (Sickle & Spector, 1996). In this way, Ben demonstrated caring for his students was important, just in a different manner as Sasha.

Classroom practices related to the inclusion of student voice. Sasha’s and Ben’s practices throughout the study were influenced by their prior experiences and teaching contexts. Sasha cared about her students, possibly because of her experiences as a woman or her existing classroom environment. Ben also demonstrated caring for his students, but his experiences and teaching context influenced his practices in a different way.

Prior experiences. Both Sasha and Ben demonstrated they cared about their students, but Sasha demonstrated her caring about students and their voice in a more traditional way, possibly because of her background in education, classes she has taken, and her prior research in relationship building with students. In addition, as a female, she may also have more capacity to care about her students in a traditional manner because society has taught her that she is expected to do so (Noddings, 2002). A woman’s experience with such things as motherhood or being cared for by other women favors the development of caring and empathy (Noddings, 2012a; Noddings, 2013). Men do possess the ability to care but the way they show care is related to

gender complexities as they are also expected to act a certain way (Hjalmarsson & Lofdahl, 2014). Therefore, Sasha may have been more likely to choose a topic such as building relationships as the focus for her action research because of this natural capacity to care. This does not mean Ben did not care, he just expressed his caring in a different way.

Teaching context. Because of their different beliefs, Sasha and Ben approached discussing their action research with their students in different ways. Sasha said that as a result of her action research, she was more attentive to asking students what they needed on a regular basis. Ben was limited in his discussions with students throughout the action research process. Part of being a caring teacher is creating a welcoming environment where every student feels like they matter (Jansen & Bartell, 2013). While Sasha attempted to have conversations with her students to ensure their needs were being met, Ben elicited his students' voices through surveys, so he never really had to talk to them at all. Even when he got some surprising results from the surveys, he decided not to ask them about it, "*I didn't share with them because their answers didn't match their preferences and I didn't know how they'd feel about that.*" In this way, Sasha appeared to care more for her students by placing importance on reciprocal relationships with them by checking in with them to make sure their needs are being met (Jansen & Bartell, 2013; Noddings, 2012a; Noddings, 2013). However, as Ben was still willing to listen to his students, he was still demonstrating how he cared for them (Noddings, 2012b; Sickle & Spector, 1996).

Benefits to teachers and students. The action research gave Sasha and Ben a way to not only increase student participation, but to share their findings with other people at their school. Ben did see the value in eliciting student feedback and planned to share what he had learned with other faculty at his school, "*I'm on the positive behavior committee and I will present it to them.*" Sasha also found value in the feedback of her students but planned to have her students share the

results of her action research with the faculty and administration. She stated that, “*yes, I would love to have them go talk to our faculty. It’s something that some of us have been wanting to do.*”

While Sasha planned to give her students more control with allowing them to share their own voice and ideas, the actions of both teachers allowed other faculty to see the benefits of listening to their students’ voices.

Affordances and obstacles related to the inclusion of student voice. All of the teachers in this study encountered affordances and obstacles with including student voice. Beliefs can be knowledge, experience, and environment-based (Mansour, 2009). Therefore, several factors can support or hinder teachers in applying their beliefs to practice including a teacher’s experience and knowledge, student population, school environment, background of teachers, class sizes, pressure to teach to the test, and time constraints (Buehl & Beck, 2015; Kang, 2008; Mansour, 2013; Nespors, 1987). At times, the teachers in this study were able to overcome obstacles and continue with their action research but other times the obstacles proved to be too much to overcome and the teachers were not able to put beliefs into action.

Teaching context. Two out of the four teachers believed their student population was an obstacle in giving them more of a voice. Ben and Naomi saw their student population as an obstacle to including student voice, while Sasha saw her population as an affordance in how well her research ended up. Based on the limited data collected from Anna, she seemed neutral in how she viewed her students related to student voice. Building relationships with students requires teachers to care and these relationships fail because of a lack of attentiveness or unwillingness to care (Noddings, 2002). Because Sasha looked at her students as people who she could work with to investigate conditions of teaching and learning, she was better able to form caring relationships with them and include their voice in the classroom than Naomi, who viewed her

students as a problem she needed to overcome. Naomi had many negative beliefs about her particular demographic of students. She viewed them as people who did not know how to behave properly in the classroom, “*my demographic...could not do it.*” Anna did not seem to view her students as negatively as Naomi did and even mentioned that they, “*talk about relationship building and how key it was to student success.*” And while Ben did not attempt to engage his students in dialogue, he still attempted to understand his students, “*you can learn English, but then you’re turning your back on your culture.*” He also mentioned that, “*you don’t know what minefield they crossed to get to school and school is a low priority because of home conditions.*” Teachers’ beliefs about their community of students can influence the care they provide in their classrooms (Rolon-Dow, 2005). In order to care for their students, teachers need to know their students more than just academically, they need to understand their experiences and how their backgrounds influence their educational experience. It is possible that in order to care enough to allow student voice, teachers need to care about understanding their students. This may be why Sasha and Ben were successful in completing their action research while Naomi and Anna dropped out midway through the study.

Even though Naomi and Anna worked in a school where student voice initiatives were already put into place, they were the ones who did not complete their action research. On the other hand, Sasha and Ben both said they did not have support from either other faculty or their administration, yet they designed, implemented, and completed their action research. This is contrary to research that shows that student voice work requires buy in from all stakeholders in the school (Fielding, 2004) and that listening and engaging in dialogue becomes more of a reality if it is supported as a school-wide initiative (Bahou, 2012). This may indicate that because their beliefs about student voice were important to them and they cared about giving students a voice,

Sasha and Ben were more successful in overcoming obstacles and completing their action research.

Benefits to teachers and students. Sasha mentioned having good relationships with her students prior to the action research made it easier for her to ask them questions and have them provide an honest response. Her desire to build relationships with her students and engage in dialogue with them to learn about their needs in school indicates that she cares about them (Noddings, 2002; Noddings, 2012a) and is concerned about their well-being (Newcomer, 2018). While Ben did not explicitly mention having these positive relationships with his students, it did appear he cared about their voice because he was willing to listen to them. Naomi appeared to have more negative beliefs about her particular population of students than positive beliefs. She described her students at the beginning of the year by saying, “*they had no regard for life or property.*” These perceptions about their student populations may have influenced the teachers’ beliefs about caring for students and whether they put these beliefs into practice in the classroom (Nespor, 1987). Sasha was able to see her relationships with students as a benefit to including student voice while Ben was able to identify how listening to his students had benefits for student voice. This may have made it possible for them to include their students’ voices and complete their action research.

Barriers to including student voice. All of the teachers in the study believed time constraints were an issue related to not only designing and implementing an action research study, but also including student voice in the process (Buehl & Beck, 2015). Sasha’s biggest issue was related to the action research itself and the data analysis she needed to do to evaluate data from her students. The other teachers’ issues were related to including student voice. Ben mentioned his concern with incorporating student voice at a higher level of the hierarchy because

of the time it would take to implement. And both Naomi and Anna had multiple prior engagements such as being department head (Naomi) or personal commitments (Anna) that may have prevented them from completing the action research. When Naomi arrived at the first action research group meeting an hour late, she stated that she “*couldn't get off work in time.*” This indicates the design of action research focused on including student voice needs to be realistic for it to be successful or to allow teachers to consider doing another action research project in the future.

Surveys allowed Ben to quickly gather data from students and give them a voice. In this manner, he was able to overcome the obstacle of not having enough time. Although there are issues with using surveys as a method of data collection (Jenkins, 2006), this may be more of a reasonable way for all teachers to elicit their students' voices and allow them to contribute to the classroom environment.

Conceptual framework. For the most part, the action research gave both Ben and Sasha an effective way to listen to their students' voices. They either maintained their beliefs about student voice or developed new positive beliefs about listening to their students. Overall, the biggest influence on their beliefs about student voice seemed to be their prior experiences, not the action research. Engaging in action research also gave Sasha and Ben a way to make small changes to their teaching practices. This may have been because of pre-existing beliefs about the importance of student voice or new beliefs they developed throughout the course of the study. It could also be because engaging in the action research influenced their beliefs about student voice because they had the opportunity to put new ideas about teaching and learning into action.

While action research gave the teachers a way to overcome some of their hesitations towards including student voice, they still encountered affordances and obstacles throughout the

process. Some of these affordances and obstacles changed as their teaching context changed (as they engaged in their action research) but continued throughout. For example, all of the teachers mentioned how their student population could act as a hinderance to collecting data. While Sasha believed she had good relationships with her students prior to the action research that made it easier for her to elicit their voices, she also felt that some of her students may not be mature enough to handle sharing their voice. This belief changed throughout the course of the study and she now believes that action research was an effective way to give her students a voice. Ben also had a similar experience related to his students' maturity and the extent to which they could share their voice.

On the other hand, some obstacles persisted throughout the study. For example, time was an issue for all of the teachers. Anna and Naomi dropped out of the study, possibly because of the time constraints they had with professional and personal commitments. Sasha faced issues with analyzing the data she collected as part of her action research. Ben was able to overcome that issue by using a survey to collect data he was easily able to analyze. He still felt it would be difficult to move up to a higher level of the hierarchy because of the time involved with collecting and analyzing data.

The findings indicate a new conceptual framework is needed to represent the relationship between student voice and action research and how teacher beliefs and practices may change as a result of engaging in action research. Figure 3 on page 174 shows the new conceptual framework for this study.

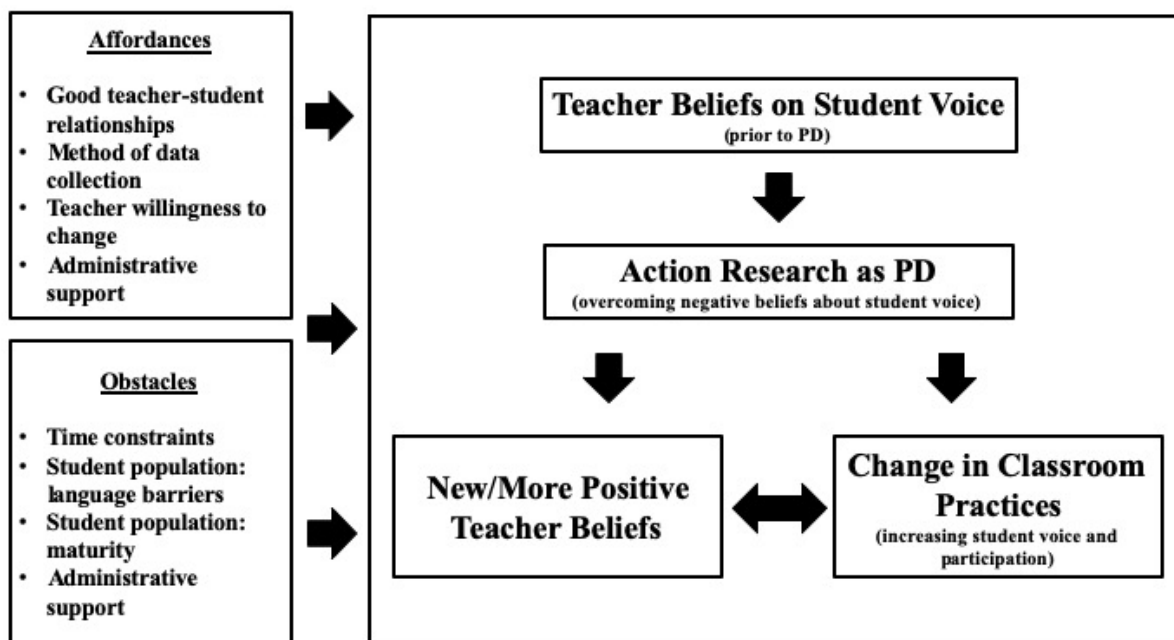


Figure 3. New conceptual framework. This figure illustrates how existing teachers’ beliefs were influenced by the affordances and obstacles they encountered throughout this study while participating in action research in order to increase student voice in their classrooms.

This conceptual framework shows the affordances and obstacles encountered by the teachers throughout this study. The arrows pointing to the remainder of the framework show how they may continue to influence their beliefs and practices about student voice even after engaging in action research. To overcome any potential negative beliefs about student voice and enhance affirmative beliefs, action research was used as a form of PD, as indicated by the arrow. The goal for this action research was to contribute to new or more positive teacher beliefs about student voice, which at times occurred simultaneously with a change in classroom practices as indicated by the double arrow. At times, teachers exhibited a change in classroom practices, but not necessarily a change in their beliefs. They also changed their beliefs about student voice, but not always their classroom practices.

Hierarchy of student participation. Between the three cases, there were three levels of participation represented. All teachers initially shared beliefs that student voice was important to them and they wanted to increase student participation in their classrooms. However, they differed in how comfortable and willing they were with doing so. Ben was unable to move past the first level of the hierarchy for various reasons including a concern about the amount of time it would take to allow students a voice at a higher level, doubting his students' interest and motivation in participating in research, and language barriers with his ELL students. Although Naomi initially had plans to increase student participation to a higher level, she only got to the first level when administering the survey to her students. She had negative beliefs about her population of students that may have prevented her from moving up to the next level of the hierarchy. Sasha not only increased student participation to the second level by engaging in dialogue with her students but has plans to move up to the third level of the hierarchy in the future by collaborating with students and having them present results from action research. She believed her students had "*important things to say*" and gave them opportunities to do so in their own words. In this manner, Sasha was the only one who did not have a conflict between what she wanted to do and what she did related to increasing student voice. Sasha's positive perceptions about her students may have allowed her to move up the hierarchy, while Ben's and Naomi's negative perceptions prevented them from moving past the lowest level (Nespor, 1987).

While Sasha was able to set a goal with a clear vision of how to increase student participation to collaborate with them on researching aspects of teaching and learning science, she was not able to envision how her students could take the initiative to conduct their own research. This provides an argument for the idea that the highest level of the hierarchy, students leading their own research, may not be possible in the typical public school setting for several

reasons. Teachers are restrained by time, resources, student knowledge or willingness to provide their voice, and also their own knowledge or willingness to listen to students (Fielding, 2004; Frost, 2008; Lewis & Burman, 2008). They are also under pressure to teach certain content for high-stakes tests that takes priority over students taking the initiative to design and carry out a research project without the direction from their teachers. However, Sasha was able to think of simple ways she could collaborate with her students to include them in the research process and increase student participation to the third level.

Engaging in dialogue is one of the most effective ways to increase student participation in the classroom (Lodge, 2005). Dialogue is a fundamental component of caring for students because it provides information about participants and supports relationships between teachers and students (Noddings, 2002; Noddings, 2012a). Sasha appeared to be more willing than Ben to discuss her action research with her students to give them a voice. Collecting qualitative data from students and listening to their ideas in their own words allowed Sasha's students to control some of the dialogue. This allowed Sasha and her students to move past the first level of the participation hierarchy where students are solely sources of information into the second level where students contribute to the conversation about teaching and learning (Fielding, 2001; Lodge, 2005). Therefore, this may have allowed Sasha to better elicit her students' voices at a higher level of the hierarchy, while Ben stayed at the lowest level. Ben cared for his students because he was willing to listen to them to give them a voice (Noddings, 2012b; Sickle & Spector, 1996) but did not place as much importance on engaging in dialogue with them as Sasha did. This may also mean that teachers need to care about promoting dialogue with their students to increase participation to the next level of the hierarchy.

Strengths

One of the strengths of this study was using action research as a form of professional development (PD). The common focus (student voice) of the action research gave teachers the opportunity to discuss how to include student voice in the science classroom and also provided them with a systematic way to reflect on their teaching practice as they attempted to increase student participation. Because we had this common purpose, the action research groups flowed well as we could talk about the teachers' action research related to student voice (Grossman et al., 2001). The group exposed teachers to new beliefs on certain educational constructs, such as student voice, with the goal of helping them change their practice (Bradley-Levine et al., 2009). In addition, the self-reflection aspect of the action research functioned to help teachers align their beliefs with their teaching practices (Buehl & Beck, 2015; Kang, 2008). This is important because changes in beliefs may not come about until after engaging in specific actions and practices through action research (Buehl & Beck, 2015).

Another strength of this study was my method of data collection. I used data source triangulation by incorporating action research group meeting transcripts, classroom observations, teacher journals, and interviews with teachers to determine if certain phenomena remain the same at different times and/or spaces (Stake, 1995). The interviews, action research group meetings, and journals allowed teachers to describe and reflect on their beliefs and how they may have changed as a result of the action research and the observations allowed me to see if teacher beliefs were being incorporated into their classroom practice.

A third strength of this research is how this study contributes to the research literature. There has not been much research done in the area of teacher beliefs about student voice and even less specifically focused on science education. This study contributes to the research

literature by exploring how science teacher beliefs on student voice and participation can be enhanced or changed through participating in action research.

Limitations

One of the limitations of this study was the collaboration in the action research group was restricted to very few teachers and only two meetings. The study began with four teachers in the group but only two of the teachers participated in the entire action research and data collection processes and were present during the second meeting. While it still allowed them to discuss their action research and plans moving forward, it limited the amount of collaboration that could have occurred if all teachers participated throughout the duration of the study. During the second meeting, teachers were supposed to have had the opportunity to provide an update on the progress of their action research and to give and receive feedback. However, because of various issues, we did not have that second meeting.

A second limitation of the study is the amount of time the teachers had to learn about student voice, design and carry out their action research, and collaborate with other teachers. Previous research on action research groups has demonstrated the longer the group lasts, the more collaborative it gets over time (Castro Garces & Martinez Granada, 2016). This is because time is necessary in building an action research community (Grossman et al., 2001). Only about two months passed between our first group meeting to the end of the teachers' action research. This may not have been enough time for the teachers to really understand the possibilities of student voice and then also implement new beliefs and practices in the classroom. Teachers need to be supported in ongoing PD programs and two months may be too short to see any changes in practices (Wickremesooriya, 2015). This was particularly evident in the case of Ben, who valued student voice but did not move up to the next level of participation. He even described his

experience as “a starter” and acknowledged he wanted to learn more about how to implement student voice in his classroom. Having more time to learn about and then implement an action research project on student voice would allow for more opportunities to include students in action research.

Implications and Future Research

Implications. This study was significant because it helped understand teacher beliefs about student voice and participation in the secondary science classroom and how these beliefs translated into classroom practice. This research fills the gaps in the literature and contributes to a greater understanding of teacher beliefs and the incorporation of student voice and participation in the secondary science classroom. Therefore, this study has implications for teachers interested in action research and increasing student voice, administrators looking for alternative PD models and increasing student voice, and researchers interested in studying student voice.

Teachers. This study gave teachers a way to reflect on their beliefs and practices in order to increase student participation in their classroom and consider the affordances and obstacles they encountered while doing so. Prior research has demonstrated that backgrounds influence beliefs (Nespor, 1987). Action research can lead to a better understanding of teaching practice through a reflective process (Feldman et al., 2018). Developing an understanding of their work helped the teachers understand how they made sense of their practices and how their beliefs influenced their decisions about teaching and learning (Lewis & Burman, 2008; Mansour, 2013). A better understanding of their beliefs and practices related to student voice can help educators understand how to better increase student participation in the future.

The participation hierarchy developed for this study was a way to guide teachers to increase student participation in their classrooms. The findings from Sasha indicated that

implementing student participation at a higher level is more conducive to eliciting voice and led to a deeper understanding of students. Prior research also supports the idea that engaging students in dialogue can allow them to better share their ideas about teaching and learning (Lodge, 2005) and that close-ended questions on surveys do not truly allow for student voice (Jenkins, 2006). However, asking students for their voice in their own words and having class discussions were also time consuming and may not be feasible on a regular basis in a typical secondary science classroom, especially since time constraints was identified as an issue by every teacher. Ben was able to overcome these time constraints by using surveys to inform his instruction. This suggests surveys are a practical way for educators to consistently include students in educational decisions.

Action research proved to be a way for teachers to increase student voice and overcome obstacles they identified related to this such as the perceived maturity of their students and willingness to share control with their students. Engaging in action research helped the teachers develop positive beliefs about the maturity of their students and how much responsibility they could handle. It also gave them a way to see how they could share some of the control of classroom decisions with their students in a structured way. Therefore, using action research as a way to increase student voice can be a way for teachers to overcome obstacles in the context of their specific teaching experience (Mansour, 2013).

Administrators and teacher educators. In this study, action research was used as a form of PD where teachers explored their individual teaching practices. Prior research has demonstrated that PD opportunities can help teachers develop positive beliefs about student participation (Fletcher, 2003). In this study, the teachers either maintained their beliefs about their students or developed more positive beliefs. This supports the idea that administrators and

teacher educators could use this type of PD to meet individual teachers' needs (Bevins et al., 2011; Bradley-Levine et al., 2009) in order to increase student voice.

The teachers in this study had prior experiences that influenced their beliefs about student voice (Nespor, 1987). Some of these beliefs were maintained throughout the study even after the action research yielded positive results. This indicates that when implementing new educational initiatives, administrators and teacher educators need to address these pre-existing beliefs and teacher backgrounds in order to successfully implement new programs and ideas about teaching and learning.

While two of the teachers in this study had administrative support and it did not help them be successful, this still may be needed in some situations (Buehl & Beck, 2015). For example, when teachers struggle with eliciting voice from groups of students who they feel that can't effectively communicate with, such as ELL students. This suggests that administrators who are interested in increasing student voice in their school need to provide support to teachers to better meet their individual needs, rather than focusing on a school-wide implementation. Another way administrators can support teachers is by encouraging them to share findings of their action research so other teachers can learn about student voice.

Researchers. The teachers in this study had prior experiences that influenced their beliefs about student voice (Nespor, 1987). Some of these beliefs were maintained throughout the study even after the action research yielded positive results. This indicates that when researching interventions in teaching, researchers need to address these pre-existing beliefs and teacher backgrounds in order to successfully implement new programs and ideas about teaching and learning.

The results of this study suggest that qualitative data might lead to a better understanding of students than using a quantitative survey. However, based on the action research completed by the teachers in this study, it can be a time-consuming process to collect and analyze this type of data. Researchers should consider the usefulness of qualitative data versus the quicker method of administering a quantitative survey in order to explore student voice.

Moving forward. Future research should include a focus on how to get over some of the obstacles the teachers faced in this study. For example, how can teachers move up the participation hierarchy without taking up too much planning and classroom time? Research could explore how to increase student participation while still meeting the time requirements of pacing guides and covering required content. Future research could also focus on what prevents teachers from studying their practice, such as in the case of Naomi and Anna.

While this study provided some insight into the beliefs and practices of high school science teachers related to student voice, a longer study would have allowed for more collaboration during the action research group and opportunities to change their teaching practices (Grossman et al., 2001; Wickremesooriya, 2015). This collaboration would further teachers' understanding of student voice and the possibilities of action research and could lead to a better understanding of how they could change to include student voice in their teaching practice. A longer study could also better address teachers' pre-existing beliefs with a better chance to overcome any negative beliefs towards increasing student voice in their classroom.

This study only focused on teachers, as teacher buy in is crucial to implementing any student voice initiative (Bahou, 2012; Fielding, 2004). Future research should also include student beliefs about collaborating with their teachers through action research. This would be

useful in understanding if the goals of increasing student voice and participation were being met and if the students were engaged, empowered, and finding meaning in their education.

Chapter Summary

This chapter presented the results of the cross case analysis between the three cases in this study. Also included in this chapter were the strengths and limitations of this study; the implications for teachers, administrators, teacher educators, and researchers; and ideas for future research.

The purpose of this dissertation research was to explore how engagement in action research influenced high school science teachers' beliefs and classroom practices related to student voice and participation. This included exploring any affordances or obstacles they experienced with attempting to increase student voice and participation in their classrooms. This study aimed to overcome some of the possible obstacles teachers face while attempting to include student voice by using action research as a form of PD and as a way for teachers to include their students' voices in their science classrooms. The intent of the action research was also to create new positive beliefs or enhance affirmative beliefs about student voice and to influence changes in their classroom practices and help the teachers understand that including student voice in the science classroom is possible.

The two teachers who finished the study either maintained or improved their beliefs about student voice. They also made minor changes to their classroom practice in order to promote student participation. All four teachers experienced both affordances and obstacles that either made it easier for them to seek out their students' ideas or made it more challenging for them to do so. The findings show that action research gave the teachers a way to increase student voice and participation in their classrooms.

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Appendix A: Sample Text from Transcripts

Meeting 1: October

Me: The point is though, the rest of us are going to listen. And try and figure out how to widen your ideas or narrow them so they can be doable. You know what I mean? We want practical ideas. And ideas that include students. And we can figure out how to do that. So, we're just going to listen. And write down comments, comments, whatever.

Sasha: Okay, so, well I talked to you about this how I've done some research in the past with at-risk students, urban students, 9th grade students, pretty much all of those together. I teach 9th grade bio so part of that would be helping those students to pass the class and lower their expected failure they're at risk for. I don't want to say expected, their risk of potentially not graduating based on those characteristics. And in that research that I did I found that relationship building and mentorship was a big part of that so that's something I want to continue.

Anna: My department chair and I, we talk a lot about relationship building and how key it is in student success. This is one of the things, this is my 23rd year of teaching and most of my, I'm from Tampa but I had been living in Tallahassee for the past 23 or 24 years. I didn't teach in Tallahassee high school, I taught in a different county. I taught at a high school and I worked for the college board. I moved home, worked at Jefferson last year, and I'm now working at my alma mater.

Me: Oh really?

Sasha: Nice.

Anna: Yeah, so that really felt good. But I'm a PhD student.

Me: Yes, that's what I remember.

Anna: This is in line...I'm not comping this semester because my mom passed and getting used to the baby, this is new, I don't do boys. I never had boys, she didn't have boys, my grandmother didn't have boys. This is a new thing. But long story short, that relationship building part is key to student success. And I found it a factor in my practice.

Ben: Well, I feel unaccomplished. I have something much tighter and smaller.

Meeting 2: December

Me: You kind of seem to have a plan. Are you going to try and keep implementing that? Are you going to try and keep implementing the clearer directions or whatever?

Sasha: Yes. I won't be assessing it.

Ben: I think it's a nifty part of your instruction though. Kick off the year like, "hey what do you want from a teacher?" and then have them vote on whether you're doing it or not.

Sasha: Right, and I used to have them, at the end of the nine weeks or semester, I would give a little five questions, "am I doing everything that you need, are you doing everything that you need, is there something I could do better?" Basically, "what am I doing well, what are you doing well, what could I do better, what could you do better?" I used to always do that. This is just another version of that, that's a little more specific. What do you really need?

Ben: That's good, that's process improvement.

Sasha: Especially cause this, when I did this, it was your teachers in general. I could maybe shift this to what do you need from me? Because I was doing most of those already, am I still doing those or is there anything else you need? Sorry, go ahead.

Me: No, that was it. I guess you have all of these survey results now, what are you going to do with it?

Ben: Well the school-wide positive behavior stuff, if we can change how we're rewarding them, then it would be worthwhile.

Me: Like school-wide? Are you going to present the results to somebody?

Ben: Well we have the PBS committee, which I am on.

Me: Oh, perfect.

Ben: And that's kind of why I surveyed them. Because it's kind of like, so we have this thing and it's supposed to reward behavior and it doesn't, what's going on? And the kids are like, "well, we don't care about the rewards." Not great to reinforce behavior with a reward they don't care about so I'm on the positive behavior committee and I will present it to them, and we'll see if we can get different rewards they like better. And then the school survey, it's a climate survey. And then I would probably share with the principal once I get those results.

Appendix B: Sample Responses to Teacher Journal Prompts

- 9/24/18
 - Brainstorm some possible starting points for your action research. What do you want your focus to be? For some ideas, think about topics you are interested in or aspects of your practice you want to improve or change. If you already have a good idea of your focus, share your ideas with us.
 - Naomi: “I would like to focus on giving my students more choice in what activities we do. I will give my students a survey asking which activities they have enjoyed most and what do they remember about the unit the activity covered.”

- 10/8/18
 - Develop your data collection plan. What is the problem you are investigating? What do you need to know to investigate this problem? What types of data will allow to investigate this problem? What types of data do you already have (artifacts such as student work, grades, etc)? What instruments will you need to collect this data?
 - Ben: “I am trying to create more student engagement by allowing students to select their learning activities. I need to know which activities the students like more and if they learn more from these activities. I am putting a poll out on Edsby and letting students vote on the activity they like and I am asking them which activities they learn the most from.”

- 10/22/18
 - Reflect on the action research process so far. What is going well? What are some challenges you have encountered?
 - Naomi: “I made the survey optional and have only had limited response so far. I will keep the survey open for another 7 days.”

- 11/5/18
 - Reflect on the inclusion of your students’ voices through this action research. Do you think it is worthwhile to include your students in the learning process? Have your perspectives on student voice changed throughout this process?
 - Sasha: “Throughout this process my students and I have had many discussions on what they really need from teachers and why those needs aren't being met. The students really want their other teachers to listen to and value their voice. I believe in education students involvement is the key to accurate research. They have valid opinions and what better qualitative data then right from the students mouth.”

- 11/19/18
 - Reflect on the action research process so far. What went well? What are some struggles you are still having? What would you have done differently?
 - Sasha: “The process went well. The students and I enjoyed to project. It is hard to constantly apply they strategies/characteristics that the students asked for. It takes a lot of mindfulness and constant reflection to make sure I am meeting their needs all day every day. If I could do something differently, I would have had more time to have the students rate me on

my usage of the strategies/characteristics more to help reflect on whether I was actually meeting their needs or not.”

- 12/3/18
 - Reflect on the action research process. What will you do with this new knowledge about your practice? How do you think this will impact your practice moving forward?
 - Sasha: “This was an eye opening and incredibly interesting process. I was expecting students to ask for silly and impractical things. While some students did, the majority of students wanted things they should already be getting from their teachers. Things like respect, care, understanding, and support. The fact that the students asked for these things means their teachers are not giving it to them. When I informally asked, how many of the ~7 teachers they have this year embody all the things they wanted in a teacher, the responses were between 1 and 3. When asked about all the teachers they had ever had (preK-11/12th grade) they said ~5. This was very sad to hear. Their responses reminded me why I became a teacher and why it is so important for teachers to build relationships with their students and give them a voice in the classroom.”

Appendix C: Observation Protocol

Date: 10/24/18 (1st period)

Teacher: Ben

Focus of action research/observation: choice in learning activities to include student engagement; surveying students on how they like to receive praise based on a school wide behavior initiative

Observational Notes	Questions/Comments for Teachers/Teacher Response	Ideas for Action Research
<ul style="list-style-type: none"> • Began with agenda, overview of lesson • Short lesson (10 minutes) on Lewis dot structures • Students were quiet, facing front, books open, taking notes • After the lesson, they had the choice of any activity from the week: concept map, T chart, vocabulary review, practice drawing Lewis dot structures, survey on Socrative – could complete on phones or laptop • Survey was not emphasized until towards the end of class and then Ben mentioned there was extra credit for anyone who completed it • Twelve students completed the survey (Socrative.com #22342) • During the two classes, we talked briefly about the questions I had 	<ul style="list-style-type: none"> • Is the survey mandatory? No but they are given extra credit for completing it • How long do they have? Three days – the end of the week • What will you do with the data? Talk to students about the results 	<ul style="list-style-type: none"> • Be overt about action research • Think about focusing on only one topic – either engagement or positive behavior • Will there be a change in practice based on the data?

Appendix D: Pre and Post Interview Questions

Pre Interview Questions

Educational background

- What is your highest level of education?
- Do you have a degree in education? If not, what is your degree in?

School environment

- How many years have you been teaching?
- What grade levels do you currently teach?
- What courses do you teach?
- How would you describe your school? (looking for information about demographics, achievement, location, etc.)

Student voice and participation

- How do you allow your students a voice in your classroom?
- How are students allowed to participate in your classroom? How are they allowed to make decisions about their education?
- How do you envision giving your students a voice through action research?

Action research

- Have you ever done action research before? If yes, can you tell me about your action research project(s)?
- Have you included your students in an action research project before? If yes, in what ways have you participated in action research with your students?

Sample text from transcripts: Naomi Interview #1 (Pre) September 20, 2018

Me: What is your highest level of education?

Naomi: All but dissertation for my PhD. Which is why I agreed to do this – I know how important it is to get someone to help you with your research.

Me: That is true.

Naomi: I take it you're doing something qualitative.

Me: Yup. Entirely qualitative. So you'll be able to watch this whole process. Okay, do you have a degree in education?

Naomi: My master's degree is in Ed Leadership.

Me: What is your bachelor's in?

Naomi: My bachelor's is in Interdisciplinary Science.

Me: How many years have you been teaching?

Naomi: 20 plus. The reason I say it like that is that I home schooled my own children way before I got my teacher certification.

Post Interview Questions

- How do you feel your beliefs about student voice changed as a result of participating in this research?
- How do you feel your classroom practice changed as a result of participating in this research?
- What benefits did you see with including your students' voices in the teaching and learning process?
- What drawbacks did you see with including your students' voices in the teaching and learning process?
- What affordances did you encounter while including your students' voices in your classroom?
- What obstacles did you encounter while including your students' voices in your classroom?
- Do you think this action research was an effective way to incorporate student voice or increase student participation in the science classroom? Please explain.
- How was participating in the CAR group helpful? Would you have liked to have more meetings? Do you think that would have been helpful?
- How do you think you will include your students in the teaching and learning process in the future? How will they be allowed to participate in your classroom? How will they be allowed to make decisions about their education?
- Do you think you could increase the amount of participation (for example, from students as consultants to students as co-researchers)? What would prevent you from doing so?

- Is there anything else you would like to add in relation to how you allow your students a voice in their learning or how you would like to continue to do so in the future?

Sample Text from Transcripts: Sasha Interview #2 (Post) December 11, 2018

Me: How do you feel your beliefs about student voice changed as a result of participating in this research?

Sasha: I would say that before I was very open to student voice and this reassured that and made me realize I had to listen to them a lot more and give them a lot more opportunity to voice their opinions and their thoughts and views and have choice in the class.

Me: How do you feel your classroom practices have changed as a result of participating in this research?

Sasha: I'm a lot more conscious of what I'm doing and what I'm saying and the activities I'm doing based on what they told me they wanted and needed. I'm constantly thinking am I meeting that, am I not meeting that, what do I need to do to meet that? And just trying to make as many adjustments towards what they need as opposed to doing the same old thing.

Me: What benefits did you see with including your students' voices in the teaching and learning process?

Sasha: They were definitely a lot more bought into the whole process and because they knew I was giving them that choice and listening to their opinion, they definitely were doing more and having a lot more open discussion whether it was about the teaching and learning process of science in general.

Me: What drawbacks did you see with including your students' voices in the teaching and learning process? If any.

Sasha: I really wouldn't say there was any. If anything, I would say that sometimes it hurts to hear that.

Me: So, drawbacks on your side?

Sasha: On my side. And maybe they get a little, they want to have some choice and opinions when it's something they really can't have choice in. But I wouldn't really say there were that many drawbacks.

Appendix E: Codebook and Themes

<u>Theme</u>	<u>Codes</u>	<u>Description</u>
Teacher beliefs	Initial beliefs	Any initial beliefs the teachers held about student voice or education in general prior to the study
	Changing beliefs – positive	Reflects a change in teacher beliefs where they think more positively about student voice/participation
	Changing beliefs – negative	Reflects a change in teacher beliefs where they think more negatively about student voice/participation
	No change	Beliefs about student voice did not change throughout the study
Classroom practices	Changing practices	Reflects a change in teaching practices as a result of incorporating student voice and participation
	No change in practice	No change in teaching practice as a result of the action research
	Communication with students	Any interaction that shows how the teachers are sharing their action research or giving their students a voice
	Collaborative classroom environment	The inclusion of student voice leading to a more collaborative classroom environment

	Teaching and learning together	Students need to be taught how to use their voice and teachers need to learn how to elicit these voices
	Feedback on teaching and learning	Students having the opportunity to provide feedback on pedagogy
	Future plans	What the teachers plan to do with their action research in their classroom moving forward
Barriers to including student voice	Student voice culture	A lack of culture in either classrooms or schools that does not allow for student voice to be seriously considered
	Student maturity	Teachers belief that their students are too immature to be able to use their voice
	Time constraints	Teachers encountering time constraints when attempting to implement student voice initiatives
	Sharing control	Teachers having issues with sharing control with their students
Benefits to teachers and students	Improving teacher-student relationships	Any mention of how the action research or the inclusion of student voice improved teacher-student relationships
	Agency	Teachers report students exhibiting an increase in science agency

	Empowerment	Teachers report students being empowered by expressing their voice
	Engagement	Teachers report an increase in student engagement with science content
	Meaning	Teachers see students finding meaning with science content/making science relevant for their students
	Motivation	Teachers report an increase in student motivation
Teaching context	Classroom description	Any information about the classroom/school environment
	Student population	A description of students in their schools and classes
Prior experiences	Prior experience – student voice	Any prior experience with allowing student voice
	Prior experience – action research	Any prior experience with action research
	Teacher background	Any information about their background in teaching and learning
Level of participation	Data sources	Students acting as sources of data only
	Active respondents	Students being given an opportunity to engage in conversations about education
	Co-researchers	

	Researchers	Students acting as co-researchers with their teachers
		Students driving their own research
Action research	Action research description	Description of what the teachers did for the action research project. Teacher perceptions of the findings from their action research projects
	Teacher collaboration	Any interactions that show how the group worked together and formed relationships

Appendix F: USF IRB Approval

University of South Florida Mail - eIRB: Study Approved

9/5/18, 10:27 AM



Katie Laux <klaux2@mail.usf.edu>

eIRB: Study Approved

1 message

rsch-arc@usf.edu <rsch-arc@usf.edu>
Reply-To: rsch-arc@usf.edu
To: klaux2@mail.usf.edu

Tue, Sep 4, 2018 at 5:36 PM



IRB Study Approved

To: Katie Laux
RE: Action Research for the Inclusion of Student Voice
PI: [Katie Laux](#)
Link: [Pro00035410](#)

You are receiving this notification because the above listed study has received Approval by the IRB. To ensure compliance with IRB requirements, please review your approval letter by navigating to the project workspace by clicking the Link above.

DO NOT REPLY: To ensure a timely response, please direct correspondence to **Research Integrity & Compliance** either through your project's workspace or the contact information below.

Research Integrity & Compliance

University of South Florida - Research and Innovation

ARC Help Desk (eIRB, eIACUC, eCOI): (813) 974-2880

Email: rsch-arc@usf.edu

Mail: 12901 Bruce B. Downs Blvd, MDC 35, Tampa, FL 33612-4799

Template:_000 - IRB Study: Approved

Appendix G: District Approval Letter

School Board
Sally A. Harris, Chair
Tamara P. Shamburger, Vice Chair
Lynn L. Gray
April Griffin
Melissa Snively
Cindy Stuart
Susan L. Valdes



Superintendent of Schools
Jeff Eakins
Deputy Superintendent
Van Ayres
Deputy Superintendent
Christopher Farkas
Chief of Schools
Harrison Peters
General Manager
Office of Strategy Management
Joe Cochran

July 31, 2018

Ms. Katie Laux
8102 Sheldon Rd. #1016
Tampa, FL 33615

Dear Ms. Laux:

The Hillsborough County Public School district has agreed to participate in your research proposal, *Action Research for the Inclusion of Student Voice*. This research has been approved for **high school only** at this time. A copy of this letter **MUST** be available to all participants to assure them your research has been approved by the district. **Your approval number is RR1819-83. You must refer to this number in all correspondence.** Approval is given for your research under the following conditions:

- 1) Participation is to be on a voluntary basis. That is, participation is **NOT MANDATORY** and you must advise **ALL PARTICIPANTS** that they are not obligated to participate in your study.
- 2) Confidentiality must be assured for all. That is, **ALL DATA MUST BE AGGREGATED SUCH THAT THE PARTICIPANTS CANNOT BE IDENTIFIED**. Participants include the district, principals, administrators, teachers, support personnel, students and parents.
- 3) Any student data **MUST** be **DESTROYED** when the project has been completed.
- 4) Research approval does not constitute the use of the district's equipment, software, email, or district mail service. In addition, requests that result in extra work by the district such as data analysis, programming or assisting with electronic surveys, may have a cost borne by the researcher.
- 5) This approval **WILL EXPIRE ON 12/31/2018**. You will have to contact us at that time if you feel your research approval should be extended.
- 6) A copy of your research findings must be submitted to this department and for our files.

Good luck with your endeavor. If you have any questions, please advise.

Sincerely,

Julie McLeod, Manager
Strategic Data and Evaluation
Office of Strategy Management

JM/vv

cc: Leslie Granich, General Director, Secondary Education
Dan McFarland, Supervisor, Secondary Education
Janet Spence, General Director, Middle School Education
Nicole Jacquay, Supervisor, Middle School Education
Lillian Wichinsky, Ph.D., Director, Office of Community Engagement & Partnerships (USF)

Raymond O. Shelton School Administrative Center • 901 East Kennedy Boulevard • Tampa, Florida 33602
School District Main Office: 813-272-4000 • P.O. Box 3406 • Tampa, Florida 33601 • website: www.sdhc.k12.fl.us
Office of Strategy Management

Appendix H: Consent Form



Informed Consent to Participate in Research

Pro # 00035410

You are being asked to take part in a research study. Research studies include only people who choose to take part. This document is called an informed consent form. Please read this information carefully and take your time making your decision. Ask the researcher or study staff to discuss this consent form with you, please ask him/her to explain any words or information you do not clearly understand. The nature of the study, risks, inconveniences, discomforts, and other important information about the study are listed below.

We are asking you to take part in a research study called: **Action Research for the Inclusion of Student Voice in the High School Classroom**

The person who is in charge of this research study is Katie Laux. This person is called the Principal Investigator. However, other research staff may be involved and can act on behalf of the person in charge. The faculty advisor overseeing this research is Dr. Allan Feldman.

Purpose of the study

The purpose of this research is for teachers to identify and reflect on how they include their students' voices in the classrooms and also any benefits or limitations they see with doing so.

Why are you being asked to take part?

We are asking you to take part in this research study because you are a current high school science teacher.

Study Procedures:

This study will take place during the Fall 2018 semester. If you take part in this study, you will be asked to:

- Plan and carry out an action research project in your own classroom (with the help of the PI) throughout the Fall 2018 semester. Total participation will total

about 60 minutes per week on average throughout the semester. The total time commitment will be approximately 16 to 20 weeks.

- Participate in three collaborative action research (CAR) groups.
- Allow the PI access to your classroom to observe the implementation of the action research plan.
- Journal weekly reflecting on your action research.
- Sit for an approximately 30-minute interview when the action research is complete.

Total Number of Participants

Approximately six to eight high school teachers will participate in this research.

Alternatives / Voluntary Participation / Withdrawal

You do not have to participate in this research study.

You should only take part in this study if you want to volunteer. You should not feel that there is any pressure to take part in the study. You are free to participate in this research or withdraw at any time. There will be no penalty or loss of benefits you are entitled to receive if you stop taking part in this study. Your decision to participate or not to participate will not affect your student status, course grade, recommendations, or access to future courses or training opportunities.

Benefits

Participating in this study may help high school science teachers identify and better understand problems within their teaching practice and how to overcome these issues. Including the student voice can create empowering opportunities for students to learn, engage with content, find meaning and relevance in science, and participate in their education.

Risks or Discomfort

This research is considered to be minimal risk. That means that the risks associated with this study are the same as what you face every day. There are no known additional risks to those who take part in this study.

Compensation

You will receive no payment for taking part in this study. However, professional development points will be awarded to those who successfully complete the action research.

Costs

It will not cost you anything to take part in the study.

Conflict of Interest Statement

No conflict of interest was reported.

Privacy and Confidentiality

We will keep your study records private and confidential. Certain people may need to see your study records. Anyone who looks at your records must keep them confidential. These individuals include:

- The research team, including the Principal Investigator, study coordinator, key personnel, and all other research staff.
- Certain government and university people who need to know more about the study, and individuals who provide oversight to ensure that we are doing the study in the right way.
- The USF Institutional Review Board (IRB) and related staff who have oversight responsibilities for this study, including staff in USF Research Integrity and Compliance.

The results of this study will be published as part of USF's dissertation requirements. Your name will not be included. Nothing will be published that would let people know who you are.

You can get the answers to your questions, concerns, or complaints

If you have any questions, concerns or complaints about this study, or experience an unanticipated problem, contact Katie Laux at klaux2@mail.usf.edu.

If you have questions about your rights as a participant in this study, or have complaints, concerns or issues you want to discuss with someone outside the research, call the USF IRB at (813) 974-5638 or contact by email at RSCH-IRB@usf.edu.

Consent to Take Part in this Research Study

I freely give my consent to take part in this study. I understand that by signing this form I am agreeing to take part in research. I have received a copy of this form to take with me.

Signature of Person Taking Part in Study

Date

Printed Name of Person Taking Part in Study

Statement of Person Obtaining Informed Consent

I have carefully explained to the person taking part in the study what he or she can expect from their participation. I confirm that this research subject speaks the language that was used to explain this research and is receiving an informed consent form in their primary language. This research subject has provided legally effective informed consent.

Signature of Person obtaining Informed Consent

Date

Printed Name of Person Obtaining Informed Consent