

Summer 2021

The Effects of a Dialogic Pedagogy in a Hybrid Advanced Placement Environmental Science Course on Students' Learning Experience

Blake Alspach

Follow this and additional works at: <https://scholarcommons.sc.edu/etd>



Part of the [Curriculum and Instruction Commons](#)

Recommended Citation

Alspach, B.(2021). *The Effects of a Dialogic Pedagogy in a Hybrid Advanced Placement Environmental Science Course on Students' Learning Experience*. (Doctoral dissertation). Retrieved from <https://scholarcommons.sc.edu/etd/6478>

This Open Access Dissertation is brought to you by Scholar Commons. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Scholar Commons. For more information, please contact digres@mailbox.sc.edu.

THE EFFECTS OF A DIALOGIC PEDAGOGY IN A HYBRID ADVANCED
PLACEMENT ENVIRONMENTAL SCIENCE COURSE ON STUDENTS'
LEARNING EXPERIENCE

by

Blake Alspach

Bachelor of Science
University of Vermont, 2005

Master of Science
Mississippi State University, 2016

Education Specialist
Florida State University, 2018

Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Education in

Curriculum Studies

College of Education

University of South Carolina

2021

Accepted by:

Todd Lilly, Major Professor

Leigh D'Amico, Committee Member

Suha Tamim, Committee Member

Suzanne Porath, Committee Member

Tracey L. Weldon, Interim Vice Provost and Dean of the Graduate School

© Copyright by Blake Alspach, 2021
All Rights Reserved.

DEDICATION

This dissertation is dedicated to my late father, Bruce Alspach, who told me he would support whatever I did in my life as long as I worked to reach the top. Thank you, dad.

ACKNOWLEDGEMENTS

I would like to thank the members of my committee for their dedication to my research project. Your feedback and support gave me the confidence to pursue this study. I am honored to have had the chance to learn from each of you. A special thank you goes to Dr. Todd Lilly for asking me challenging questions that made me reflect on my core beliefs of what teaching and learning mean.

I would also like to thank my colleagues, my friends, and my family. To Martha Chang, Margaret Nampon, Jim Hoffman, and Robert Anderson, thank you for your support and feedback to improve my instructional practice. To my students, thank you for all of your hard work and patience. I hope to continue to provide you with the best possible learning experience. To my friends, Steve, Alie, Cody, Olivia, Rebecca, Robin, Matt, Becs, Matty, Hannah, Andy, Selena, Cheryl, Harry, Luke, Tashi, Beilei, Kris, and more thank you for the parts you played in this journey. To my dogs, Reveille and Trigger, thank you for the walks to clear my mind and get lost in thought. To my wife, Amanda, thank you for listening to hours of thoughts, proofreading passages, and supporting me through the highs and lows of seven years of graduate school. My life would not be complete without you. To my daughter, Ashtyn, thank you for understanding and appreciating the time I needed to complete this study. Please chase your dreams in life. To all those who never doubted me, supported me, and understood this journey: we did it. Always.

ABSTRACT

This action research study evolved from the sudden shift in schools and districts in response to the COVID 19 pandemic. Shifting from a traditional face-to-face AP Environmental Science classroom to a hybrid classroom required evaluating and revising the pedagogical choices made to create a positive learning experience. A hybrid classroom consists of face-to-face students in the classroom and online students attending the class simultaneously through video conferencing software. Teachers and students had little to no experience engaging in a hybrid learning model, thus creating a need to develop and implement effective instructional practices to support student learning. This qualitative action research case study analyzed the student learning experience through the lenses of Bakhtin's dialogism, Vygotsky's social constructivism, and Deci and Ryan's self-determination theory. Student interviews, student surveys, and teacher-researcher observations were the three data sources collected and analyzed as part of the study. The resulting research of this study suggests that implementing a dialogic pedagogy positively impacts the student learning experience by increasing content understanding and student motivation compared to a monologic approach. The teacher facilitated effective dialogue by using purposeful questioning techniques, scaffolding within the lesson, cultivating small group collaboration, and an overall restructuring of the power dynamics within the classroom. These findings can support effective dialogic instruction as schools continue to progress in the digital age in either face-to-face or hybrid classrooms.

TABLE OF CONTENTS

DEDICATION	iii
ACKNOWLEDGEMENTS	iv
ABSTRACT	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
CHAPTER ONE: INTRODUCTION	1
CHAPTER TWO: THE THEORY, IMPLEMENTATION, AND EFFECTS OF A DIALOGIC PEDAGOGY	13
CHAPTER THREE: METHODOLOGY	58
CHAPTER FOUR: RESEARCH FINDINGS	75
CHAPTER FIVE: SUMMARY	130
REFERENCES	147
APPENDIX A: LESSON SAMPLE	157
APPENDIX B: PARENT/GUARDIAN CONSENT FORM	160
APPENDIX C: STUDENT CONSENT FORM	163
APPENDIX D: INTERVIEW PROTOCOL	168
APPENDIX E: PARTICIPANT SURVEY	172
APPENDIX F: LESSON SAMPLE	179

LIST OF TABLES

Table 4.1 Nicole's assessment scores	103
Table 4.2 Participants perception of the learning experience	127
Table 4.3 Participant demographics.....	128
Table 4.4 Participant academic background	129

LIST OF FIGURES

Figure 4.1 Sample discussion board posting.....	81
Figure 4.2 Discussion board meme.....	83
Figure 4.3 Exploratory question example #1	89
Figure 4.4 Exploratory question example #2.....	93
Figure 4.5 Exploratory question example #3.....	100

CHAPTER 1

INTRODUCTION

The day before Spring Break and the end of the third quarter of the academic year in March 2020, I said goodbye to my AP Environmental Science (APES) students, and we all left campus that day. Over the next week, the education system that we left that day would change. The COVID-19 pandemic forced the closure of schools to minimize the spread of the coronavirus. At first, physical classrooms in the district would remain closed for a week. Days later, the school district announced that students would not return to physical classrooms for a month. Ultimately, the physical classrooms were closed for the remainder of the 2019-2020 academic year. By May 2020 worldwide, over 67.7% of all students worldwide were affected by school closures (UNESCO, 2020). As physical classrooms closed around the world, new digital classrooms opened.

As the fall of 2020 approached, safely reopening schools during a pandemic became a highly debated topic. The State of Florida, in July of 2020, issued an emergency order that required all schools to reopen in August to provide continued education for all students (Florida Department of Education, 2020). However, the emergency order also allowed school districts to present various strategies to reopen schools and provide options for parents in terms of the physical learning environment to minimize the threat of being exposed to COVID-19 (Florida Department of Education, 2020). This flexibility allowed school districts to propose new, innovative options for students to attend classes. One such proposal that many school districts, including my

own, chose to offer students was a hybrid learning model where both face-to-face and online students would attend the same class simultaneously. This new hybrid learning model was an environment that no teacher in our school or district had ever experienced before, and we had ten days before the 2020-2021 academic year began.

In the year before the COVID-19 pandemic, after 14 years as a teacher in Central Florida, I had begun to realize that an instructional approach that is teacher-centered and lecture-based represents monologic pedagogy in the classroom. This monologic approach is not unique in classrooms, as Nystrand (1997) found that most classroom discourse is monologic. The teacher is the primary, often a sole contributor to the discourse, and the instruction is teacher-centered (Wegerif, 2013). While monologic pedagogy is a common instructional practice, the instructional approach that best supports thinking and learning creates an open dialogue between all classroom members (Wegerif, 2013). Dialogic pedagogy was likely to be the most appropriate pedagogical approach to improve student learning and teacher efficacy in an APES classroom. Before the pandemic, I had only begun attempting to use a dialogic approach in my classroom. I had no formal training or experience facilitating this type of instruction. Suddenly, I was faced two problems: how does a more dialogic approach affect student learning, and how could such an approach be facilitated in a hybrid learning environment?

Dialogic pedagogy and the theory of dialogism are grounded in the work of Mikhail Bakhtin. According to Bakhtin, to arrive at one's own consciousness about words or concepts, there must be a prior struggle with another's discourse or perceived consciousness of the same word or concept (1981). As a dialogue occurs between voices, there is an opposition of centripetal (divergent) and centrifugal (convergent) forces that

arises between the utterances of voices as each works to develop a unique and individual understanding of words or concepts against a background of language and social context (1981). Bakhtin's dialogue could be akin to a verbal negotiation between two voices. The interchange between voices creates meaning and social consciousness of words or concepts (1981). Applied to teaching and learning, Bakhtin's theory of dialogism suggests that students must engage in a dialogic struggle with another by proposing ideas, analyzing various perspectives among voices, and revising their ideas to create a personal understanding of the concepts and words of the curriculum.

The necessity of another voice for one to develop understanding and meaning aligns with Lev Vygotsky's theory of social constructivism. The need for a dialogic process between different voices indicates that learning is a social process that occurs among individuals. According to Vygotsky (1978), learning occurs twice, first between individuals on a social level and then on the individual level. Much of Vygotsky's (1978) work centers on the concept of a more knowledgeable other (MKO) and one's zone of proximal development (ZPD). Through social interaction, individuals learn with the guidance and support of the MKO, who may be a teacher or peer (Vygotsky, 1978). Therefore, through the lens of social constructivism, learning for all students must include a social process that provides varying levels of support for students to help them progress beyond their ZPD.

The social learning theories of Bakhtin and Vygotsky suggest that attempting to support student learning using a primarily teacher-centered lecture-based instructional approach is inherently flawed. Instead, a teacher should use a pedagogical approach that is grounded in social collaboration and dialogism. Robin Alexander (2008) connected the

work of Bakhtin and Vygotsky. Alexander (2008) stated that although the two individuals never met, their similar belief that learning began first at a social level and then to the individual level can be interconnected as “dialogue provides a potent form of peer or adult intervention in the child’s progress across the zone of proximal development” (p. 109). Therefore, to maximize learning potential, dialogue between students should be a prominent feature in classrooms.

Incorporating a dialogic pedagogy into a classroom could increase student understanding and increase students’ intrinsic motivation. Eugene Matusov described that students are the primary author of their learning whether teachers choose to acknowledge that fact or not (Matusov & Miyazaki, 2014). The teacher’s role is to structure and facilitate the student’s opportunity to develop that authorship and that a dialogic approach promotes student authorship (Matusov & Miyazaki, 2014). This type of autonomy over a student’s learning may increase intrinsic motivation. Autonomy is one of the three tenants, along with competence and relatedness, of Deci and Ryan’s self-determination theory (SDT) (Ryan & Deci, 2000). Therefore, engaging in a dialogic classroom would presumably enhance content understanding, higher-order thinking skills, and experience greater intrinsic motivation levels, all of which could provide students with a more positive learning experience.

However, instead of using instructional strategies to facilitate dialogue in a physical classroom, the COVID-19 pandemic required implementing a dialogic pedagogy in a hybrid learning environment. The increased availability of technology can result in a tremendous change in teaching and learning; however, not all education levels have quickly adapted to greater access to technology. Rupert Wegerif (2013) stated that “The

Internet is a disruptive technology for education. It cannot simply be incorporated into existing formal education systems without changing them” (p. 3). Compared to K-12 schools, post-secondary schools have utilized technology more effectively, as can be seen by the wide variety of online learning options for students ranging from individual courses to fully online degree programs (Yu, 2020). While secondary schools are experiencing increased virtual school options for students, research has shown that students in these programs are not achieving the same academic success as students in traditional classrooms (Tate, 2019).

Students also struggled to find academic success in our new hybrid learning environment, whether online or face-to-face. In an email to the faculty on October 30, 2020, our school principal noted a significant problem in our student’s academic achievement. She said that 40% of our students had at least one grade of a ‘D’ or ‘F’ in their classes, a percentage far higher than in previous years. At first, the principal also noted that she believed this to reflect that 75% of our students had opted for our county’s digital hybrid learning model, LaunchEd. However, as our principal examined the data, she found no considerable difference between face-to-face and LaunchEd students’ academic success. Students in our school were struggling to be academically successful no matter their mode of learning. The type of instruction the teachers at our school were providing was seemingly not effective. As I attended meetings, discussed the situation with other teachers, and heard students discuss other classes, it became clear that most teachers were still attempting to implement a monologic, lecture-based approach in their new hybrid learning environment.

This fact was not surprising. In 2019, a National Education Policy Center (NEPC) study found that one-third of all online charter school virtual programs exclusively used self-paced online courses using individualized, student-driven independent study models. The second most frequent instructional strategy was teacher-driven synchronous discussion, a monologic learning environment (NEPC, 2019). One of the least used instructional strategies in online charter virtual school programs was collaborative learning (NEPC, 2019). In total, the NEPC (2019) study found that students in online programs have less synchronous interaction in a week than traditional students have in a day. If dialogue is essential to learning, the lack of social interaction in online programs may be a fundamental cause for students' decreased achievement levels enrolled in these programs.

As most schools, teachers, and students found themselves transitioning to a new, increasingly digital learning environment, instructional practices that reverse the decreased academic performance currently seen in many online programs and align to digital learning require exploration. Before the COVID-19 pandemic, technology use was increasing in schools and society, and after the pandemic, the implementation of digital technology will likely only continue to grow in prevalence in classrooms. However, there remains a tension between traditional instructional practices and strategies for the internet age (Wegerif, 2013). Traditional print-based education relies on transmitting knowledge from one individual to another; however, the Internet and digital technology provide opportunities for creating knowledge through dialogue and collaboration between individuals, not just a place for information retrieval (Wegerif, 2013). One central concern for teachers should be supporting students in learning how to engage in dialogue

to create their understanding of subject matter in a digital environment, whether it be in a fully online program, using technology in a traditional classroom, or in the 21st-century workforce (Mercer, Hennessy, & Warwick, 2019). Therefore, while the future of the classroom and the incorporation of digital technology may remain unclear due to the long-term effects of the COVID-19 pandemic, for students to achieve success academically and in life in the internet age, several decades of research has shown that more authentic discourse will be required (Skaftun, Igland, Husebø, Nome, & Nygard, 2018).

Problem of practice

Teachers and students had to transition from traditional face-to-face classrooms to various online or hybrid learning environments due to the COVID-19 pandemic, a new experience for all stakeholders. Research studies and personal real-world experience have indicated that students are experiencing decreased academic performance, especially in online learning environments, potentially due to less effective instructional strategies, including using a monologic pedagogy by many teachers. As teachers and students transitioned into various online or hybrid learning environments, there was an increased urgency to identify and implement more effective instructional strategies. Attempting to use a more dialogic pedagogy and provide opportunities for students to engage in dialogue effectively could possibly improve the students' learning experience and academic achievement.

Research question

The purpose of this action research study will be to develop an insight into the experience that APES students have while engaging in a course using a dialogic

pedagogy in a hybrid classroom. This investigation seeks to answer the following research questions:

How does a dialogic pedagogy affect students' learning experience in a hybrid Advanced Placement Environmental Science course?

This study will attempt to address this research question through the following objectives:

- 1) To understand how the experience affects student understanding and application of course content.
- 2) To understand how the experience affects student motivation.

Purpose statement and overview of the methodology

The purpose of this qualitative action research case study is to explore the lived experience of students engaged in instructional strategies using a dialogic approach and the effect on the students' learning in a hybrid Advanced Placement Environmental Science course at a select high school in Central Florida. The study sought to understand how this experience, engaging in academic tasks attempting to facilitate dialogue, has affected student learning, motivation, and engagement. Additionally, the study served as a form of professional development for me as a teacher-researcher. I attempted to identify aspects of the experience that most benefited and least benefited the students to understand how the teacher-researcher can refine instructional practices to support student learning in an online, hybrid, or face-to-face learning environment.

This action research case study used qualitative research methods to investigate the effect of a dialogic pedagogy among students in a hybrid learning environment. The research method chosen for the study was action research because, as opposed to alternative forms of research, action research is done with an inquiry style approach by

insiders or with insiders, but not to or on them (Herr & Anderson, 2015). Additionally, action research aims to improve individuals' instructional practice, which aligns with my purpose of increasing instructional efficacy for my students (2015).

The study collected data in three different ways. One source of data was through student interviews to obtain the student perspective on the experience of engaging in a course using a dialogic pedagogy in a hybrid learning environment. This data was analyzed using a priori thematic coding to understand the lived experience of the participants. The second data source was a survey to obtain the participants' demographic and academic background information. This information helped to provide a more holistic understanding of each participant in the study. The third data source was a reflective journal that I recorded throughout the data collection process and was analyzed using a priori thematic coding. This data provided observations from my perspective on student learning, engagement, motivation, and the effects of the instructional strategies. This study would help inform my future instructional practices to modify and improve the implementation of a dialogic pedagogy in an online, hybrid, or face-to-face learning environment. The cyclical nature of action research involving data collection and intervention alongside stakeholders, in this case, are the students, would increase my knowledge of the problem over time and, hopefully, lead towards its solution (Herr & Anderson, 2015).

Significance of the study

The increasing digital technology in the classroom has influenced how information is shared, the delivery of instruction, and the quantity of information available. There is also the awareness of the decreased academic performance of students

engaged in online or hybrid educational programs. I believe it is essential to investigate the experience students have as they attempt to engage in a course using a dialogic approach in a digital environment and the resultant impact on student learning. Although this small qualitative study cannot be generalizable in the statistical sense, this study aims to understand, from the students' perspectives, the phenomena of engaging in dialogic discourse in a hybrid learning environment in greater depth (Merriam & Tisdell, 2016). The knowledge gained from this action research study could be transferred and used by another individual in a similar context (Herr & Anderson, 2015).

I intend to investigate the effectiveness of strategies used to implement a dialogic pedagogy in this unique hybrid learning environment that can improve student learning and teacher practice in the future. Teachers face a crossroad as education transitions to the Internet, and the digital age is accelerating due to the COVID-19 pandemic. This reality makes understanding how to support student learning in a digital environment more critical than ever before. As the world becomes more reliant on digital technology, developing students' critical thinking, collaboration skills, and problem-solving within a digital environment is essential for developing successful people. Other studies have identified that “The uses of digital technology that support a dialogic pedagogy need more exploration; research in this area is in its infancy, despite some encouraging results” (Mercer, Hennessy, & Warwick, 2019, p. 197). The findings from this study can provide insight into the effectiveness of implementing dialogic instructional practices with the ultimate goal of increasing student achievement in the digital age.

Key terms:

Action research - A type of research with the goals of improving practice or developing individuals, whereas others see its goal as transforming practice (Herr & Anderson, 2015)

Autonomy - concerns a sense of initiative and ownership in one's actions (Ryan & Deci, 2020)

Authorship - active participation in knowledge generation as a function of learning (also called agency) (Cavagnetto, Hand, & Premo, 2020)

Case study - an in-depth description and analysis of a bounded system (Merriam & Tisdell, 2016)

Competence - concerns the feeling of mastery, a sense that one can succeed and grow (Deci & Ryan, 2020)

Dialogic discourse - give-and-take dialogue where students actively construct meaning (Truxaw, 2020)

Dialogic pedagogy - development of meaningful dialogue between the student and teacher, or even among the students themselves (Farooq & Benade, 2019).

Dialogism - discourse between voices where there is a continual and collective search for meaning and understanding through dialogic interactions (Bakhtin, 1981; Bakhtin, 1986).

Engagement - The cognitive, affective, and behavioral aspects of students' learning (Chandra Handra, 2020)

Extrinsic motivation - Extrinsic motivations that are external to the student to please others or for external rewards (Ryan & Deci, 2000)

Hybrid learning - Students learning in the same course simultaneously face-to-face and synchronously live online (Raes, Detienne, Windey, & Depaepe, 2020)

Intrinsic motivation - Intrinsic motivations are internal to the student, and the student is motivated by the desire to learn and the enjoyment of learning (Ryan & Deci, 2000)

Monologic instruction - a teacher-centered discourse that often relies on an initiation-response-evaluation (IRE) pattern of questioning in which a question is posed, a student or students respond, and the teacher provides an evaluation of the response (Truxaw, 2020)

Motivation - students' engagement, effort, or persistence in academic tasks (Yun, Park, Kim, Jung, & Yoon, 2020)

Relatedness - concerns a sense of belonging and connection (Ryan & Deci, 2020)

Self-determination theory - a broad framework for understanding factors that facilitate or undermine intrinsic motivation, autonomous extrinsic motivation, and psychological wellness (Ryan & Deci, 2020)

Social constructivism - a person's development occurs twice, first between people on the social level then to be followed within the person on the individual level (Vygotsky, 1978)

Zone of proximal development - is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers (Vygotsky, 1978, p. 86)

CHAPTER 2

THE THEORY, IMPLEMENTATION, AND EFFECTS OF A DIALOGIC PEDAGOGY

The literature review examines four major themes to build a foundation for this action research study. The first theme will be the current state of classroom discourse and its impact on student learning and teacher-student relationships. The next theme will be the theory of dialogism to establish its principles and the potential for a dialogic pedagogy to alter the modern-day classroom dynamic. The third theme will address the research that has analyzed the implementation of a dialogic pedagogy in classrooms and its resulting impact on students. Finally, the research that has examined the student experience in online or hybrid courses will be summarized. The research presented within the literature review will provide the lens through which this study will analyze student learning, curriculum design, and rationale for the instructional decisions.

Importance of the literature review

The literature review is a “written argument that supports a thesis position by building a case from credible evidence obtained from previous research” (Machi & McEvoy, 2016, p. 5). The process of conducting a literature review allows a researcher to collect and organize the information associated with the identified problem of the study, to organize the information about the topic, to begin to draw conclusions and build an argument in support of the thesis, and finally present an accurate, complete, and understandable that demonstrates the result of the research conducted (Machi and

McEvoy, 2016). This literature review was conducted using electronic databases such as Education Resources Information Center (ERIC), EBSCO host, Google Scholar, doctoral dissertations, newspaper articles, and books.

Monologic nature of classrooms

The studies examining classroom dialogue have shown that it has become clear that the classroom discourse has become increasingly monologic, representing the industrialized nature of the modern classroom. Much of this teacher-directed instruction results from the ever-increasing importance and prevalence of standardized testing, which has become accepted practice within the current education system (Gershon, 2015). To meet the demands of covering an extensive curriculum results in using a lecture-based format that offers an inexpensive, flexible method of presenting large amounts of information to large audiences (Kramer, 2017).

This type of teacher-driven instruction represents a monologic pedagogy within the classroom. The teacher is the distributor of information, and the students are passive entities in which to deposit information. Nystrand (1997) found that most of the verbal discourse in classrooms was overwhelmingly monologic, with the teacher being the primary contributor to the discourse. The same study found that lecture and recitation were frequently used instructional practices (1997). When teachers were not lecturing, students' primary task is answering questions or completing individual seatwork (1997). When students experience a classroom in which discourse is primarily monologic, the result is that students cannot learn quickly or effectively but also fail to develop the explanatory and questioning powers that are required to demonstrate their understanding of the course content (Alexander, 2008).

The monologic nature of classrooms and instruction is rooted in the assumption that learning occurs in a linear pathway from one point to the next (Wegerif, 2013). The lecture technique represents this monologic and linear approach to learning in which the teacher presents information to the students. The students listen and learn the material. The students then demonstrate their understanding of the material on an assessment. In this sense, the presentation of information as a series of facts that students are to master after being deposited into their brain by a teacher parallels Friere's (1993) banking system of education. Wegerif (2013) stated that when schools teach science fields with such an approach, they present physics, chemistry, and biology as if they were matters of fact and laws that students could memorize instead of fields of knowledge to be understood. As a result of the increased importance of standardized testing and the need to cover a large amount of curriculum, teachers often rely on a linear, monologic approach to classroom instruction, teaching scientific processes and theory as mere facts for memorization instead of understanding.

Questioning techniques in monologic classrooms

To elicit students' thoughts, ideas, and questions, teachers often use questions directed at students. However, the nature of these questions often prevents them from accomplishing their intended nature. When Alexander (2000) studied some classrooms and lessons across five nations, he found evidence of teachers' questions and responses provided effectively chaining together into meaningful and cognitively demanding discourse patterns. However, in others, a simple initiation and response pattern resulted in the exchange of little meaningful information (Alexander, 2000). The traditional initiation-response-evaluation (IRE) pattern of questioning where the teacher poses a

question, a student or students respond, and the teacher's evaluation of the response represents teacher-centered, monologic pedagogy (Truxaw, 2020).

Within classrooms, there appears to be a differentiation between dialogue and conversation (Alexander, 2000). Questions that teachers intentionally craft that result in inquiry and new questions represent a dialogic interaction between individuals and represent a shift from a monologic pedagogy to a dialogic pedagogy that encourages verbal exchange between all classroom members (Alexander, 2000). Only when questions and responses move beyond a simple two-part sequence does the classroom discourse become dialogic encouraging attention, engagement, and creating meaningful exchanges between individuals (Alexander, 2008).

Grouping students in monologic classrooms

There is often an attempt to break free of classrooms' monologic tendency throughout the learning process by placing students in groups to represent a dialogic environment as students complete tasks assigned by the teacher. However, Mercer and Littleton (2007) found that although grouping is a common organizational strategy found in classrooms, educationally valuable dialogue rarely occurs within the groups. Alexander (2008) found similar results: while groups of students talked more, the generic and individual tasks involving reading and writing resulted in an informal variety of talk. Alexander (2008) continued to state that although teachers often place students into groups in classrooms, teachers continue to use a monologic pedagogy with the teacher controlling the right to communicate in the classroom.

While verbal exchanges in the classroom may be frequent with teachers asking students questions and students organized into groups to complete assigned tasks, this

discourse is monologic. The teacher controls the discourse, students provide little response to teacher-directed questions, and the discourse is casual and conversational in tone instead of academic.

Industrialization of the modern classroom

A monologic pedagogy and teacher-centered classroom discourse also represent the industrialization and mechanization of the modern classroom. Educators of the mid-nineteenth century used designs from the industrial factories that were becoming increasingly common and used this model to design the industrial-age school system, which resembles an assembly line, and is still the dominant model in education today (Senge, 2012). The expectation is that students enter each grade level, teachers endow them with a particular set of knowledge and skills, and then they are passed to the next grade level and teacher (2012). The school, representing the factory, and its teachers, representing the factory owners and managers, are tasked with the successful production of knowledgeable students. Within this mechanized world of education, Senge (2012) describes schools as a “world of teachers in control, students dependent on teacher’s approval, and learning defined as getting an A on the test” (p. 39).

Within this world, a monologic approach seemingly aligns with the design of the education model. The teacher’s role is to impart their knowledge to the students preparing them for the next stage of their education process. Like an assembly line, there is a belief that students passively wait and be appropriately constructed by the teacher in schools. In this sense, “The teacher presents himself to his students as their necessary opposite; by considering their ignorance absolute, he justifies his own existence” (Freire, 1993, p. 72). Attempting to impart knowledge to students by a teacher represents Freire’s banking

model of education “in which the scope of action allowed to the students extends only as far as receiving, filing, and storing the deposits” (Freire, 1993, p. 72). Within the industrialized education model, the expectation is that teachers produce students, and students produce work. Children spend tremendous amounts of time listening and writing, not because it helps develop cognitive and linguistic capabilities; instead, there is a belief in the education system that written work is the only real work students can do (Alexander, 2000).

The education system has become focused on production, much like a factory. There is increasing importance on the schools’ accountability to reproduce quality products like a factory, which would be the students in this analogy. As Schiro (2013) discusses, with the rise of the accountability movement in education, the goal of the curriculum is “The raising of student academic performance [has become] the terminal objective of social efficiency educators” (p. 81). When observed, administrators value student engagement over rigor and choice, which Schiro (2013) characterizes as representations of a social efficiency curriculum that envisions learning as an active process that requires extensive practice with feedback to the learner. Some school districts have returned to creating district-wide lesson plans for teachers to follow, implying that education is a formulaic model in which the teachers’ role is similar to an assembly line supervisor in that “Once students engage the learning environment, the teacher’s job is to supervise work” (Schiro, 2013, p. 93).

Standardized testing’s impact on the curriculum

An additional cause of increased monologic strategies and industrialization of education is the increase in high-stakes, standardized testing in schools. The increase in

high-stakes testing results from the accountability movement in schools (Au, 2013). These tests are often seen as critically important within schools due to policies linking scores on standardized tests to graduation, grade promotion, and teacher/administrator salaries or tenure (Au, 2013). The implementation of standardized testing has resulted in tremendous changes to the curriculum and instructional practices in schools. High-stakes tests have resulted in teachers “narrowing curricular content to those subjects included in the tests, resulting in the increased fragmentation of knowledge forms into bits and pieces learned for the sake of the tests themselves, and compelling teachers to use more lecture-based, teacher-centered pedagogies” (Au, 2013, p. 307). The greater the frequency of standardized testing in schools and the greater the importance placed on the outcomes of these high-stakes tests, the more teachers are encouraged to use a monologic pedagogy and industrialized instructional practices, which can have a tremendous impact on student learning.

Impact of monologic pedagogy and industrial instruction on students

However, this monologic and industrialized view of education, while potentially achieving its goal of improving student scores on standardized assessments and increasing numerical school grades, begins to have unintended consequences. Instead, there are many alternative pedagogical approaches that teachers should implement in schools. Dewey (1916) advocated that education aims to prepare children for adult life’s responsibilities and privileges. Dewey (1916) stated, “Were all instructors to realize that the quality of mental process, not the production of correct answers, is the measure of educative growth something hardly less than a revolution in teaching would be worked” (p. 176). Alexander (2000), speaking of Dewey, stated that “Dewey’s version of

classroom democracy concentrated on the nature of knowledge and the relations between teacher and taught. His democratic pedagogy eschewed the authoritarianism of teacher instilling information that was open neither to challenge nor exploration” (p. 521).

Alexander (2000), in opposition to a teacher-centered monologic classroom, proposes that dialogic pedagogy begins to align with Dewey’s vision of education in that it is not just successful learning which defines classrooms but also the creation of social cohesion, active citizenship, and a good society. Senge (2012) concludes that “Students who spend the bulk of their classroom time learning to pass tests lose opportunities to gain the many other skills they might find valuable as a whole, competent, and generous human beings” (p. 14). The current approach to education may be achieving its goals of achieving specific benchmarks on standardized exams. Still, the teacher-centric approach does so by sacrificing a more democratic and collaborative approach to teaching that empowers students to be more active participants in learning (Wright, 2011).

Monologic learning also represents a potentially oppressive and discriminatory environment. It entrenches the teacher as the ultimate authority and holder of standardized knowledge within the classroom and the students in a passive, complacent role as learners. Freire (1993) described that education often becomes the act of deposition where the teacher acts as the depositor, and the students serve as the depositories. Instead of communicating with each other, teachers’ monologic approach depends on teachers depositing information to students as they patiently receive, memorize, and repeat information (Freire, 1993). As teachers distribute what they believe to be proper knowledge and the students receive that knowledge as passive entities, it acclimates students to take on a passive and compliant role within society that they

expected to fill within society (Freire, 1993). When education is an exercise of dominance, it “stimulates the credulity of students, with the ideological intent (often not perceived by educators) of indoctrinating them to adapt to the world of oppression” (Freire, 1993, p. 78). A monologic and industrial approach to curriculum and instruction represents an oppressive approach to classroom instruction because of the authoritarian relationship between teacher and student that fails to help students develop freedom of thought and action similar to what Dewey believed schools should cultivate within students.

The dynamic between teacher and student is not the only way oppression may occur in a monologic classroom. This approach can also serve to marginalize many students within the classroom. While teachers may choose to utilize, or believe in, the banking system of education, not all students feel the banking system aligns with their desire for an education. For example, hooks (1994) stated that "The banking system of education (based on the assumption that memorizing information and regurgitating it represented gaining knowledge that could be deposited, stored, and used at a later date) did not interest [her]" (p. 5). According to hooks (1994), within classrooms, the monologic approach and the banking system of education is not the only problem. In discourse dominated by teachers, where they represent true knowledge, the English language can represent the language of the oppressor (hooks, 1994). The students in the classroom may have a discourse that is different from their teacher. The difference in discourse may result in marginalized students being forced to learn and use the language of their oppressor, which can disempower these students (hooks, 1994). A monologic

approach can quickly segregate a classroom and marginalize students who do not identify with the teacher's discourse pattern reinforcing discrimination for many students.

Dialogism

The natural opposite to a monologue approach to learning is a dialogic approach. Dialogic pedagogy is grounded in the theory of dialogism established by Mikhail Bakhtin, who studied literature and linguistics. Through the analysis of literature, Bakhtin (1981) proposed that the meaning of language and words is deduced through the dynamic nature of discourse, stating that "The way in which the word conceives its object is complicated by a dialogic interaction within the object between various aspects of its social-verbal intelligibility" (p. 277). For Bakhtin, there is no separation between the content of the word and the context of its use because "Form and content in discourse are one, once we understand that verbal discourse is a social phenomenon" (p. 259). This interconnectivity between the meaning of a single word and the environment of its use, including the background of all other words and the social context of its interpretation, Bakhtin refers to as the dialogized heteroglossia. At each moment a word is used, that word takes meaning and shape based on the environment of its use (Bakhtin, 1981). As time progresses, the context of the use of them may change (Bakhtin, 1981). Therefore, the meaning of a word continually evolves, widening and deepening the heteroglossia as long as the word is alive (Bakhtin, 1981). Therefore, at any moment, the meaning of "language is heteroglot from top to bottom: it represents the co-existence of the socio-ideological contradictions between the present and the past, between differing epochs of the past, between different socio-ideological groups in the present, between tendencies, schools, circles, and so forth" (Bakhtin, 1981, p. 291). According to Bakhtin, words are

not prescribed meaning within a language; words develop in a continually evolving understanding based on their use within a particular environment.

Words can develop meaning through the process of discourse between voices. Bakhtin (1981) describes that the word a voice uses only develops meaning once the speaker presents it to the conceptual system of the receiver of that word. As Bakhtin (1981) explains, the receiver's response is the activating principle that builds the meaning of a word once there is a mutual understanding between the speaker and receiver. Bakhtin (1981) states, "Understanding and response are dialectically merged and mutually condition each other; one is impossible without the other" (p. 282). According to Bakhtin, understanding and meaning are active processes because every word's utterance must be assimilated and merged in the receiver's response. The requirement of a receiver's response makes it so that "The word in language is half someone else's. It becomes 'one's own' only when the speaker populates it with his own intention, his own accent, when he appropriates the word, adapting it to his own semantic and expressive intention" (Bakhtin, 1981, pp. 293 - 294). The discourse between voices, the presentation of meaning, and the following response of a receiver is the process that must exist for each voice to construct the meaning of language and words.

Without the continual process of assimilation between voices, the meaning of language remains an abstract and undefined entity. As Bakhtin describes, every word is a point where the speaker and receiver, each with their unique context and history, and their linguistic "processes of centralization and decentralization, of unification and disunification, intersect in the utterance" (p. 272). Through this intersection between voices, each with unique perspectives, that work to attribute meaning to words creating

an understanding for each voice through an active assimilation and accommodation process. Therefore, the meaning of words and language represents a history of varied perspectives, understandings, and judgments that have been merged into the word's heteroglossia. Without this dynamic struggle between voices, the meaning of the word remains abstract to the individual. Bakhtin states that "The importance of struggling with another's discourse, its influence in the history of an individual's coming to ideological consciousness, is enormous" (Bakhtin, 1981, p. 348). Without another voice, dialogue ceases, and the voice can only be monologic.

The lack of the struggle between voices, a monologue, leaves, as Bakhtin (1981) describes, "the naked corpse of the word, from which we can learn nothing at all about the social situation or the fate of a given word" (p. 292). The lack of discourse removes the contextualized and mutual understanding of the word resulting in a lack of meaning. This singular, monologic voice results in "no understanding at all, only the abstract aspect of meaning" (Bakhtin, 1981, p. 281). Related to the concept of a monologic voice is Bakhtin's (1981) idea of the authoritarian word in that when a word is not left open to discourse, "it demands our unconditional allegiance" (p. 343). This lack of flexibility and interpretive context of the authoritarian word makes it more difficult for individuals to create meaning due to the lack of discourse and the opportunity to infuse the word into the individual's context.

While Bakhtin did not direct his theories to understand teaching and learning processes, understanding how the meaning of words and concepts occurs has implications in the classroom. For students to develop meaning and understanding of course content, opportunities to engage in dialogue within a course constructed with a dialogic pedagogy

must be present. They must be permitted a chance to develop the meaning of the concepts against the background of their own experiences and understanding of language through a struggle between voices (Alexander, 2008). A teacher-centered lecture can be seen as an authoritarian monologue and results in the student having only an abstract meaning, prescribed by another's voice, of the word.

Social constructivism

If meaning and understanding result from a dialogic process between individuals, this would indicate that learning is a social process. In this regard, dialogism is similar to Vygotsky's theory of social constructivism. In Vygotsky's (1978) theory of social constructivism, a child's development occurs twice, first between people on the social level and second within the child on the individual level. Through social interaction, children can achieve more significant outcomes because of engagement in a collective activity with peers or under an adult's guidance (Vygotsky, 1978). This distance between what a child can accomplish individually and what they can achieve with the support of others Vygotsky (1978) defined as the zone of proximal development (ZPD). The ZPD is "is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). Vygotsky (1978) proposes that a critical aspect of any instruction is that it created the ZPD and "awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with his peers" (p. 90).

Dialogic pedagogy and social constructivism

A vital feature of the interaction between the child and other people within the environment would be the teacher's use of dialogic pedagogy, which establishes the link between dialogism and social constructivism. Alexander (2008), an advocate of using a dialogic pedagogy in classrooms, recognized that learning is a social process stating that education must replace the "view of the developing child as a 'lone scientist,' who learns by interacting with materials, by one of learning as necessarily a social process" (p 132). Therefore, any pedagogical strategy must be a mix of immersing students in a collaborative environment with purposeful scaffolding from masters or more advanced peers who support others' progress beyond each student's ZPD (Gee, 2000). Wegerif (2013) also identified the connection between social constructivism and dialogic pedagogy, concluding that a dialogic approach to "science education [is] about drawing students into those ongoing scientific dialogues through which shared knowledge is constructed, and human understanding is increased" (p. 124). Alexander (2008) also noted dialogue as a means of supporting progression through a student's ZPD, stating, "dialogue provides a potent form of peer or adult intervention in the child's progress across the zone of proximal development" (p. 109). Dialogue is essential to support students as they move beyond their ZPD defined by social constructivism due to the social, collaborative, and supportive learning nature.

Dialogic pedagogical approach

If the meaning words and concepts are continually being reshaped and renegotiated by the voices engaged in dialogue, there is never finalization of meaning and understanding for the individual (Bakhtin, 1984). Therefore, can this theory be applied to

teaching and learning in a course with specific learning objectives? Eugene Matusov states that “Preset endpoints contradict [the] open-ended spirit of dialogue, in which all participants — teachers and students — genuinely interested in topics, issues, and inquiries they discuss” (Matusov & Miyazaki, 2014, p. 2). However, Matusov describes two distinct versions of dialogic pedagogy: instrumental and ontological (Matusov & Miyazaki, 2014, p. 2).

Within a curriculum that has set learning goals for students, an instrumental dialogic approach is most appropriate as a pedagogy. Matusov described an instrumental dialogic pedagogy as:

“The use of dialogue between the teacher and the students and among the students to achieve some particular intellectual curricular endpoints preset by the teacher.

Dialogue here is a pedagogical method (e.g., Socratic Method) or an instructional strategy along with other pedagogical methods and instructional strategies, which can be switched on and switched off” (p. 7).

Unlike an ontological dialogic approach, where the endpoint is unknown to either voice in a dialogue, the teacher supports students through dialogue to reach a set end goal in an instrumental dialogic approach. Matusov described that in an instrumental dialogic approach, both the teacher and the students create new understanding (Matusov & Miyazaki, 2014). While the students are creating new knowledge about course material through dialogue, the teacher is developing new “pedagogical knowledge about how to teach better — e.g., how the teacher can address better students’ old, known, and new, emerging, misconceptions” (Matusov & Miyazaki, 2014, p. 7). While ontological and instrumental dialogic approaches are different, they are both grounded in dialogic theory.

Using an instrumental dialogic approach does not devalue Bakhtin's theory of dialogism. As Matusov stated, "I have never claimed that instrumental, ontological and epistemological pedagogical dialogues are in opposition to each other or are mutually exclusive" (Matusov & Miyazaki, 2014, p. 26). Therefore, while the teacher may not engage in the same dialogue as the students, the students are involved in and experiencing a dialogic pedagogy. They engage in the active construction of understanding and meaning of concepts for themselves through discourse. Student engagement and student understanding are the most critical aspects of education. As Matusov describes, "Teaching is secondary in education. The primary focus in education is always on the learner's own, autodidactic, learning and study" (Matusov & Miyazaki, 2014, p. 38). An instrumental dialogic approach engages students in dialogism aligned with Bakhtin's theoretical basis.

Dialogue in classrooms

Teachers can implement an instrumental dialogic approach in a classroom by creating an environment where the process of discourse, not merely realizing a correct answer, is an integral part of the learning cycle. Mercer and Littleton (2007) described that within a classroom, three primary types of talk emerge between students: Disagreement and individualized decision making, short exchanges and little attempt to collaborate represent disruptional talk; a second is cumulative talk where speakers build positively but uncritically on what each other say, repetitions, confirmations, and elaborations; a third is exploratory talk where students engage in critical but constructive dialogue, challenging and counter-challenging ideas, and groups jointly make decisions once all perspectives considered. Exploratory talk represents dialogic pedagogy because

students actively struggle to create meaning and understanding of words and content within the various responses and perspectives of the other voices they engage within in dialogue.

Does this mean that monologic talk should never occur in classrooms if dialogue among its members is essential to student learning? Mercer discussed that teachers could use monologic talk effectively at certain moments (University of Cambridge, 2018). Mercer described that a monologic lecture by a teacher or professor could serve as a model for discourse by demonstrating subject matter language (University of Cambridge, 2018). It can also provide a large quantity of information and help create excitement for the subject matter (University of Cambridge, 2018). However, Mercer notes that while a monologic lecture does have some benefit and can be used strategically by teachers, it does not likely result in much learning (University of Cambridge, 2018). Instead, there is a need for shared dialogue among the students and teachers for learning to occur.

Dialogic pedagogy and impact on learning

Studies have shown that the classroom that best promotes thinking and learning is rooted in open dialogue, not through a monologic approach (Wegerif, 2013). Creating opportunities for students to engage in dialogue allows them to understand the curriculum's words and concepts. Mercer and Littleton (2007) identify exploratory talk, a type of dialogue, as having positive effects on children's reasoning. The constructive critiques that occur within exploratory talk and dialogue help create meaning for children and help develop critical thinking and problem-solving skills (Mercer, Hennessy, & Warwick, 2019). Students engaged in exploratory talk must continually reshape their understanding of words and concepts as they interact with their peers (Mercer, Hennessy,

& Warwick, 2019). This active mental engagement can also allow students to relate what they are learning with what they already know, which has long been promoted by cognitive psychology to promote learning (Nystrand, 1997). Establishing connections between what students already know or have experienced with new information enhances retention, especially when they can do it in their own words (Nystrand, 1997). Nystrand (1997) concluded that none of the analyses they conducted ever found that increasing the cognitive difficulty of instructional activities increased learning. Instead, Nystrand (1997) found that the interaction between the teachers and students, including the questions and discussion they engaged in, was the only explanation for different instructional practices' effectiveness. Facilitating dialogue in the classroom is a critical aspect of instruction by teachers in classrooms.

Dialogic pedagogy and role of the teacher

In addition to supporting student learning, dialogic learning promotes student empowerment, equity, and culturally responsive pedagogy compared to a monologic approach based on the banking system Freire described. When depositing information to students is not the learning approach, education can fulfill its function as the practice of freedom (Freire, 1993). Freire (1993) stated that through dialogic interactions, “the teacher-of-the-students and the students-of-the-teacher cease to exist and a new term emerges: teacher-student with students-teachers. The teacher is no longer merely the one-who-teaches, but one who is himself taught in dialogue with the students, who in turn while being taught also teach” (p. 80). Dialogic interactions elevate the student to a partner in the learning process instead of a passive recipient in a monologic approach creating a less oppressive classroom environment. In this dialogic model, “no one teaches

another, nor is anyone self-taught. People teach each other, mediated by the world, by the cognizable objects which in banking education are ‘owned’ by the teacher” (Freire, 1993, p. 80). This change in the dynamic between teacher and student promotes freedom and empowerment in the students with a dialogic approach to instruction.

Dialogic pedagogy and student empowerment

One of the critical aspects of establishing an improved dynamic between teacher and student and promoting freedom and empowerment for students is what Freire (1993) describes as problem-posing education. The banking system of instruction resists dialogue due to the reduction of perceived authority by the teacher; however, teaching using the problem-posing model recognizes dialogue as indispensable (Freire, 1993). Banking education treats students as objects of assistance; problem-posing education makes them critical thinkers” (Freire, 1993, p. 83). In problem-posing education, the teacher presents concepts to students for their consideration, and, as students share their perceptions, the teacher simultaneously reconsiders their own (Freire, 1993). In this structure, the students are no longer passive receptacles of information but instead are creators of knowledge alongside the teacher (Freire, 1993).

Supporting students in developing critical thinking and problem-solving skills is essential to helping students achieve success in school and later in life. For example, Ladson-Billings (2009) states that “if students are to be equipped to struggle against racism, they need excellent skills from the basics...to understanding history, thinking critically thinking, solving problems, and making decisions; they must go beyond merely filling in test sheet bubbles with Number 2 pencils” (p. 153). Suppose students are not supported to develop their critical thinking ability, problem-solving skills, see themselves

as empowered, and value society members? In that case, more significant social problems like racism, discrimination, and other injustices may perpetuate within our society. A monologic approach cannot accomplish these goals due to its authoritarian, unidirectional, and compliant nature and cannot be seen as an effective instructional design.

Dialogic pedagogy and a student-centered classroom

A dialogic approach sees students as essential contributors to the learning process. The belief and expectation that all students and opinions, perspectives, and ideas have equal value help develop a community of learners instead of a classroom full of individual students. As hooks (1994) stated, "There must be an ongoing recognition that everyone influences the classroom dynamic, that everyone contributes. These contributions are resources. Used constructively, they enhance the capacity of any class to create an open learning community" (p. 8). A learning community can help support all learners to be successful on a grander scale than reliance on a single teacher for validation and approval as Emdin (2016) discussed stating that "Teaching is a process where context is created in which information is exchanged among people with the end result being an increase in the knowledge/information of everyone who takes part" (p. 54).

Additionally, this learning community model places value in each member, representing a more culturally responsive instruction model than approaching information through the teacher's single cultural lens. Emdin (2016) discusses that culturally responsive instruction values each student's behavior, language, and dialogue, and "the teacher assesses content knowledge simply on the merit of its conceptual and scientific accuracy and not on the ways that the information is shared. This means that answers to

questions can be in slang, and students can express themselves naturally” (p. 182). A dialogic classroom promotes inclusivity and places greater value on its learning community members, unlike a monologic approach with only one truth, one approach, and one way of achieving success: the teacher’s truth.

Dialogic pedagogy and student identity

The instructional decisions that a teacher makes for their curriculum can significantly impact the students beyond their academic achievement. As Freire, hooks, Emdin, and Ladson-Billings discussed, classrooms’ power structure can create oppression or empowerment systems for students. Johnston, Ivey, and Faulkner (2011) stated:

The language we use with children influences, among other things, who they think they are, what they think they are doing, the relationships they have with others, the strategic information available to them in the classroom, and the possibilities available to them for thinking about literacy and their own lives. (p. 237)

This point is critical in that the choices teachers make can shape what James Paul Gee (1996) refers to as a student’s identity or big ‘D’ Discourse that “embodies language and other dispositions that signal one’s sociocultural membership” (p. 131). The primary Discourse that almost all individuals develop, and determines how they are as a person, comes from their socialization early in life (Gee, n.d.). This primary Discourse helps create an identity for oneself and shapes how individuals interpret lower ‘d’ discourse or language (Gee, n.d.).

Throughout life, individuals develop secondary Discourses within organizations like churches, schools, businesses, or governments (Gee, n.d.). Students in schools will develop an identity, or secondary Discourse, encompassing their language, behavior, and norms that align with their understanding of being a student (Gee, n.d.). A student's exposure to the teacher's pedagogical approach will significantly impact their identity for themselves (Gee, n.d.). That secondary Discourse can represent one of oppression or empowerment based on the language and strategies teachers use.

In theory, teaching “involves helping learners to create cultures that nurture engaged, persistent, collaborative, responsible, and caring minds” (Johnston, Ivey, & Faulkner, 2011, p. 234). For students to develop the type of identity that Johnston et al. (2011) described, opportunities for “students to be engaged and encourage them to act strategically, rather than telling them how to do so, they will develop a stronger sense of agency and be able to more easily go beyond what we teach them” (p. 236). As students begin to identify themselves as literate in a subject area such as sciences, this allows them to acquire capital in that area (Black & Hernandez-Martinez, 2016). This capital includes science-related qualifications, understanding, knowledge, and interest (2016). The accumulation of science capital is crucial for students in both the short and long term. In the short term, the development of science capital can lead to increased participation and engagement, leading to a greater science identity and the acquisition of more science capital (2016). Then, in the long-term, science capital can be used in exchange for more privileged positions in science fields that can, again, lead to generating more capital (2016).

Too often, students do not share science capital evenly (Black & Hernandez-Martinez, 2016). A dialogic pedagogical approach can help more students develop a Discourse or an identity that allows them to begin developing capital in science that students can use in school and in life to achieve more dominant positions in society (2016). A monologic pedagogy, based on an authoritarian word and a lack of student opportunity to engage in dialogue, does not lead to independence or understanding (Johnston et al., 2011). In terms of both knowledge and identity development, a monologic pedagogy fails students.

Many say that one goal of education is to create literate students. However, individuals must recognize that literacy is not limited to linguistics (Johnston, 2019). Literacy goes beyond syntax and grammar and “is a relationally and emotionally saturated collection of social practices” (Johnston, 2019, p. 79). As opposed to the banking system of education described by Freire, a dialogic pedagogy promotes the development of a student’s Discourse and literacy that is more aligned to a democratic society, as Dewey described.

Dialogic pedagogy and student motivation

Improving student motivation, especially in high school science subjects, has been challenging for teachers (Kadir, Yeung, Ryan, Forbes, & Diallo, 2020). A decline in student motivation is often seen among high school science classes as students have increased their grade levels (Kadir et al., 2020). Declining motivation is likely the result of teacher-led classrooms and the use of relatively ineffective means of instruction, which are commonplace throughout the world (Kadir et al., 2020). In attempting to improve students’ achievement in high school science, to this point, many curriculum innovations

have focused on students' cognitive ability and relatively ignored the need for student motivation in learning and persistence (Kadir et al., 2020).

A dialogic approach can empower students to recognize themselves and others as collaborators in the learning process instead of recipients of knowledge from an authoritative, monologic voice (Matusov, Smith, Soslau, Marjanovic-Shane & von Duyke, 2016). This sense of empowerment and control over the classroom can potentially impact students' motivation due to self-determination theory (SDT), as described by Ryan and Deci (2000). SDT connects an individual's degree of motivation with three basic tenets: autonomy, competence, and relatedness (Ryan & Deci, 2000). As three factors become increasingly present, the motivation levels of individuals change.

The first tenant of SDT is competence which Ryan and Deci (2020) define as the feeling that a person can progress and achieve mastery in a situation. Pedagogically, the greater number of opportunities that learners have to interact through student-teacher or peer interactions provide more opportunities for students to explore and develop their strengths increasing feelings of competence (Kadir et al., 2020). An instructional approach that limits students' opportunities for interactions, conversely, reduces a sense of student competence (Kadir et al., 2020). To unlock greater motivation in students, teachers must provide challenging tasks yet flexible cognitive structures that allow students to develop feelings of autonomy and competence in the learning process increase their feelings of intrinsic motivation (Ng, Liu, & Wang, 2016). Teachers can increase competence for all students by gradually providing purposefully sequenced learning tasks where students can access pre-existing knowledge and make connections to current course material resulting in greater achievement (Kadir et al., 2020). A well-structured

instruction using a dialogic pedagogy that supports dialogue in small collaborative groups would likely provide ample opportunities for students to develop competence, supporting each other as they move beyond their respective ZPDs instead of a lecture-based classroom with few moments to develop competence.

Relatedness, a person's sense of belonging and connection to others, is the second need individuals require to increase their motivation level (Ryan & Deci, 2020).

Fulfilling an individual's sense of relatedness can occur by perceiving others' respect and care for an individual (Ryan & Deci, 2020). Students' need for relatedness is often not supported in a passive, lecture-based learning environment because they lack the connection to the course material and other individuals because of the passive learning environment and lack of interaction with teachers or peers (Kadir et al., 2020). When provided, small group collaboration can support students' feelings of relatedness because of the increased interaction (Kadir et al., 2020). Allowing students to engage in collaborative groups is essential because a critical aspect of developing a sense of relatedness is one's perception of support that they receive from their peers (Furrer & Skinner, 2003). Increased perceptions of peer support and feelings of relatedness can lead to greater levels of engagement, work ethic, academic achievement, and self-confidence (Furrer & Skinner, 2003). Therefore, developing a sense of relatedness in students should be a focal point for teachers to increase intrinsic motivation and academic achievement.

Autonomy, defined as an individual's sense of ownership of one's actions and a sense of initiative, is the third need individuals must have fulfilled to develop motivation (Ryan & Deci, 2020). The sense of autonomy may be the most critical aspect of the application of SDT to the field of education. Studies have shown that teachers who

support their students' autonomy see greater intrinsic motivation, competence, and self-esteem within their students (Ryan & Deci, 2020). The changes are also physiological, with students in more autonomous environments displaying higher heart rates and lower cortisol, the "fight-or-flight" hormone, than students in more controlling environments (Ryan & Deci, 2020). In pedagogical application, a teacher-centered, information delivery environment that lacks discussion among students does not support student autonomy (Kadir et al., 2020). In opposition, in an environment where teachers explain the rationale behind tasks and students are provided the opportunity to discuss information and make choices in their learning, the need for autonomy is more greatly met, and motivation increases (Kadir et al., 2020). Teachers can support greater levels of autonomy in students by providing students time to discuss possible responses to questions, consider multiple possibilities to solve problems, encourage students to share their opinions, allow students to relate information from their own lives to course content, and help students make connections to the prior course material (Nalipay, King, & Cai, 2020). The greater the autonomy in classrooms, the more likely teachers will begin to unlock students' intrinsic motivation and help them succeed academically.

Supporting students' three needs provides greater feelings of competence, relatedness, and autonomy, increasing motivation and, more importantly, intrinsic motivation in students (Ryan & Deci, 2020). According to SDT, there are three types of motivation: amotivation, extrinsic motivation, and intrinsic motivation (Ryan & Deci, 2000). Extrinsic motivation is the motivation to complete a task to gain a specific outcome; completing the task itself is not the action's reward or purpose (Ryan & Deci, 2000). Often in school settings, the student's specific outcome is the grade associated

with an assignment or task. However, Ryan and Deci (2000) described that “Students taught with a more controlling approach not only lose initiative but learn less effectively, especially when learning requires conceptual, creative processing” (p. 71). The reliance on extrinsic motivation creates external coercion causing more students to display decreased interest and decreased effort (Ryan & Deci, 2000). This controlling approach may result in students’ compliance to achieve an external reward but can lead to students’ resistance and hostility (Deci & Ryan, 1985).

Teachers should strive to create situations where students can develop intrinsic motivation. Instead of using a more authoritarian, monologic approach, “Contexts supportive of autonomy, competence, and relatedness were found to foster greater internalization and integration... [and] is of great significance for individuals who wish to motivate others in a way that engenders commitment, effort, and high-quality performance” (Ryan & Deci, 2000, p. 76). A more supportive context can result from teachers providing students activities that hold personal interest, are novel, and are challenging (Ryan & Deci, 2000). Presenting students with opportunities like these allows them to exercise and extend their abilities to explore, learn, and develop intrinsic motivation (Ryan & Deci, 2000). As Ryan and Deci (2000) describe, there is “Perhaps no single phenomenon reflects the positive potential of human nature as much as intrinsic motivation” (p. 70). A dialogic approach in the classroom could meet students’ need for competence, relatedness, and autonomy and support students’ intrinsic motivation. As instruction meets students’ needs, they develop greater feelings of intrinsic motivation, and, simultaneously, academic achievement improves (Ng, Liu, & Wang, 2016; Ryan &

Deci, 2020). Therefore, using a dialogic pedagogy and meeting students' needs to support intrinsic motivation per SDT will significantly improve students' academic achievement.

Implementation of dialogic learning

To shift from a classroom that has been primarily monologic, understanding the implementation of a dialogic pedagogy in classrooms and the impacts it has on diverse learners is critical to a successful transition. Much of the research investigating dialogic pedagogies in the classroom addresses two dominant themes. One is implementing a dialogic pedagogy in classrooms, and the other is the impact of dialogue pedagogy on specific student subpopulations. However, there is not a large quantity of research on using a dialogic pedagogy in classrooms. Mercer and Littleton (2007) state that "The use of language as a tool for collective reasoning is not a common topic in classroom talk or in school curricula" (p. 67). This lack of research is most likely because "that if children are to be empowered as thinkers and take a more active role in using talk to construct knowledge and understanding in class, teachers need to foster a different environment for talk in their classrooms" (Mercer and Littleton, 2007, p. 67). Again, many classrooms still utilize a monologic approach, and implementing the complete opposite approach is more challenging to institute than an instructional strategy.

On a grander scale, a shift to an education system based on using a dialogic pedagogical approach would force a rethinking of every level of teaching, including curriculum specifications and rationales, classroom organization and layout, the balance of writing and talking in the curriculum, teaching students how to linguistically code switch, and balance individual, collective, and collaborative discourse in a way to help students develop ideas, ask questions and solve problems (Alexander, 2008). Often,

instead of rethinking the approach to instruction at the foundational level, to improve failing schools, “many reformers and school leaders resolved that adopting a range of new ideas and programs was the best strategy to spur positive change and to discover what works” (Newmann, Smith, Allensworth and Byrk, 2001, p. 316). Therefore, such a macro-level change in instruction and curriculum is often not attempted, especially when the current culture of accountability can often create resistance to deviating from accepted instruction norms.

Creating dialogic space in lessons. Many current studies on dialogic pedagogy focus on teachers’ strategies to initiate and perpetuate dialogue in the classroom. Bansal (2018) reviewed the discursive moves and their rationale to achieve effective dialogue in science classrooms. This case study design included teachers from three schools teaching science to 14- to 15-year olds in New Delhi, India (Bansal, 2018). Bansal (2018) found teachers using a general schema in dialogic lessons following a three-stage sequence: foundation, initiation, and perpetuation. Bansal (2018) defined the foundation phase as a process in which the teacher established or reestablished a proper foundation of ground rules for dialogue in the classroom. Bansal (2018) described the foundation phase as an essential requirement for creating discourse for students to feel comfortable, confident, and participate in the discourse. Once the teacher establishes the proper dialogic foundation, the teacher moves to the initiation phase (2018). The teacher provides talking points, which may be accurate, inaccurate, or entirely wrong, to begin the discourse process (2018). To create a dialogic environment for all classroom members, teachers actively worked to perpetuate the dialogue once it has begun (2018). Otherwise, the dialogue tends to break down (2018). To perpetuate the conversation, the teacher must

use specific discourse moves, including “to press students to explicate the reason behind their ideas, support their arguments with evidence, challenge or critique evidence to advance knowledge and engage in other intellectual practices of science” (Bansal, 2018, p. 1906). Through the foundation, initiation, and perpetuation schema described by Bansal (2018), teachers could open the discourse using initiation moves, perpetuate the dialogue using questioning techniques, and return to the foundation level as needed to ensure effective dialogue was occurring. Bansal provides an essential insight into how a teacher could implement dialogic learning into a classroom.

Dialogic questioning techniques. Many studies have focused on questioning techniques that teachers use to perpetuate the dialogue within a classroom. Sherry (2019) examined how dialogic, whole-class discussions emerged and developed in a classroom. This case study focused on a history teacher and analyzed videotapes, observations, and transcripts of interviews with the teacher involved in the study. This study is notable because the discourse analysis used, as Sherry (2019) describes, a Bakhtinian perspective on classroom dialogue. Sherry (2019) found that the emergence and development of a dialogic, whole-class discussion were due to the open-ended and hypothetical questions posed to the class. The classes resembled what Sherry (2019) described as seminars in that students were not focused on finding the correct answer but instead, to “articulate, challenge, clarify, and thereby improve one’s understanding” (p. A50). The structure of the questions and the classroom environment promoted dialogic interactions among the classroom members.

A study by Tytler and Aranda (2015) also analyzed the discourse patterns in a primary science classroom and how teachers orchestrated whole-class dialogue. They

examined selected elementary school classrooms of teachers representing expert practice in three countries: Australia, Germany, and Taiwan. Teachers in many classrooms use a stereotypical initiation, response, evaluation (IRE) question formation where the teacher initiates the discourse with a question, the student responds, and the teacher evaluates the response (Tytler and Aranda, 2015). They concluded that through effective questioning techniques, teachers could “move thinking forward through acknowledging, shaping and extending student language and ideas, rather than imposing science ideas in a manner unconnected with student experience and thinking” (Tytler and Aranda, 2015, p. 442). Tytler and Aranda (2015) classified teacher moves into one of three categories: ‘eliciting/acknowledging’ where the teacher recognizes the student response or asks for additional information; ‘clarifying’ where the teacher follows-up on or summarizes the student response; or ‘extending’ in which the teacher asks the students to extend their thinking or use their ideas in a different context. As opposed to the traditional evaluation of a response as correct or incorrect, these three types of moves supported high-level thinking and reasoning and helped students establish scientific perspectives and language (Tytler and Aranda, 2015). Due to these dialogic moves’ flexibility, teachers could utilize a dialogic approach to learning across a broad spectrum of pedagogical contexts (Tytler and Aranda, 2015). Therefore, a teacher could use these questioning techniques to transition from a monologic approach and a typical IRE question pattern to a more dialogic approach to discourse.

The frequency of dialogic pedagogy in classrooms. Vrikki, Wheatley, Howe, and Hennessey (2019) analyzed classrooms to determine if there were, as the study described, pockets of excellence in classrooms even though the traditional initiation,

response, and feedback (IRF) questioning technique, the same as the IRE technique, is widespread. The analysis of 72 lessons from elementary classrooms in various subject areas across England, looking for pockets of excellence, found that there was “relatively high usage of many such forms in primary classrooms, contradicting the impression often given by observational studies in this field” (Vrikki et al., 2019, p. 96). Unlike prior studies, it revealed that teachers use dialogic strategies more frequently than assumed (Vrikki et al., 2019). There was, however, considerable variability in the frequency of discourse and the type of discourse (Vrikki et al., 2019). One type of discourse was elaborative discourse, where students are building upon prior responses (Vrikki et al., 2019). This type of dialogue occurs more frequently than discourse involving students synthesizing and connecting ideas, dialogue that represents more complex tasks (Vrikki et al., 2019).

Although the use of dialogic pedagogical strategies is more than expected, there is still additional room to enhance its use in the classroom (Vrikki et al., 2019). The authors also discussed the possibility that transitioning between dialogic and authoritarian interactions between teachers and students may support more meaningful learning (Vrikki et al., 2019). Effective instruction may not exclude teacher-centered instruction through IRF questioning and authoritative presentations but instead requires the careful use of such strategies in conjunction with dialogic interactions to allow students significant opportunities to be active participants in creating meaning and understanding (2019). As Alexander (2008) acknowledged, transforming classrooms to truly dialogic spaces may be difficult in the current education system, but perhaps, as Vrikki et al. (2019) describe, effective use of dialogic learning strategies within the modern-day

classroom may achieve the goals of dialogic learning theory alongside more traditional instructional practices.

Dialogic pedagogy and standardized assessments. A study by Segal, Snell, and Lefstein (2017b) analyzed the use of dialogic learning theories in a classroom that focused on preparation for a standardized assessment: the SAT. Segal et al. (2017b) describe that dialogic instructional strategies do not align with the concept of teaching to the test, which has become a common practice in education, as discussed earlier by Au (2013). Instead, dialogic pedagogy focuses on skills such as critical thinking, authenticity, and freedom, in comparison to the concept of test preparation which “evokes all that is narrow, instrumental and cynical in education, and high-stakes standardized testing all that is authoritarian, coercive and alienating” (Segal et al., 2017b, p. 596). However, Segal et al. (2017b) argue that it is possible to implement a dialogic pedagogy while managing the high-stakes standardized tests required of teachers and students. An education system focused on high-stakes testing discourages independent thought, critical thinking and directs teachers and students along narrow content paths (Segal et al., 2017b). This study involved implementing a professional development program to facilitate dialogic teaching in a school in England and analyzing 73 literacy lessons in 7 classrooms, teacher interviews, and observations (Segal et al., 2017b). The analysis found that teachers could effectively oscillate between dialogic and test preparation sequences (Segal et al., 2017b). Within the lessons devoted to testing preparation, the teacher could create, expand, or vacate dialogic opportunities for students to varying degrees, allowing them to move between the test preparation and dialogic inquiry (Segal et al., 2017b). This study is notable because it represents a realistic vision of dialogic learning in modern-day

classrooms (Segal et al., 2017b). The authors argue that “that the purists in neither the dialogic pedagogy community nor those involved in test preparation at the levels of scholarship and policy have found ways to help teachers navigate this particular set of competing demands” (Segal et al., 2017b, p. 608). Students benefit from having experienced more significant amounts of dialogue and inquiry and are likely to use them to achieve greater success on standardized tests (Segal et al., 2017b). Therefore, while it may not be possible to implement truly authentic dialogic learning, the use of such strategies can help students achieve success in classrooms focused on standardized test preparation and accountability.

Difficulty in implementing dialogic pedagogy. However, studies that have analyzed dialogic learning have not always found it positively impacted student learning. Ruthven, Mercer, Taber, Guardia, Hofmann, Ilie, Luthman, and Riga (2017) analyzed an instructional intervention program called epiSTEMe that introduced dialogic learning and two modules on curricular topics in science and mathematics. The experimental study randomized classrooms between intervention and control groups and used pre-tests and post-tests, student surveys after the completion of the modules, student surveys at the start and end of the year, classroom observation, and teacher questionnaires to determine the impact of the dialogic approach in the epiSTEMe program (Ruthven et al., 2017). The authors found that dialogic strategies, based on post-test scores as an indicator of topic proficiency, did not affect student learning (Ruthven et al., 2017).

Additionally, they found that the students’ attitudes and experiences with the epiSTEMe program were similar to the instructional strategies that they would have in a traditional classroom (Ruthven et al., 2017). While the results of these studies indicate

that dialogic approaches may not improve student learning as other studies suggest, Ruthven et al. (2017) proposed that a possible cause of the lack of increase in learning gains was the lack of familiarity and proficiency with the innovative features of the program by the teachers. Ruthven et al. (2017) argue that the results may signal an implementation dip and believed that it would become more effective as teachers had more experience with the intervention. Dialogic learning represents a massive shift from traditional classroom practice, and teachers and students would require time to develop familiarity and experience with the system to see the potential benefits of such an approach to be revealed.

Dialogic pedagogy and English language learning (ELL) students. Another area many research studies focus on is using dialogic strategies with student subpopulations to determine these strategies' potential ability to support all students' learning. A study by Ernst-Slavit and Pratt (2017) analyzed the quantity and quality of questions and the resulting impact on students in diverse classrooms. This study was part of a more extensive ethnographic, sociolinguistic, and multi-site study that attempted to analyze the different patterns of interactions, teacher talk, and teachers' questions in elementary school classrooms in the Pacific Northwest United States (2017). Researchers collected teacher interviews, classroom observations, audio, video recordings, photographs, and field notes from eight classrooms over five years (2017). At least five bilingual students were present in each classroom in three districts and analyzed (2017). This part of the study explored the dialogue during a 4th-grade science unit (2017).

The study made two significant conclusions. First was the type of questions, and the level of rigor of the questions impacted learning (Ernst-Slavit and Pratt, 2017). Ernst-

Slavit and Pratt (2017) described that “Although questions are prevalent in classrooms, the skill of asking questions is more nuanced and complex than educators may realize” (p. 9). Therefore, as other studies have implied, transitioning from moving from a monologic pedagogy to a dialogic pedagogy is the purposeful nature of asking questions to students, including the type of questions the teachers pose, the frequency, the sequence of questions, and the wait time provided to students (Ernst-Slavit and Pratt, 2017). The second finding was that teachers could support both language-learning and science-learning by using more effective questioning techniques, provided that teachers have the structures to help bilingual students participate (Ernst-Slavit and Pratt, 2017). A dialogic approach, including the questions posed, using specific language, and providing students opportunities to think and communicate their thoughts and ideas, supports bilingual students to succeed academically and linguistically. A dialogic pedagogy could be effective in classrooms as English Language Learning (ELL) students increase in schools.

Another study by Truxaw (2015) found similar results regarding the impact of dialogic strategies on ELL students. Similarly, as with Ernst-Slavit and Pratt’s study, this study was part of a more extensive study on elementary math classrooms where Spanish was the primary language for most students (Truxaw, 2015). Researchers analyzed audio recordings, video recordings, and field notes to investigate the discourse in an elementary school in the Western United States (Truxaw, 2015). Previous research has shown that most ELL students’ instruction focused primarily on procedures and vocabulary rather than linguistically and cognitively demanding activities (Truxaw, 2015). Therefore, compared to non-ELL students, teachers did not hold equal expectations for ELL students, negatively affecting their learning (Truxaw, 2015). In the study, Truxaw (2015)

found that most of the talk within the classroom was monologic; however, there were examples of shifts towards a dialogic approach that revealed potentially promising results. When provided with the opportunity, including the time to think, explore, and explain, Truxaw (2015) found that ELL students could participate in meaningful mathematical discourse. Moving beyond simple vocabulary drills with ELL students is critical to support meaning discourse and learning in classrooms (Truxaw, 2015). As Truxaw (2015) describes, ELL students should not be seen as deficient, as a monologic approach often characterizes all students, but rather “It is important to figure ways to support students who have the capacity to learn more than one language to also learn mathematics meaningfully. This research provides beginning steps toward this goal” (p. 13). Dialogic learning provides an opportunity for student empowerment and supports inclusion for ELL students.

Dialogic pedagogy and marginalized students. It is not just ELL students who have benefitted from a dialogic approach than the more traditional monologic approach. Segal, Pollack, and Lefstein (2017a) examined pedagogic and discursive practices in Israeli schools as part of a more extensive study by collecting data from documents, interviews with teachers, and teacher focus groups (Segal et al., 2017a). The study found that culturally valued communicative norms were often aligned to socially, culturally, or economically privileged groups within classrooms, leading to disenfranchising students outside those norms (Segal et al., 2017a). However, the use of a dialogic pedagogy cultivates “the inclusion and empowerment of disenfranchised voices” (Segal et al., 2017a, pp. 21 - 22). The use of strategies to promote and facilitate dialogic learning can make progress “to not always privilege the same student voices, and to seek ways to

proactively make space for disenfranchised voices” (Segal et al., 2017a, p. 23). A transition to a dialogic approach would increase content knowledge and all learners’ personal growth in a classroom.

A linguistic ethnographic study conducted by Snell and Lefstein (2018) in a school in England was another study that highlighted a dialogic pedagogy’s potential to impact all students. The school was under substantial pressure to reverse a downward trend in SAT scores and implemented a professional development program to increase dialogic learning in their instruction (Snell and Lefstein, 2018). Teachers expressed a commitment to dialogic pedagogy in theory; however, many teachers resisted changing their instructional practice (Snell and Lefstein, 2018). One point of contention, in particular, was that the teachers believed that “that only some children—the high achievers—were capable of participating effectively in classroom dialogue” (Snell and Lefstein, 2018, p. 49). Regarding the low-ability students that the teachers identified, the teachers “often appealed to aspects of their pupils’ social background as an explanation for their lack of achievement, and especially, poor linguistic skills” (Snell and Lefstein, 2018, p. 52). By not challenging all students because of preconceived notions by teachers, marginalized students “may become discouraged by low expectations, switch off from learning (replacing active participation with a passive shrug or one-word response), and thus continue to fulfill the identity of low achiever attributed to them” (Snell and Lefstein, 2018, p. 73). However, a dialogic learning environment can cultivate students’ confidence to challenge received knowledge and pose their questions, promoting engagement and learning (Snell and Lefstein, 2018). The study by Snell and Lefstein (2018) concludes “that dialogic pedagogy’s potential as a lever for equity and

social justice can only be realized if it is enacted within an ideology that views ability as dynamic, context-dependent, and socially constructed” (p. 73). Implementing this approach in the classroom may serve as a means to help students, often identified as low-ability, engage in the classroom and serve as a means of empowerment and equity.

The student experience in online or hybrid courses

While studies have investigated the use of dialogic pedagogy in traditional face-to-face classrooms, other studies have examined discourse in online courses, which to this point, have primarily been an analysis on using discussion boards to facilitate dialogue among members of the class. The nature of discussion boards and the ability to serve as a place for interaction in a digital space has led online discussion boards to be an “essential component of online learning technologies and provide a platform for asynchronous message exchange within groups” (Delaney, Kummer & Singh, 2019, p. 902). Studies have described the importance of discussion boards and their ability to drive student engagement through collaborative interaction among participants (Toro-Troconis, Alexander & Frutos-Perez, 2019). Additionally, discussion boards are a type of activity that can promote higher-order thinking and can promote student achievement in a course (Toro-Troconis et al., 2019). For a completely online course, discussion boards also serve an essential role because students have limited engagement opportunities with other course participants (Martin & Bolliger, 2018).

There are other benefits for students when engaging in dialogue in a digital space. Studies have shown that some students feel more comfortable engaging in discourse online (Dailey-Hebert, 2018). Students also have a longer processing time due to the slower nature of responding to discussion boards (Mercer, Hennessy, & Warwick, 2019).

However, discussion boards are not without difficulty in implementation. Discussion boards are seen as one of the least valuable assignments in online courses by students (Martin & Bolliger, 2018) and often characterized by simplistic and surface-level postings (Frohlich, 2020). This interaction does not represent real dialogue but simple message posting instead (Champion & Gunnlaugson, 2018).

Increase in blended and hybrid classrooms. Blended learning, the integration of face-to-face and online learning, has been proposed to engage learners more thoroughly in courses (Halverson & Graham, 2019). There are a variety of definitions of blended learning (Halverson & Graham, 2019). One form of blended learning is hybrid learning, where students attend the same class simultaneously, face-to-face, and from remote locations (Raes, Detienne, Windey, & Depaepe, 2020). Hybrid learning has become a popular method for students with a prolonged illness (Raes et al., 2020) and has become a popular model since the beginning of the COVID-19 pandemic (Leiberman, 2020). Multiple studies have shown that blended learning programs have increased scheduling flexibility, individualized learning pathways, and expanded interaction opportunities compared to completely online learning (Halverson & Graham, 2019). However, blended learning has also proven to be challenging to implement due to technical problems impeding learning (Halverson & Graham, 2019), the drastic change in pedagogical practices for teachers, the increased difficulty for remote students self-regulating their engagement, and a lack of feeling connected to the learning community (Raes et al., 2020). Research into this new instructional model has occurred, but “more research is needed into different pedagogical scenarios and their impact on student outcomes” (Raes et al., 2020, p. 286).

Student experience in hybrid courses. When traditional classrooms closed in the spring of 2020, only 28% of parents were very satisfied with their children's alternative online school programs that schools quickly developed to continue learning (Bailey, 2020). The desire to provide effective instruction amid a pandemic led schools to open various hybrid learning programs in the fall of 2020 that combined face-to-face and online learning models (Lieberman, 2020). Due to the relatively new nature and varied definitions of hybrid programs, research on the effects of hybrid learning on student learning is limited.

One study investigated hybrid learning in an undergraduate Introduction to Psychology with approximately 300 students (Park, Martin, & Lambert, 2019). In this course, hybrid learning constituted alternating face-to-face and online sessions using instructional videos and online quizzes (Park, Martin, & Lambert, 2019). Students who experienced academic success were students with strong academic backgrounds, and the course delivery format did not impact student learning (Park, Martin, & Lambert, 2019). Instead, Park, Martin, and Lambert (2020) suggested that increased participation may have helped increase student achievement and successful completion of the course, and further studies should investigate factors that increase motivation and participation in hybrid course formats.

Another study examined a finance course at a university in China where a live broadcast connected students accessing the class remotely to the students physically present in a classroom (Xiao, Sun-Lin, Lin, Li, Pan, & Cheng, 2020). To conduct a synchronous hybrid course, a live chat room, an audio/video call system, and texting helped to replicate real-time communication (Xiao, Sun-Lin, Lin, Li, Pan, & Cheng,

2020). Like the Park, Martin, and Lambert study found, the students who had the most success in the format were the students who had the greatest cognitive engagement levels (Xiao, Sun-Lin, Lin, Li, Pan, & Cheng, 2020).

A third study used an undergraduate health care class with 24 students enrolled in 2015 (Singh, 2017). This study's hybrid model had face-to-face sessions and online class sessions during the fall semester (Singh, 2017). This study found that increased active learning in the hybrid learning course increased student achievement (Singh, 2017). These active learning methods, positively received by students, included small group activities, establishing connections to content learned in other classes, and allowing students to search and find solutions to problems (Singh, 2017).

However, not all hybrid courses have included such active learning methods. As schools implement more hybrid learning models, many are very teacher-centric without focusing on student learning (Linder, 2017). Many use video lectures and represent a return to the "sage on the stage" method of instruction instead of using active learning strategies (Linder, 2017). The need for teacher training to support the hybrid learning model, primarily due to technology implementation, has also shifted the focus of the hybrid learning model to the teacher's needs instead of the student's needs (Linder, 2017). While traditional and hybrid classrooms share many aspects, differences exist (Linder, 2017). Technology and hybrid learning change how students interact with course content, interact with each other and learn and offer many new possibilities to improve the student learning experience (Linder, 2017). However, this will require a shift in instructional strategies.

Deficiencies in literature and the significance of the study

While studies have investigated using dialogic pedagogical strategies in traditional face-to-face classrooms, few studies have examined using a dialogic pedagogical approach or strategies from the students' perspective and how being a student engaged in a dialogic environment in a hybrid learning modality has affected the students' learning experience. Due to the increased availability of technology in classrooms of all levels and the expansion of online learning programs, the effective use of dialogic pedagogy, incorporating digital technology, to support student learning requires more investigation (Mercer, Hennessy & Warwick, 2019). Additionally, most research into hybrid learning is in its infancy, as this instructional model is relatively new (Raes et al., 2020). This study's findings can provide insight into how students experience dialogic pedagogy in hybrid classrooms using digital technology and help develop strategies to increase classroom dialogue.

Effectively implementing a dialogic pedagogy could address one of the identified shortcomings of hybrid learning: students often feel disconnected and are provided with fewer engagement opportunities online than in face-to-face settings (Raes et al., 2020). With the increase in technology available in classrooms, the growth of online learning, and the current need for hybrid learning due to the COVID-19 pandemic, practical strategies to incorporate digital technology with instruction centered on dialogue could support more aspects of learning, including critical thinking, problem-solving, engagement, intrinsic motivation, and content understanding than a traditional monologic classroom.

Conclusion

A monologic approach to instruction, often a staple of college and high school classrooms, has become recognized as a less effective means of supporting student learning and their development as children in preparation for entering society as empowered critical thinkers and problem solvers. The rapidly changing world and the advancement of digital technology have helped promote the right conditions to rethink the approach teachers are currently using in curriculum design and instruction. The view of education as disseminating information to students “is no longer appropriate because knowledge so rapidly becomes obsolete that a knowledge-based curriculum risks becoming irrelevant” (Alexander, 2008, p 140). Instead, it is time “to develop a unifying sociocultural, dialogic theory of how knowledge is jointly constructed and how learners achieve greater understanding” (Mercer and Littleton, 2007, p. 135).

A more dialogic approach in curriculum design and instruction can support student learning, empowerment, critical thinking, and problem-solving to support student learning and development. However, implementing such an approach, especially with new classroom environments such as hybrid settings, is challenging and has not been studied extensively. There are many barriers to implementation, including structural issues of time, managing a crowded curriculum that encourages breadth over depth of knowledge, actualizing a radical shift in how knowledge is defined, challenging the long-held beliefs on what classroom instruction looks like, and the intensive demands that dialogic teaching places on teacher knowledge and flexibility (Snell and Lefstein, 2018). While implementation may be complex, a lack of progress towards an instructional

approach that holds such great potential for student learning and development would be detrimental to schools' purpose: supporting all students' learning.

CHAPTER THREE

METHODOLOGY

A qualitative action research case study allowed the investigation into the students' lived experience of engaging in a hybrid APES course taught with a dialogic pedagogy.

The rationale for the selected methodology

Action research. The study used a practical action research approach to investigate students' lived experiences in a hybrid APES course that approaches instruction with a dialogic pedagogy. A practical action research study investigates a specific problem in a classroom, school, or community setting (Mertler, 2020). Unlike traditional research conducted by outsiders, action research is where teachers assume the researcher's role and study their practice from within their classrooms (Efron & Ravid, 2013, p. 4). In this research style, the research questions arise naturally from events or problems that the teacher deems important and significantly impact student learning (Efron & Ravid, 2013, p. 4). While the goal of action research is similar to traditional research in that it attempts to generate new knowledge, the two are quite different. The purpose of action research is for the teacher, who is also the researcher, to improve their practice and professionally grow by developing a greater understanding of their students, solving problems within education, or developing new skills (Efron & Ravid, 2013, p. 4).

This study used an action research methodology to investigate students' lived experiences in a hybrid APES course implementing a dialogic pedagogy. After the study,

I hoped to gain greater insight into the impact that dialogic-based instructional methods have on the student experience and develop a more effective means of implementing these strategies within a hybrid or face-to-face APES course.

Case study. This study was considered a case study which is “an in-depth description and analysis of a bounded system” (Merriam & Tisdell, 2016, p. 37). This case study focused on one particular classroom, one set of students, and one teacher that comprised this study’s participants. This selection is applicable for this study because, as Merriam & Tisdell (2016) state, “For it to be a case study, one particular program or one particular classroom of learners... would be the unit of analysis” (pp. 38 - 39). A case study design allows for “the search for meaning and understanding, the researcher as the primary instrument of data collection and analysis, an inductive investigation strategy, and the end product being richly descriptive” (Merriam & Tisdell, 2016, p. 37).

Qualitative research. Qualitative studies different from quantitative studies in that instead of analysis of numerical data, researchers “rely on text and image data [and] have unique steps in data analysis” (Creswell, 2013, p. 262). For this study, a qualitative approach would align with the study’s purpose and theoretical framework for three primary reasons. First, qualitative studies “tend to collect data in the field at the site where participants experience the issue or problem under study” (Creswell, 2013, p. 234). Second, researchers conducting qualitative research collect data by examining documents, observation, and interviews rather than relying on a single data source (Creswell, 2013). Third, data analysis can include inductive and deductive data analysis; the data was reviewed and organized in categories or themes that cut across all data sources to create a holistic picture of the problem under study (Creswell, 2013).

Action research cycle.

Mertler's (2020) four-step cyclical process for action research was this action research study's structure. As a teacher-researcher, I had dual roles as I was part of the group and collected data. The four-step process for conducting action research involves a planning stage, an acting stage, the developing stage, and finally, the reflecting stage (Mertler, 2020). Identification of a problem occurred in the planning stage and was followed by gathering and reviewing information about that identified problem (2020). From that analysis, a research plan was developed (2020). Next, I implemented the research plan during the acting stage, and data was collected and analyzed (2020). Then, during the developing stage, I created an action plan for the next cycle of action research based on the collected and analyzed data (Mertler, 2020). Finally, the plan for sharing the results will be specified (Mertler, 2020).

Planning stage. The rapid transition into a digital learning environment required a rapid transition to understand how to implement a dialogic pedagogy in a digital learning environment. First, an understanding of the digital environment is necessary. The school district uses the Canvas Learning Management System (LMS) as the digital platform for academic courses and supports Microsoft Teams as a video conferencing platform. Additionally, teachers had access to multiple other digital tools, including Google's product suite (docs, sheets, slides, drive, and more), Padlet, Kahoot, Quizlet, and the College Board's digital content.

There were many variables to account for in developing effective pedagogy for facilitating dialogue in a hybrid course. First, students simultaneously attended class face-to-face and online so ensuring all students had opportunities to engage in discourse was a

priority. Second, monitoring and supporting all students' learning progress and attending class in either learning modality were considered. Finally, the task sequencing and structure had to make engaging in dialogue accessible for all students.

This study took place over a three-week period that covered parts of two academic units designed by the researcher, focusing on renewable energy and air pollution. According to the College Board's AP Environmental Science Course and Exam Description, the researcher constructed the unit, which outlines the required content within an APES course (College Board, 2019). The information covered in the lessons over three weeks accounts for approximately 10% to 20% of the AP Exam (College Board, 2019, p.18).

Lesson structure. The study focused on a fifteen-day period where students participated in instruction that used a dialogic pedagogical approach to support students' progress through parts of the renewable energy and air pollution units taught in the course and developing their understanding of the material. Each lesson had four primary parts: bellwork, individual "leading questions," teacher-led monologue, and group "exploratory questions."

Each lesson began with a five-minute bellwork activity to review course content from the previous lesson and transition to the lesson for the day. All students, jointly online or physically in the classroom, provided their responses to a series of three to five questions using Padlet. This digital collaboration tool allows students to digitally post their responses and review others' responses and allow for students to make real-time revisions to their responses. The teacher can view these responses to gauge understanding of the material, address any concerns, and then introduce the lesson for the day. Mercer

and Littleton (2007) stated that dialogic lessons might include a teacher-led whole class session to establish the lesson's purpose and goals.

Students began by working individually by reviewing resources, completing individual "leading" questions that are multiple-choice, filling in the blank, matching style questions, and posting their responses on a Canvas discussion board. Leading questions are used in this segment of the lesson to draw the students to key aspects of information as selected by the teacher in alignment with the curriculum's goals (Truxaw, 2020). While seemingly more representative of a traditional classroom than dialogic pedagogy, this initial part of the lesson prepares students to engage in dialogue later in the lesson. This initial part of the lesson is similar to the foundation stage of a dialogic lesson described by Bansal (2018). Introducing certain aspects of knowledge, vocabulary, and language to students should occur before engaging them in exploratory talk (Littleton, Mercer, Dawes, Wegerif, Rowe, & Sams, 2005). Without an introductory interaction to the knowledge and language relating to the lesson, some students may not find it possible to work collaboratively and use language appropriately (Mercer & Littleton, 2007). The proper guidance and instruction from a teacher can create common ground, help create some prior knowledge, and allow students to begin to make connections between their current knowledge and new information allowing all students to engage in dialogue effectively (Nystrand, 1997). This segment of the class, lasting between five to ten minutes in length, provided students with an introduction to the lesson's information and support students to engage in dialogue with their classmates.

I used Canvas to monitor the discussion boards to ensure that students have posted their initial responses to these leading questions. Once each student has posted

their responses, I reviewed the information presented in the resources in a three to five-minute overview. As Mercer discussed, this strategic use of monologic talk helps provide examples of subject matter in dialogue, quickly highlight essential information, and show the teacher's interest and excitement in the information provided (University of Cambridge, 2018).

Once the teacher and students create the foundation for dialogue, students engaged in guided collaborative inquiry to engage in student-led inquiry guidance towards scientific topics (Wegerif, 2013). To allow for small-group, student-led inquiry in a hybrid classroom, the teacher separated students into small groups using Microsoft Teams that allowed for live videoconferencing among the small groups. Students first reviewed and revised their responses to the initial leading questions reviewing any questions with different responses in their groups. They have the opportunity to discuss the reasoning behind different responses as necessary until they reach a consensus. The students then are provided a series of five to ten questions based on hypothetical scenarios or real-world events, often containing data tables, graphs, or excerpts (See Appendix A). These questions guided students in investigating the processes, causes, effects, and possible solutions of each event using various resources, including the Internet and their textbook. These types of authentic, problem-solving inquiry questions promote the use of exploratory talk. As Sherry (2019) found, these open-ended type questions lead to more dialogue. Exploratory talk is described as students brainstorming and participating in dialogue where partners interact critically but constructively with each other's ideas, considering all opinions before jointly making decisions (Mercer & Littleton, 2007; Nystrand, 1997; Truxaw 2020). Throughout their time collaborating in

small groups on Microsoft Teams, as the teacher, I joined each group, monitored the group's progress, asked probing questions, and sought to address any concerns that the group may have as they review the series of guiding questions. After the class period, each group member posted their final, revised responses that reflect their group's dialogue on the discussion board on Canvas. As the researcher, I observed the groups and recorded notes on the engagement, dialogue, and collaboration among the groups' members in the reflective journal. This lesson structure continued over fifteen days as students' progress through the learning targets of the unit.

Acting stage. As the researcher, I collected multiple forms of data during the acting phase to respond to the research question proposed in this action research case study. Creswell (2014) stated that interviews, observations, documents, and other forms of data are used in qualitative research rather than using a single data source. Researchers then review all of the data, analyze it, and develop themes that cross all the data sources (Creswell, 2014).

Context and participants. The high school in the study was my current school of employment, and the students selected for the study were all the students enrolled in all APES classes for the 2020 - 2021 academic year. The school in the study is in the suburbs outside of Orlando, Florida. According to the Florida Department of Education (2020) school grading scale, it ranks as an 'A' school that uses ten metrics to calculate schools' quality. The school was within a school district with over 212,401 students, 58,573 of whom attend one of 20 full-time high schools (Orange County Public Schools, 2020). Demographically, as of 2020, the student population at the high school was approximately 43.2% Hispanic, 25.1% White, 24.3% Black, 4.9% Asian, and 2.3%

multiple races (Orange County Public Schools, n.d.). Across the school, 15.9% were English Language Learners (ELL), 10.3% are on an Individualized Education Plan (IEP) for students with special educational needs, and 45% are enrolled in or qualify for the free/reduced lunch program (Orange County Public Schools, n.d.). The school site, as of 2018, had a graduation rate of 95.0% and a college enrollment rate of 76.2% (Orange County Public Schools, n.d.). For the study, six APES classes, totaling 99 students, made up the sample population. The class sections ranged in size from 11 to 27 students. Each class section met five times a week for a total of 240 minutes of instructional time each week. Due to the COVID-19 pandemic, only 30% of the students are face-to-face, and 70% attend class synchronously live online from remote locations.

The students participating in this action research study were students in an APES course consisting of juniors and seniors who voluntarily enrolled in the spring of 2020. The school requires all students who enroll in the course to take the AP exam, but the school pays each student's exam fee. According to school policy, the only prerequisite required for enrollment is completing two years of high school lab science with a C grade or better.

Purposive sampling was the sampling method used in this study. Purposive sampling is opposed to probability sampling, which attempts to generalize the study results to the greater population (Merriam & Tisdell, 2016). Therefore, as in a qualitative study, "probabilistic sampling is not necessary or even justifiable" (Merriam & Tisdell, 2016, p. 96). Unlike a quantitative study, this study is not concerned with generating generalizable data as it focused on a single teacher and their students.

Non probabilistic purposive sampling is “based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned” (p. 96). One type of purposive sampling is convenience sampling, utilized when a study selects participants “based on time, money, location, and availability of sites or respondents” (Merriam & Tisdell, 2016, p. 98). The students selected for this study were currently enrolled students in the researcher’s course, offering a convenient sample to obtain participants.

To use purposive sampling, the researcher must first establish a criteria to identify potential participants (Merriam & Tisdell, 2016). This criteria should reflect the purpose of the study (Merriam & Tisdell, 2016). This study’s purpose was to determine how a dialogic pedagogy affected student understanding and motivation in a hybrid APES course so students that expressed a divergent experience in APES compared to their previous or current school experience, positive or negative, was the primary criteria used to identify participants.

The potential participants were selected based on their shared experiences about school in general and the APES course, specifically through a mid-year course and self-reflection survey. Periodically throughout the year, APES students are asked to share their APES course experiences in a survey. The students’ feedback allows the teacher to identify areas of strength in the course, areas for course improvement, and insight into students’ personal feelings about their experience in the course. This survey was not part of the study; the teacher used students’ feedback to modify instructional practices and provide a better learning environment. Students that indicated that they were having a divergent experience in APES compared to their other courses, current or prior, were

identified to better understand how the use of a dialogic pedagogy was causing this divergence.

Teacher observations, conversations with other teachers, and feedback from the feedback survey helped identify students who seem to have contrary learning experiences in the hybrid APES course from the rest of their academic courses. What made these students have a different experience in this class than in their other classes? Ideally, students would represent different genders, ethnic groups, and academic backgrounds to gain a broader perspective on the effect of using a dialogic pedagogy in a hybrid APES course.

From the group of students that experienced a different learning experience in APES, fifteen students who shared that they felt more or less satisfied, engaged, motivated, or learned in other courses compared to their hybrid APES course were contacted and asked to participate in the study. Case studies often focus on four to five cases (Creswell & Creswell, 2018). Of the fifteen students contacted about potentially participating, seven agreed to participate in the study. I selected the sample population method instead of conducting the method until reaching the saturation point in the participants' responses where no new information is obtained (Creswell & Creswell, 2018).

Before data collection. Before beginning data collection, the study sought approval from the university's institutional review board and the school district. I provided consent forms to each student and their parents or guardians via email, authorizing using their data in the study (see Appendix B and Appendix C). The students

or their parents or guardians were permitted to withdraw from the study without penalty; however, they would still participate in the class.

At the beginning of the three-week data collection period, students who agreed to participate in the study completed the student survey. All students, including the participants, were assigned to be part of a small collaborative group that they would be engaging with during the lessons taught using a dialogic pedagogy. Group sizes ranged from three to five students due to teleconferencing limitations that only reasonably allowed a maximum of five channels to be open on Microsoft Teams at a single time. Each group had one face-to-face member, if class sizes permitted, which allowed the teacher to have direct contact with each team throughout small group collaboration.

Student interviews. According to Merriam & Tisdell (2016), “Interviewing is necessary when we cannot observe behavior, feelings, or how people interpret the world around them” (p. 108). Attempting to understand the effect of an instructional strategy and its effect on student learning must incorporate the student’s feelings, emotions, and beliefs that are not always visible to the researcher, especially in a digital space. Merriam & Tisdell (2016) also describe that interviews are an effective form of data collection when conducting case studies (Merriam & Tisdell, 2016).

The study used a semi-structured interview (see Appendix D) to gain insight into students’ lived experiences of participating in dialogic pedagogy. The semi-structured interview questions mix more and less structured questions (Merriam & Tisdell, 2016). This interview structure allowed me to respond with greater flexibility depending on the situation, the interviewee’s response, and new ideas that emerge from the interview

(Merriam & Tisdell, 2016). The interviews gathered information on the students' perception of using a dialogic pedagogy in a hybrid learning environment.

During the fifteen-day data collection period, all study participants were interviewed at an agreed-upon time outside school hours to minimize disruption to the students' academic day. The interviews lasted approximately thirty to forty-five minutes. The interviews were conducted digitally using video conferencing on Microsoft Teams through a secured, password-protected Microsoft account provided by the school district. The Microsoft Teams recording feature allowed for the recording of the interviews. I transcribed the interviews and stored the transcriptions on a password-protected computer to prevent unauthorized access. After transcription, the interviews were analyzed using thematic coding to answer the research question and understand the lived student experience having engaged in a hybrid course using a dialogic pedagogy. I interviewed each student participating in the study once during the data collection period.

Student Survey. During qualitative research, documents like journals, e-mails, reports, strategic plans, and other records may serve as data sources (Creswell & Creswell, 2018). At the beginning of the study period, a survey created for this research study was administered to the participants (see Appendix E) to gather additional demographic information, including ethnicity, socioeconomic, and each participant's academic background. I analyzed this data alongside the interview data to develop a greater holistic understanding of each participant's lived experience as they engaged in a dialogic pedagogy.

Reflective journal. Another data source for this study was a reflective journal that I used throughout the study. I used the journal to make observations and reflect on

experiences daily throughout the data collection timeframe. The journal recorded observations on student learning, engagement, motivation, and effectiveness of the instructional strategies. The reflective journal was also analyzed using thematic coding to provide another perspective to answer the research question.

Data Analysis and coding. The student interviews and my reflective journal were coded using a priori coding. Coding begins with the initial coding phase and can be done word-by-word, line-by-line, or incident to incident (Charmaz, 2006). This process aimed to identify segments in the data set that responded to the research question (Merriam & Tisdell, 2016). I then used these codes to generate themes that emerged from the data gathered in the study (Creswell & Creswell, 2018). The themes that emerged would guide the response to my research question and the findings of my study (Creswell & Creswell, 2018).

There are different coding procedures (Creswell & Creswell, 2018). For example, some qualitative studies develop codes only on the collected data, while other studies may use predetermined codes (Creswell & Creswell, 2018). For this study, a priori or predetermined codes would be used to investigate the experience of engaging in dialogic pedagogy in a hybrid APES course. A priori coding is when the codes are created before data collection begins to focus on specific aspects of a study (University of Huddersfield, n.d.). This coding technique was used because certain aspects of the phenomena of engaging in dialogic pedagogy were the focal point of my study.

There were five perspectives that guided data analysis and used to develop codes. First, the data was analyzed for the presence or absence of authentic dialogue described by Bakhtin. Authentic dialogue was defined as the presentation of ideas by students,

convergent or divergent ideas proposed in response by other students, and the ensuing verbal negotiation as students develop their understanding of words and concepts. Second, the data was analyzed to determine if dialogic pedagogy supported the opportunity for students to use dialogue to progress beyond their ZPD with Vygotsky's social constructivism. Finally, the data was analyzed to determine the effect of dialogic pedagogy on the three aspects of Deci and Ryan's self-determination theory: autonomy, competence, and relatedness. The student interviews and teacher reflection journal were analyzed for the presence or absence of evidence that indicated how using a dialogic pedagogy affected each of these perspectives. The themes that emerged from the data can create a conceptual overview to make inferences, develop models, or generate theories about the meaning of the data that can be used to inform future activity (Merriam & Tisdell, 2016).

Merriam and Tisdell (2016) state that in their belief, qualitative data analysis is primarily inductive. Using a priori coding is more deductive in that data is being fit into predetermined categories instead of the categories emerging naturally from the data. However, Creswell (2013) and others describe those codes can be created before data analysis on topics that researchers expect to find based on their literature review (Miles, Huberman, & Saldana, 2013; University of Huddersfield, n.d.). When using a priori coding, there is a tendency to overlook potentially emergent themes by focusing too intensely on the predetermined codes (University of Huddersfield, n.d.). Therefore, the code list was tentative, and emergent codes could be added as needed to ensure that the study's findings represented the data collected and the experience of engaging in dialogic pedagogy.

Validity. The use of two strategies increased the validity of the study. A valid qualitative study often relies on a rich description to detail that the researcher's conclusions make sense (Merriam & Tisdell, 2016). One of the most common strategies of validity in a study is the process of triangulation (Merriam & Tisdell, 2016). The use of three different data sources, including student interviews, student surveys, and a reflective journal, helped provide a range of perspectives on the impact of a dialogic pedagogy on student learning, increasing the study's validity. A second strategy that increased the validity of the study was member checking or reciprocity. This process involved soliciting feedback on the participants' emerging findings to reduce bias and misunderstanding (Merriam & Tisdell, 2016).

Developing stage. The developing stage is the stage in action research where the action plan is developed that provides a specific and tangible process to solving the original problem of practice (Mertler, 2020). The action plan generated from an action research study may focus on an individual teacher, classroom, or on a larger scale of multiple teachers, a school, or even an entire district (2020). An effective action plan usually includes summarizing the findings, recommended further actions, responsibility for implementing those actions, who needs to be consulted about those actions, who will collect the data, the timeline of implementation, and any resources necessary (2020). In this sense, the cyclical nature of action research becomes apparent.

Reflecting stage. The final phase of the action research cycle, the reflecting phase, is where the study's findings are shared (Mertler, 2020). Even though this action research study was conducted in a single classroom, it does not mean that the knowledge gained from the study is not be transferable in some form with other educators or

administrators, nor will it mean that there is no interest in the results from outside parties (2020). School based Professional Learning Communities, a department or faculty meeting at the school site or during a professional development session at the school site or within the district were are environments where these findings could be shared (Mertler, 2020). On a larger scale through a professional conference or within an academic journal these results may be shared (2020). As most educators are continuously looking for ways to improve their practice, sharing the findings from this study at various levels may support their professional development (2020).

Ethical concerns

In this qualitative study, there were a few ethical concerns that I addressed. This study's primary ethical concern is obtaining the necessary permissions to access the site and the participants (Creswell & Creswell, 2018). Before conducting this qualitative study, this study was submitted to the University of South Carolina IRB for review, submitted to the school district office of research for district approval, and cleared by school site administrators before the beginning of the study. Additionally, all participants and their guardians were presented with a consent form to participate in the study.

The second ethical concern was the confidentiality of the participants' information. The participants' privacy must be respected by dissociating names from responses and collected data from the participants (Creswell & Creswell, 2018). Therefore, I stored all the data in password-protected digital accounts and digital devices to prevent unauthorized access. A key was created and maintained to dissociate the participants' names and data. Destruction of all data will occur three years after the study is complete.

A third ethical concern for this particular study was the potential power imbalance between the researcher as a teacher of the student participants during the interview.

Creswell and Creswell (2018) describe that power imbalances may cause the interview to be stressful for participants. Therefore, all interviews began with the understanding that a power balance exists between the data collector and the participants, providing a different perspective on results (Creswell & Creswell, 2018).

Role of the researcher

Researching my classroom and my students required acknowledging the potential for compromised research due to the nature of conducting what Creswell and Creswell (2018) define as backyard research. The role of the researcher as the teacher of the participants created a foundational power imbalance. While these factors may dissuade one from conducting research in this setting, a researcher's unique access to this environment and the professional relationship they have developed with students also provide an opportunity to gain insight into the student's perspective that an outsider could not obtain.

Throughout the study, I refrained from making statements, comments, or asking questions about the study to influence their responses during the intervention. Additionally, as Herr & Anderson (2015) caution, there is a tendency to "put a positive spin on data" (p. 44). However, doing so would invalidate the effectiveness of the study. I must objectively reflect on implementing dialogic-based strategies and analyzing the effectiveness of my own choices, implementation, and the resulting impact on student learning to achieve this study's goals.

CHAPTER 4

FINDINGS

I graduated from my undergraduate program in 2005, and ten years later, I found myself falling asleep on a weekday evening watching a video lecture for my master's degree program. I walked back to the kitchen for another glass of water when my wife, Amanda, asked how it was going, to which I replied, "I do not understand how they expect me just to sit and listen to them go on and on about stuff for an hour and for me to pay attention." Amanda slowly turned and looked at me with a puzzled expression and replied, "How do you think your kids feel?" I stopped dead in my tracks.

Since that moment of insight from Amanda, who is not associated with the education profession but is an astute observer and critic, I attempted to make my APES course more engaging and support more students to greater levels of success. However, student performance did not change significantly. There was still something missing. For the majority of our class time, I was the one talking, and the students were the ones listening. When the students worked, they worked independently, often in relative silence, raising their hand if they needed help. The class would conclude with me calling on students to hear their responses to a given question, identifying if they were correct or not, and then moving onto the next question. The activities, resources, or content I presented to the students to make the class more engaging were still not meeting my goals of enhancing the students' learning experience. The problem was more profound than a quick-fix solution.

Bakhtin (1981) stated that the presence of a singular, monologic voice results in no understanding but only an abstract meaning assigned to the word or concept. Matusov (2009) has described that a lecture is a potentially long dialogic exchange in response to a question. However, in my class, was any student actively asking a question before the lecture to begin a dialogic exchange? Were my students actively engaged in mentally negotiating their thoughts in relation to the information presented in the lecture? After reading Bakhtin, Alexander, Nystrand, Wegerif, and more, the realization slowly began: The students' voices were missing in my classroom.

At the beginning of the 2019-2020 academic year, I began to experiment with creating more opportunities for students' voices to be present in my classroom. I implemented different lesson structures, different types of resources and practiced asking different kinds of questions to students. Every choice I made was to create more opportunities for student voices to be more evident in the classroom. By March of 2020, I thought my students and I had taken massive strides towards representing a dialogic classroom. Then the COVID-19 pandemic changed everything.

As the fall of 2020 approached, the changes occurred quickly. First, the school board announced that school would start in September, not August. "Good, that gives me time to prepare," I thought. Second, a few days later, the school board reversed its decision and decided to start with our original start date. "Well, there goes my prep time," I cursed. Finally, classrooms would look different this year because the school district introduced hybrid learning. Students would all attend class but through two different modalities. They could choose to be a face-to-face student or an 'online learning' student to attend class live through Microsoft Teams. How could I replicate what I was beginning

to create in the traditional classroom in a hybrid learning setting? How effective would it be? How would it impact student learning? These thoughts led me to the research question that drove this action research study:

How does a dialogic pedagogy affect students' learning experience in a hybrid Advanced Placement Environmental Science course?

The transition to hybrid learning

When I first considered implementing a dialogic pedagogy in a hybrid classroom, I wanted to observe two student actions. The first action was to hear students engaged in dialogue. As Bakhtin (1981) described, dialogue is the struggle between centripetal (divergent) and centrifugal (convergent) forces as voices attempt to develop an understanding for themselves with their perspectives and backgrounds interwoven in the context of the utterances. Dialogue is a negotiation between voices as thoughts and ideas diverge and converge through a verbal exchange until each voice develops an understanding. I wanted to see students proposing ideas, questioning each other's thoughts, using evidence found online or in course resources, and, ultimately, students creating new understanding about course material through this dialogue as Matusov (2014) described.

I also wanted to see students supporting one another as they progressed through and beyond their zone of proximal development (ZPD). As Vygotsky (1978) described, learning occurs with the guidance and support of a more knowledgeable other (MKO) that may be a teacher or peer. Students who were asking questions, explaining concepts, and describing their reasoning to support one another as they progressed beyond their

ZPD would represent social constructivism. Students should not be sitting idle, having their questions unanswered, and not being supported in their progress.

Ideally, if students were displaying these two actions, their motivation should increase according to Deci and Ryan's SDT. The students would feel greater competence because MKOs could support them beyond their ZPD. They would experience greater relatedness because they were collaborating with small groups of students. They would also feel greater autonomy because they were no longer the passive receptacle of knowledge that Freire described but, instead, co-creators and authors of their learning.

Using discussion boards to support dialogic pedagogy. There seemed to be one mechanism in a hybrid setting that would create an environment for students to engage in dialogism, provide scaffolded support for each other beyond their ZPD, and experience the needs required to increase student motivation - discussion boards. As Toro-Troconis et al. (2019) described, many online courses use discussion boards to drive student engagement through collaborative participation. I had experienced many discussion boards in my time as an online graduate student and recognized them as the most likely avenue to support dialogic pedagogy in a hybrid setting.

Therefore, my lessons became revolved around discussion boards. The class would begin with bellwork displayed for all students using the screen sharing feature in Teams, and the students would post their responses on Padlet. The students would then access the discussion board for that lesson. Students were divided into small groups in Canvas to interact on the discussion board, similar to how I divided students into small groups in the past. Singh (2017) also described that small groups were one form of instruction in an online course that positively affected student learning. The discussion

board would contain the prompt for the lesson and present questions that would guide the students' inquiry into the topic for the day (See Appendix F). The inquiry questions would appear as such:

1. Describe the motion of tectonic plates at a divergent boundary like the one in the Atlantic Ocean.
2. Did you know the island of Iceland is on top of the mid-ocean ridge? It is covered in volcanoes. A volcano is defined as a location where magma reaches the surface of the Earth.
3. Describe how/why volcanoes occur at divergent boundaries.
4. The longest mountain chain in the world is the Mid-Atlantic Ridge, along the divergent boundary in the Atlantic Ocean. How do the volcanoes found along divergent boundaries form underwater mountain chains like the Mid-Atlantic Ridge?
5. Have you ever heard of seafloor spreading - how is seafloor spreading related to divergent boundaries? What does that mean for North America and Europe? What does that mean for the Pacific Ocean?
6. How is the African Rift Valley connected to the concept of divergent plate boundaries?
7. True or false: Earthquakes will occur along divergent plate boundaries

The students would use the Internet and course resources to review the concepts presented within the inquiry questions, and each student would post an initial post to the inquiry questions. They would then review their group members' posts, respond to them by asking questions, offering alternative perspectives, or supporting their thinking. This

active discussion on the discussion board would represent the dialogue Bakhtin theorized. The plan seemed like a solid first step into implementing dialogic pedagogy in a hybrid course.

While research has shown that many online courses use discussion boards to promote engagement, other studies have shown that they are often ineffective at creating authentic dialogue, the divergence and convergence ideas in verbal negotiation. Students have responded that discussion boards are often one of the least valuable aspects of online learning (Martin & Bolliger, 2018). The content of the postings represents message posting and not dialogue (Champion & Gunnlaugson, 2018). My experiences were sadly no different. Instead of seeing convergent and divergent thought processes and dialogism, I saw simplistic statements of agreement, as shown in Figure 4.1, which presents a replication of a Canvas discussion board.

STUDENT INITIAL POST

1. In a divergent boundary, the tectonic plates involved move apart and away from each other ultimately to form a new crust.

2. Volcanoes would be found along divergent boundaries because when the tectonic plates are separating and moving away from one another that leaves space sort of like a gap for magma/molten lava to rise up from within the mantle and fill in the newly opened space.

3. Divergent boundaries form underwater chains like the Mid-Atlantic Ridge by that as the tectonic plates move apart, it leaves a gap. This gap allows for magma to rise from the mantle onto the base of the ocean where the magma will harden into rock and continuously build up to eventually create an underwater mountain.

4. Seafloor spreading is related to divergent boundaries because seafloor spreading takes place at divergent boundaries. The seafloor gets bigger with the tectonic plates moving apart and magma filling in the gap to ultimately harden on the seafloor and build up. What this means for North America and Europe is that the Atlantic Ocean will be getting bigger so therefore the distance between North America and Europe will enlarge and they will be farther apart from one another. In terms of the Pacific Ocean, since the Earth doesn't change size from the Atlantic Ocean enlarging, that means the Pacific Ocean is getting smaller.

5. The African Rift Valley is connected to the concept of divergent boundaries because the whole East part of Africa is moving apart and separating from Central Africa which is what happens at a divergent boundary where two tectonic plates move away from one another.

6. True

RESPONSE POST 1

I agree that the moving of tectonic plates leads to Earthquakes.

RESPONSE POST 2

I agree with number 2, but do you believe that it can be dangerous for a volcano to be so close to a divergent boundary and what would happen if they weren't there?

Figure 4.1 Sample discussion board posting

Minimalistic discussion board postings of “I agree with you” were not my vision for the results of using a dialogic pedagogy in a hybrid course. The verbal negotiation of Bakhtin, Vygotsky’s concept of student progression beyond their ZPD with support of an

MKO, and motivational needs prescribed by Deci and Ryan were absent from most students' posts. There were a few examples, but as the first units progressed, the quality of the discussion boards regressed. My discussion boards represented a popular meme (Figure 4.2) instead of dialogic pedagogy.



Figure 4.2 Discussion board meme mocking simplistic posting (Martinez, 2019)

My students voiced frustration with the experience matching my frustration with what I saw. Marcus began the year as an online student. However, he was discontent with his online experience, and he switched to being a face-to-face student about halfway through the first quarter, hoping for a better learning experience. Marcus had taken many AP classes before entering APES, and he saw himself as a 'C' student in his AP courses but a 'B' student in science classes. He shared that working online with discussion boards was like many other group experiences that he had in school in that "You're just sitting there like not doing anything, just writing down answers like your group mates...it's just not fun."

Alex was an online student throughout the year and was academically similar to Marcus. He had taken a few AP courses and identified himself as a 'B' student in AP courses but only a 'C' science student. When reflecting on this early implementation of a dialogic pedagogy in APES, Alex recalled that "it seemed to have been something like really scary." Alex's revelation that he was scared was significant and appreciated, reflecting that he and most of my other students had not likely experienced either hybrid learning or a lesson structured as such. Johnston (n.d.) noted that students must be taught how to think together before a classroom learning community is present. Without prior experience in dialogic pedagogy and thinking beyond the individual, students would be less able to express themselves, share ideas publicly, be willing to listen to other's ideas, provide reasoning and evidence for their perspectives, and support group dynamics (Johnston, n.d.). Students need time to see such strategies used before applying them themselves (Johnston, n.d.). As Johnston (n.d.) states, "By the time a strategy appears in the conversation [six] times it is being used by 46 percent of the students. If used eight or more times, it is being used by 69 percent of the students" (p. 1). Alex's expression of fear and the lack of dialogue on the discussion boards reflected the students' lack of social development, as Johnston (n.d) described.

Alex also shared that early on in APES and in other hybrid classes, instead of engaging in the course, he would "look at my phone or like do multitasking or, you know, find something else to do." My early strategies were not meeting my objectives. Marcus and Alex did not identify themselves as 'A' students though, would a stronger student feel the same way?

Jennifer saw herself as an ‘A’ student in the AP courses that she had taken and a ‘B’ student in her science classes. She also had a higher weighted GPA than Marcus or Alex. However, she described that when she is not forced to interact with students, “I’ll be like more distracted and focused on other things that are happening around me instead of like the actual course.” Marcus, Alex, and Jennifer represented different types of students. Still, all described how a lack of interaction could lead to a lack of motivation and lack of understanding because of the high risk of distraction from students in an online setting. The work on the discussion boards and the student’s level of engagement were not promoting the learning experience I wanted to provide for students using a dialogic pedagogy.

Monologic pedagogy in hybrid classrooms. It was not just my class that students experienced these feelings of dissatisfaction and lack of dialogue. The majority of participants reported that many of their hybrid learning classes relied on a monologic pedagogy that involved long segments of the teacher providing lectures that resulted in little to no understanding of the course material. Like the discussion boards in my class, monologic classrooms were not encouraging and developing the exchange of divergent and convergent dialogue from students. The dialogic theory of Bakhtin and Matusov’s instrumental use of dialogue was absent from my classroom and monologic classrooms. Students were still trapped in Freire’s authoritarian banking system of education. Jennifer stated that she felt “like I’m not actually learning because like it’s just there, we’re not really understanding like why we just know it’s just there.” A traditional, lecture-based, monologic pedagogy did not seem effective in a hybrid environment either.

Another accomplished student in my course was Melissa. Melissa had experienced a few AP courses during high school and identified herself as a 'B' student in AP courses and science classes. I had taught Melissa's older sister a few years before and knew the family well. Melissa was an intelligent student; however, Melissa stated that "just sitting there listening to a teacher, give me this information, I don't pick it up as much." Melissa often had to spend a lot of time outside of class learning the information. Like Jennifer, more traditional instructional styles were not effective in any environment, hybrid or face-to-face.

How did a monologic pedagogy affect a student like Alex, who had not experienced the same level of academic success as Melissa and Jennifer? Alex had great feelings of frustration because he felt unsupported to progress beyond his ZPD. In his US History course, he said that the teacher assigned a large amount of independent work, but the teacher struggled to interact with the students through Teams. Alex stated that:

"He never really looks at teams. It takes a minute to ask the questions, and then at that point, it becomes irrelevant, or he just doesn't like half the time to answer it. So it just it sucks there."

Alex wanted engagement. He wanted to have a dialogue to help him understand the material, as Bakhtin described. He wanted to be supported beyond his ZPD, as Vygotsky described. The lack of relatedness and competence significantly impacted Alex's motivation.

Then there was Cameron, who just stopped attending class or showed up tardy to most APES classes. Cameron is a gifted student meaning that through testing, the district has identified his high level of intelligence and developed a plan to support his academic

growth that included taking rigorous courses like APES. While he sees himself as an ‘A’ student, his weighted GPA reflects more of a ‘B’ or ‘C’ student. Cameron was absent from or tardy to his first-period APES class many times in the first quarter of the school year, and he ended the first semester of APES with a ‘C’ grade.

In many of his classes as a hybrid student, Cameron explained that “we're just kind of stuck just like at home. Then we just maybe turn the camera on, barely participate.” The feeling of entrapment and lack of initiative may have caused Cameron’s reluctance to participate early in the year during APES. He described that a lecture-based, monologic pedagogy represents “most all of the classes that I take. They're just the teacher talking to us, and we just basically have to listen.” He honestly shared that in this type of class setting, “We would just be listening to [the teacher] and no way do teenagers nowadays, and like in the school system, we probably won't be paying attention.” Cameron also noted that hybrid learning has “made it hard for teachers to like, teach the students and grasp their attention,” but also pointed out that this was also common before the pandemic. He shared that in classrooms that fail to grasp his attention or rely on lectures, he feels little motivation or engagement, but rather “I just have to be in the class and show up and just barely learn anything.” Cameron should be excelling due to his natural abilities. However, Cameron was disinterested and unmotivated by seemingly all of his classes before and during the pandemic.

Then there is Ava, the student that every teacher wants in their course. Ava is an outgoing, energetic, and intelligent student. She has taken over six AP courses and was an ‘A’ student in those AP courses and her science courses. She was a high-achieving student, and one would think that she saw school as a positive experience. However,

according to Ava, the result of these long lectures and lack of engagement in school was a feeling of “memorizing what they're giving me, which isn't really learning it [and] after I take the test, I'm going to forget it.” Even the highest achieving students did not benefit from a monologic pedagogy, especially in the hybrid learning environment.

The participants described little understanding and retention from lectures in hybrid courses. That assumes that the participants were paying attention. Many participants told how they would turn their cameras off, play with their phones, or take a nap during such lessons instead of participating. Little had changed during the transition to hybrid learning. Students were still trapped in Freire’s banking system of education. APES was not going much better as I reviewed the discussion boards and provided feedback to the groups each day. There was no evidence of dialogism, social constructivism, or motivation. I had to make changes.

The evolution of dialogic pedagogy lessons in a hybrid classroom

Through observations, I realized that attempting to use discussion boards in a live, hybrid classroom was not resulting in the learning experience that I desired for the students. I attributed the problem to a few factors. One was the fact that students did not have an access point to the information. I presented students with a series of five to ten inquiry questions and asked them to respond. The students seemed lost. There needed to be something before the more difficult inquiry and having students attempt to engage in dialogue. Littleton et al. (2005) had described that there needed to be an introduction to certain aspects of knowledge, vocabulary, and language to students that would provide them the foundation to engage in dialogue in their small groups. Kadir et al. (2020) also

discussed the need for sequential activities that allow students to connect pre-existing knowledge to new material is an essential feature in instructional design.

The second change was the type of questions that I was asking the students. Mercer and Littleton (2007) described different types of talk that occur in classrooms. One is disruptive talk characterized by disagreement and individual decision-making. No observations of disruptive talk were made or reported by participants at any point in the study or course. The second was cumulative talk, where participants build positively but uncritically on what each other says. The third exploratory talk where students engage in a critical but constructive discussion, challenging and counter-challenging ideas. Exploratory talk best aligns with Bakhtin's dialogism, and I needed to foster more of it in lessons.

To promote exploratory talk in the classroom, I realized that questions could not have direct or recall-type responses. Instead, the question needed to elicit a decision to be made or a debate about the situation among the students using information from the course. Within the need to make a decision, exploratory talk could emerge. As the year progressed, I noted that the amount of exploratory talk among the students correlates to the types of questions and situations. Questions that required information to be recalled or reported from resources led to little exploratory talk because the response was either correct or not; there was no possibility of a different response. Meanwhile, questions that required students to apply their knowledge to new situations, with different potential solutions or responses, resulted in an increased frequency of exploratory talk—for example, these two different question styles appear in Figure 4.3.

20. Examine the following table of populations:		
Bismarck	Fargo	Minot
72,000	121,000	48,000
Identify which location where you may find high levels of nitrogen oxide in North Dakota and describe your reasoning		
21. Describe why acid deposition is classified as a secondary pollutant.		

Figure 4.3 Exploratory question example #1

Question #21 in Figure 2 represents a recall or report-type question. While an essential piece of understanding to APES, students can simply look up an appropriate response to this question. Often, group members would simultaneously find this information, share what they found, and decide on a proper answer to the question. While this supported cumulative talk and focused students on critical pieces of information, it did not represent exploratory talk or a verbal negotiation of ideas, leading to increased retention and understanding.

However, question #20 would more likely result in exploratory talk because the students must apply their knowledge of factual information to create an understanding of the relationship between human behaviors and nitrogen oxide levels in the atmosphere. In a question such as this, students may believe that different cities would have higher levels of nitrogen oxide for various reasons and share those with the group. Often, these proposed ideas would not be the same, resulting in students having to provide their logic and reasoning to the group. As this exploratory talk continued, students would create or revise their understanding of the course content. To create dialogic space for students, teachers must present questions that promote exploratory talk more frequently than recall or reporting style questions to support learning. This realization emphasizes the teacher's

role in creating a dialogic space for students within a lesson using more open-ended, hypothetical questions as described by Sherry (2019).

My third realization was that not using the technology available to have synchronous video conferencing between students led to a lack of dialogue, support for students, and feelings of relatedness. As Melissa described, she often felt disconnected in hybrid classes because teachers did not provide the opportunity to interact with others. Alex wanted to engage in dialogue with the teacher or other students verbally but found a whole-group digital environment a barrier for interaction. Instead of using discussion boards, I created channels in Teams that allowed the students to break out from the whole group into live small collaborative groups in separate channels. They could work through the lessons in real-time instead of being more asynchronous by only working on the discussion board.

A new lesson structure to implement dialogic pedagogy. I created a new lesson structure to create more dialogic space for my students in the hybrid classroom. Students would begin by completing their bellwork as they had before with the bellwork questions displayed using the share screen feature with Teams and the students responding on Padlet. I would introduce and provide an overview of the lesson in a couple of minutes as Mercer and Littleton (2007) described in that dialogic lessons might include a teacher-led whole class session to establish the lesson's purpose and goals. The students would then engage in ten minutes of individual work as they reviewed course resources and any other resources as they responded to a series of leading questions. As Truxaw (2020) described, these leading questions are used in this segment of the lesson to draw the students to key aspects of information as selected by the teacher in alignment with the curriculum's

goals. They were multiple-choice, fill-in-the-blank, and short response formats to help build the foundation for dialogue in the student's small group. The students would then post their responses to these leading questions on their group's discussion boards.

After ten minutes, I would ask the students to join their group's channel on Teams. Their first task was to review each other's responses to the leading questions. Marcus was a high-speed reader and often read his group members' responses as they posted because he was often the first to post in his group. As they joined the channel, Marcus would start the group's dialogue by indicating which, if any, questions they "disagreed on." An interesting note was that Marcus nor other students would often use the word "wrong." They would use the word disagree or an extension of that sentiment. Already I saw more dialogism occurring. Students were asking each other for their reasoning as to why they thought the response to number three was 'B' instead of 'C.' Students would share their perspectives, discuss each other's thoughts, and ultimately settle on one response.

Not all talk among the students about this section was exploratory and elicited debate. In this section of leading questions, the dialogue was much more often cumulative as students agreed to responses or admitted to misreading the question or putting the wrong response. Either way, this first section primed the students to engage in dialogue more so in the next section than if they had not had this opportunity to review the content and focus on its specific aspects. Cameron appreciated this lesson structure, noting that "I feel like the class really has a good balance in terms of individual and group work. I like how we first start off with what we know, and then we go into groups we discuss." This initial segment of individual work introduced certain aspects of

knowledge, vocabulary, and language to students providing them the foundation to engage in dialogue in their small groups (Littleton et al., 2005). As Cameron described, students would not have been able to engage in dialogue easily without this foundation.

Once the students reviewed their responses to the leading questions, they would progress to the exploratory questions as I titled the next section of the lesson. In this section, the questions began to shift to promote more exploratory talk instead of cumulative talk. The questions I asked required more scaffolded thinking or multiple steps for students to reach a response. I wanted students to apply the information presented in the lesson or found online to a real-world or hypothetical situation. Ryan and Deci (2000) described that novel and challenging tasks increase student motivation as well. The need for such questions meant increasing my creative thinking and constructing the different scenarios that would promote exploratory talk. For example, question #20 in Figure 4.4 is an example of a question that would promote exploratory talk.

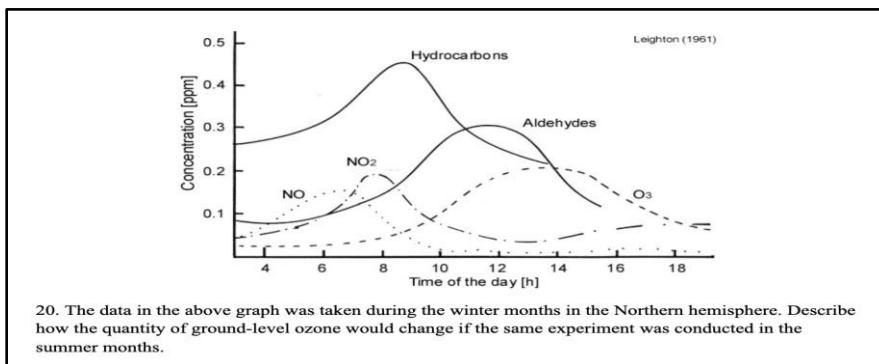


Figure 4.4 Exploratory question example #2

This question could be asked in a way to promote cumulative talk by asking, “Describe how sunlight affects the formation of photochemical smog.” The students could review course-provided resources or search the Internet for an answer. They could simply find an answer, agree, and move onto the next question. However, question #20

addresses the same course content from a different perspective. Question #20 requires the students first to understand how sunlight affects photochemical smog formation. Then the students must apply that knowledge to understand how a change in sunlight intensity during seasons may affect photochemical smog formation. This additional thought process required of students I discovered to be essential in promoting exploratory talk. Suddenly, the students could not just Google the answer or look it up in a textbook. The students had to propose their perspectives to the group and debate the possibilities before finally reaching a consensus as a group. Dialogic exchanges began to take place.

The lesson would end with each group member posting a final post on their discussion board. This final post would represent their final responses to the leading questions and their written responses to the group's exploratory questions. This final post from each student allowed me to review the group's collective progress in thinking and identify individual students' strengths and gaps in understanding to address in the future.

The evolution of group dynamics in a hybrid dialogic classroom

With a new lesson structure planned, my next focus came to the composition of each group. If I wanted students to engage in dialogue, their groups had to support the development of dialogue. To support group dynamics, I had to take on an active listening role in my classroom. As I joined each group's channel on Teams, I listened and joined the dialogue as needed to ask probing questions or provide feedback. I also analyzed the dynamics occurring within each group. Who was leading the conversation? Who was passive in the conversation? Who was not being listened to in the group? I saw part of my role as trying to support and enhance the dynamics of the group. I would ask for a quiet student's thoughts or ask another student to summarize the group's thought process. I

would ask if the group considered everyone's opinions before the group reached its consensus. As the days and weeks progressed, I often reshuffled the groups in a human version of Tetris, attempting to find personalities and dispositions that would complement each other and create more effective groups.

Monitoring group dynamics, especially when the majority of students were online, was a difficult task. With groups secluded into different Teams channels, large segments of time could elapse before checking in on a group. Many teachers who attempted to use small groups placed face-to-face students in groups and online students in separate groups. The separation of students based on learning modality created a significant barrier between the two groups of students. Ava noticed how separating students impacted her learning. She stated that:

“Usually [teachers] would give more attention to face-to-face people because that's just how it works. That's just how human brains work. So when giving a lecture, teachers usually lecture towards face-to-face students and have a deeper connection with them.”

I took a different approach to group students. If numerically possible, I created heterogeneous groups that contained at least one face-to-face student in each group. The heterogeneous composition of the groups provided me the ability to simultaneously monitor each small group's progress, similar to before the pandemic when all the small groups were physically in the classroom. School administrators observed this strategy and shared it with other teachers at our school. Once instituted, the other teachers reported that the functionality of small groups increased. The heterogeneous mix of students in

each group allowed me to improve my ability to monitor, connect, and support each group as they progressed toward learning goals.

Creating effective groups became a critical component of supporting dialogic pedagogy in the classroom. Others had always told me in education that groups should have one high-level student, one low-level student, and one or two middle-level students. This formulaic group construction ignores personality, past relationships, and the background knowledge of students. Instead, I tried to look at the students and who they were and create cohesive groups. Alex shared that initially, finding himself in a classroom that encouraged dialogue was intimidating. Still, as he became more comfortable in small groups and collaboration, “once we started like moving around people and like fitting people that like seem to fit better brains wise with each other.” Alex continued to describe that his feelings of competence increased as a result of his interactions with his group sharing:

“[When] we were mixed into that final group of people who were more confident and better at, you know, expressing our thoughts and ideas and coming to the same conclusion, at least we feel a little, I think, at least for me, it was our more intelligence that made me feel a little bit more smarter.”

These feelings of increased competence can be linked directly with Deci and Ryan’s SDT and can increase motivation in students, one of the objectives I wanted to achieve. Alex’s description of seeing himself as more intelligent also began to reveal the potential for dialogic pedagogy to support students developing an improved secondary Discourse, as Johnston et al. (2011) and Gee (n.d) discussed. Alex’s identity was transforming, and he saw himself as more capable and intelligent due to dialogic pedagogy.

Jennifer also expressed how transitioning to real-time interaction with her group benefited her learning experience. She stated that:

“I feel like because I have to talk to my group, I'm motivated to actually do the work instead of like just waiting and then going to look online for answers or something 'cause I have to do it in the real-time and talk with them, so my motivation is higher.”

Jennifer now had control over her learning and felt a responsibility to her group. As discussed by Deci and Ryan, these two feelings of increased autonomy and relatedness that she now felt increased her motivation.

However, creating groups that could benefit each student was a challenge that, if not overcome, could dramatically affect their learning environment. A few participants noted in their interviews that the functionality of the group limited the benefits of dialogic pedagogy. Ineffective group functioning can occur at the beginning of the year or when the group's composition changes. Alex, for instance, noted that at the beginning of the academic year, when the students first experienced dialogic pedagogy, “it seemed to have been something like really scary.” He continued to state that “I've been geared to like, do a lot of things by myself, so when I did go start, you know when I hear that we were going to do [group work], I was a little bit off-put.” As time progressed, though, Alex did say that his opinion and comfort level changed, as discussed previously. Jennifer also had a similar experience in that:

“Before I started, I was really nervous because I'm a bit like awkward with new people, but I guess as we work in the group, they kind of warms up a bit more, so it's easier to talk to them.”

Transitioning from traditional monologic pedagogy did require a period of adjustment for some students, but they did describe that, with time, those initial anxious feelings faded.

Ava, the straight 'A' and experienced AP student, also commented on how group composition could affect a student's learning. She stated that:

“Sometimes I feel like in one specific group I do so well in, like academically, like my grades are just like skyrocketing and then in another group, I feel like we do good, but my grades are like [ok], and maybe it depends on me too, and my dynamic with the group.”

Cameron also shared that “You can see some students like in my previous group some don't put in as much effort as others do.” Marcus stated how a poorly functional group could be frustrating, stating, “If I'm the only one talking...then it's like I'm not getting too much out of that. 'cause I'm not like bouncing back and forth with someone my ideas.” Many participants highlighted that if the group dynamic does not encourage dialogue, using a dialogic pedagogy can result in a less beneficial learning experience. I began to recognize that creating and facilitating groups would be critical to the effectiveness of dialogic pedagogy.

Nicole's story. No one's experience highlighted the importance of creating effective groups as much as Nicole's. Nicole was an online student who reported having a 3.0 - 3.99 weighted GPA. She identified herself as a 'B' student in all academic courses but earned a 'C' for the year in APES. The 'C' would be a 4.0 weighted score, higher than her perception of her GPA. Nicole is significant because she was the one participant that did not discuss a significant difference between the instructional strategies used in

APES and her other classes. When asked how participating in dialogic pedagogy was different from other classes, Nicole responded that:

“Well, literally today in my AP English class, we had the same thing where we were put into small groups and like you know, do things with English basically, so I mean, it's kind of the same thing where you bounce ideas off of each other, and you see people think.”

During her interview in the middle of the year, unlike other participants, Nicole did not describe classes that were very vastly different in the instructional strategies compared to APES. Her responses were unique as she did not see APES as many other participants noted significant differences between classes.

When asked about how engaging in dialogic pedagogy has impacted her understanding of course material, Nicole just responded that “I know someone from my class, and we might have the same question we might, or I have a like an answer to a question they might have, so it kind of connects you with other people.” There was no discussion of sharing different perspectives, revising understanding, or engaging in any creation understanding through dialogue or commentary representing the theory of dialogism. Nicole’s responses on the collaborative small-groups used in APES reflected what Marcus described small-group work as in other classes: students placed into groups but often chose to work independently, and there is no true collaboration.

When observed in her group, Nicole was often very quiet. During one lesson on solar energy, Nicole did not engage much in the group. The group was provided a hypothetical scenario of three different schools and asked to identify which school was painted a darker color and describe their reasoning (see Figure 4.5).

Three different schools in a northern state school district, let us assume Minnesota, have been studied for their use of active and passive solar energy to supply heating for air and water to the school. Assume the same number of students per school.

	North High School	Central High School	West High School
Square Footage of School	180,000ft ²	180,000ft ²	180,000ft ²
Kilowatt-hours of electricity used per square foot per month	170,000kWh	180,000kWh	190,000kWh
Average air temperature in December inside school	73°F	68°F	71°F

15. Buildings can be painted in different colors to utilize passive solar energy for managing air temperature. Identify which school is painted a darker color based on the data above and describe your reasoning.

Figure 4.5 Exploratory question example #3

At first, the group was very focused on the electricity used by each school and discussed how using electricity would affect the color of the buildings but could not reach any conclusions. Finally, one group member stated that they did not believe that the electricity use was significant. Another group member then proposed an alternative line of thinking to the group asking, “Darker colors absorb heat. So wouldn’t that impact temperature?” The group used this fact to analyze the different temperatures of the buildings then. As they discussed, they noticed that North High School had a higher average indoor air temperature. The group eventually reasoned that because darker colors absorb more heat, the school absorbs more solar energy, heating the school’s air temperature. The exchange was lengthy and was evidence of dialogism; however, Nicole barely engaged in the group’s dialogue and interjected with short “I disagree” or “Yes, that sounds good” type responses.

In her interview, Nicole shared that “usually I just like working by myself.” Her responses indicated that the group could be a significant barrier to a positive learning experience in a dialogic pedagogy. Nicole stated that:

“But for me, like personally, I guess it kind of just depends on the type of people that I'm with. Sometimes I might be like way more like reserved and don't talk as much....like [using a dialogic pedagogy] either helps me or it doesn't, depending on the type of people that I'm with.”

Nicole honestly discussed her perception of engaging in dialogue in a group, sharing that “I find it like kind of scary to talk to people in these like small groups.” She expressed her anxiety, stating that:

“I get nervous to like talk, and I'm like, oh I, I don't want to say the wrong thing. So if it's like the wrong answer, especially in, I don't want to come off like you know ‘she said the wrong answer’ so I can be more like reserved with that, and sometimes it just grows and grows. I'm like, OK, I'll just stay silent instead of giving my opinion on things.”

This fear of being wrong and engaging in dialogue was very different from Marcus’ or Cameron’s perspective in that both discussed how they saw little shame in being wrong and felt free to share their ideas if they were correct or not. Marcus described that he felt comfortable working in his group and “you're bouncing your ideas off of each other, and if you're wrong, you're wrong, and I don't think there's like shame. You're just kind of like OK, and it helps you understand the material better too.” Cameron stated that:

“I feel like the group discussion really does help me as a student because not only is it me just talking, it's other people talking. If someone needs help, I will help

them the best that I can with what I know in the class. And if I need help, my teammates can always help me.”

Nicole did not have the same level of comfort and trust with her group. This lack of relatedness reduced her motivation, using SDT, to engage in dialogue with her group in situations like the question about solar energy. Without engaging in dialogue, she could not benefit from dialogic pedagogy and gain support from her peers beyond her ZPD. Nicole’s struggle highlighted how Bakhtin’s, Vygotsky’s, and Deci and Ryan’s theories interconnect to support student learning. When one aspect is missing, as with Nicole’s feelings of relatedness, the entire system crumbles. Nicole’s experience was unique and provided a different insight into students engaging in dialogic pedagogy.

Nicole shared that she did enjoy the opportunity to “hear other peoples like answers or stuff, [and] it makes me look at things a different way, and that helps.” She also expressed that she is more engaged in the class than others because she knew she would “report back to a group and have to talk to people. I don't want to be like I don't know what I'm talking about it.” Therefore, she put in more work into the class because she shared she would be more likely to skip over information or not read it without discussing the content in small groups. However, Nicole’s progress in the course was not what I believed it could be, and I had to make more changes to support Nicole’s learning.

After Nicole’s interview, I discussed her feelings about her group with her. I asked if there were students she may feel more comfortable with being in a group. We switched her group, and in the following days, I saw an immediate change in Nicole’s engagement. The student who was unwilling to share her opinion was now leading the conversation. In another lesson investigating water as an energy source, Nicole was now

clarifying and explaining to her group members how areas with greater tidal ranges would turn turbines in the ocean with greater force to create more electricity. Examining Nicole’s third-quarter summative assessment (consisting of a multiple-choice and free-response section), grades also showed a change in understanding correlated with her increase in engagement (see Table 4.1).

Table 4.1 Nicole’s Third-Quarter Grades on Summative Assessments

	Unit 7	Unit 8	Unit 9	Unit 10
Overall Percentage	57.5%	63%	65%	80.5%
Multiple-Choice Section	70%	86%	60%	85%
Free-Response Section	45%	40%	70%	76%

While Nicole did well on the multiple-choice section of assessments, she did not have as much success responding to the prompts in the written free-response section of the assessments. However, after switching groups after Unit 8, Nicole began engaging more frequently in the dialogue within the group more, and her ability to respond to the open-ended short answer questions in the free-response section increased. Ending the year, Nicole scored 80% of the possible points on the free-response section of her cumulative mock exam. When asked about the change in the group, Nicole shared that she felt more comfortable with her new group, which allowed her to more freely share her points of view with her group members and revise her understanding as needed. These increased feelings of connection and belonging improved her motivation and engagement. With Nicole more engaged, she interacted in the dialogue and more greatly benefited from the dialogic exchanges. Nicole had a unique experience with dialogic pedagogy, and her

reflection provided insight into how group dynamics can modify the effect of dialogic pedagogy on the student's learning experience.

The effect of new dialogic lesson structure on dialogism.

As I implemented my new lesson structure, I wanted to observe students more frequently engaging in verbal negotiation aligned to Bakhtin's theory of dialogism and supporting each other's progress beyond their ZPD according to Vygotsky's theory of social constructivism. If these actions were present, it should enhance students' feelings of autonomy, competence, and effective grouping, increasing a student's motivation. The new lesson structure should create a positive learning environment for students in a hybrid classroom.

My previous attempt at using discussion boards to promote dialogic exchanges did not work and resulted in simplistic dialogue that did not support students' content knowledge development. Other classes that relied on monologic, teacher-centered lessons in their hybrid classrooms were also not generating dialogue. These lessons consisted primarily of lectures and independent work that did not promote dialogism and a positive learning environment. As Ava described, "In general, most classes are like OK, here are the notes we're going to lecture you for about an hour. You take notes. Hopefully, you retain this information." Jennifer also described how "in other classes, I won't really talk at all because there's no requirement to talk, so I'm kind of just there and we don't interact with anyone, so it's just like you're there, and then you leave." Both Jennifer and Ava described how the lack of opportunity to engage in dialogue prevented them from developing an understanding of the material or feeling motivated in the course due to the lack of relatedness. As Jennifer described, "it's just like you're there." However, by

introducing live video conferencing, grouping students together in separate channels on Teams, and providing both leading and exploratory questions, I hoped to change the learning experience for students.

Alex's experience. As I observed Alex working in small groups, he is a student who likes to discuss ideas and concepts, something he cannot do in all his classes. One example of his use of dialogue to understanding a concept was when the group was attempting to determine how clearing a forest to mine for coal would affect climate change:

Alex: "It would decrease carbon dioxide levels because if there are fewer trees, there is less carbon dioxide in the atmosphere."

Group Member 1: "I think carbon dioxide is absorbed by trees, so if the trees so if they are cut down, carbon dioxide levels will increase."

Alex: "Why?"

Group Member 1: "Because photosynthesis removes carbon dioxide to convert into oxygen"

Alex: "Oh, ok, that makes sense."

Group Member 2: "Yeah, trees remove carbon dioxide to produce sugar, so more trees would lower carbon dioxide levels."

Without his group member's support, Alex may have struggled with understanding how carbon dioxide levels in the atmosphere and photosynthesis are related. He proposed an idea in response to a hypothetical scenario; his group members responded and explained their reasoning. While brief, this dialogic exchange represented dialogism in that through dialogue, Alex and other group members created an understanding of the course content.

Each member now better understood the relationship between atmospheric carbon dioxide levels and deforestation through this exchange.

The theory of dialogism is grounded in the verbal negotiation of voices as they converge and diverge to create meaning. Each voice has the opportunity to revise and refine their understanding as they propose ideas and listen to the response of another voice. Alex identified this verbal negotiation as an aspect he valued in dialogic pedagogy, stating, “you have a thought you know, and if it's wrong, then you get the correction, and then you get to keep that.” Alex’s response is indicative of him proposing an idea or understanding of a concept, listening to an individual’s response to his thought, and then revising his understanding of the concept. Alex’s reflection of his experience with dialogue in APES aligns with Bakhtin’s dialogism.

Ava’s experience. Ava described that engaging in dialogue with her group members improved her retention of the material, stating that “especially if we argue over an answer, I think I remember that answer the most.” She referenced the dialogic debate, a cornerstone of dialogism, frequently in her interview. An example would be one such exchange with her group in discussing the different potential air pollutants in Orlando, Florida:

Ava: “I think it would be nitrogen oxides because there are so many more cars in Orlando than coal power plants.”

Group Member 1: “But if we have catalytic converters on the cars, wouldn’t that stop nitrogen oxide emissions from cars?”

Group Member 2: “Remember, it is not perfect. They reduce but do not stop emissions.”

Ava: “So if there are more cars, then more nitrogen oxides are released.”

Group Member 1: “OK, that makes sense, plus there is only one power plant in Orlando, so the amount of emissions is likely much less than all those cars.”

As the group attempted to understand how a large city like Orlando would impact different levels of different air pollutants, group members proposed ideas, responded to those ideas, and ultimately reached a consensus based on the shared dialogue. The verbal and mental negotiation represented dialogism as each group member attempted to develop an understanding. Ava valued the opportunity to discuss content sharing that “I’m able to again talk to other people and share my ideas with them, so maybe I come up with a hypothesis or something that someone else is like “No, that’s wrong” and I’m like what do you mean?” The recognition that each student’s perspectives were valued represented how Ava had grown to appreciate other voices to develop her understandings, representing dialogism.

Melissa’s experience. Melissa noted that she has “always known that I would like to be part of conversations rather than just listening to like teachers give the information.” Therefore a dialogic pedagogy would likely be very effective in supporting her learning. She described that the opportunity to engage in dialogue in small groups “helps me process the information better and especially since I get to hear other classmates’ like answers and what they think it is so we can talk about it and come to the right answer.” She elaborated later in the interview, describing that engaging in dialogue was essential to support her understanding of course content, stating that “Because I’m not always right with these questions, so hearing their answers and being able to compare

and figure it out together is important.” Her commentary on using others’ ideas to compare to her own and revise her understanding reflects Bakhtin’s dialogism and the creation of understanding through a verbal exchange. During one lesson on solar energy, Melissa and her group were attempting to understand and differentiate between different solar energy systems:

Melissa: “For #9, I think it’s an active solar system.”

Group Member 1: “I don’t. I think it is solar electric because it is generating electricity.”

Melissa: “Oh, don’t active systems generate electricity?”

Group Member 1: “No, active systems heat water or air by absorbing sunlight, not generate electricity.”

Melissa: “Oh, ok, that makes sense. So active solar systems are used to heat air or water, and PV cells create electricity.”

This exchange allowed Melissa to propose an idea that her group member countered and provided an alternative explanation. Melissa was then able to follow up and ask for more information that the group member could provide. Melissa was then able to revise her understanding of different solar systems based on the information provided by her group member. This exchange supported Melissa’s belief that engaging in dialogue helps her understand the information by comparing what she knows to other students and making mental revisions of knowledge.

Melissa described that the opportunity to engage in dialogue is an opportunity to “getting to actually understand the answer rather than just get the answer.” In a monologic pedagogy, she was passively receiving information. In a dialogic pedagogy,

she saw herself as part of the information, which changed her perceived role in the learning process, much like Freire described. Dialogic pedagogy has increased her learning in her mind because “I’m a more like active learner and if it’s just information, just being like said to me rather than me being involved, I don’t pick it up.” Additionally, the opportunity to engage in dialogue in small groups has increased her motivation “because now that I’m sharing answers with people, I want to get them right and not embarrass myself.” Increased competency levels, a result of greater comprehension, and autonomy, responsibility for her learning, increased her confidence according to Deci and Ryan’s SDT.

Cameron’s experience. Cameron found that a dialogic pedagogy provided a different learning experience than he experienced in other classes. He stated that “Being able to talk to other students, I get a better grasp on what we’re learning.” He attributed this to the fact that when teachers use a dialogic pedagogy:

“you get a lot of perspectives on what you’re learning about other peoples like their thoughts and how they view the lesson in the curriculum... in a sense, it’s not just what we learn; it’s what our classmates learn. We can hear, and we can discuss it and talk about it.”

The exchange of ideas from varying perspectives was a key component of Bakhtin’s dialogism. Understanding and meaning are a result of the heteroglossia that words accumulate over time for individuals. Cameron’s reference to building on each other’s ideas to better understand the material presented in the course represents dialogism. He stated that in small groups:

“We build upon our ideas. We come to a conclusion, and with that, with those ideas that we have that help us answer questions that we have...it's all their ideas put together into one, not just one person.”

Participating in small collaborative groups and engaging in discussion helped him engage in the course and better understand the course material. Cameron described how often he would think back to his group's discussions on course material during assessments. These discussions were responsible for helping him understand and retain the course content. It was not the teacher who provided him an understanding; he thought back to his small-group discussions as his reference for learning.

Marcus's experience. Marcus shared that before the pandemic, “other classes don't really like, actively put you in groups, I guess.” However, group work in other classes became less frequent for Marcus with the pandemic and hybrid learning. If teachers did implement small groups, the dialogue within the group was almost non-existent, according to Marcus, who shared that “If you're online like no one is really forcing you to like talk in your groups. So if you're if you like, let's say you're in a group and it's all online people, then like no one will talk.” Marcus' experiences with school consisted primarily of lectures and group work representing collections of students working independently. Hybrid learning for Marcus was not much different in many courses.

Marcus expressed his boredom during lecture-based classes. As a face-to-face student, I would often observe him finish his work quickly and then begin to fidget or multitask. Even when I attempted to provide an overview of the lesson, lasting mere minutes, Marcus' attention waned. I could only imagine how little engagement Marcus

would have in a monologic pedagogy. However, when we broke into small groups in APES, I observed Marcus' demeanor change entirely. Instead of staring through the window or browsing websites, Marcus opened Teams, joined his group's channel, and immediately engaged in dialogue. When asked in his interview if group work could be considered fun for him based on my observations, Marcus responded:

“Yeah, you're bouncing your ideas off each other, and if you're wrong, you're wrong, and I don't think there's like shame. You're just kind of like OK, and it helps you understand the material better too.”

Marcus believed that he retained the information more than other classes and improved his understanding of the content because of the opportunity to share and revise ideas. He described that by engaging in dialogue with his group, “you really retain the information. I feel like 'cause you're saying it out loud. So you like, you remember it more. It does make it easier 'cause you're like talking about it.” Marcus shared multiple benefits of engaging in dialogic pedagogy in his interview, including listening to others' perspectives and sharing his own to progress his learning. Instead of just passively listening, students were placed into positions of power in small groups to build each other's understanding through dialogue.

Summary. Alexander (2008) described that students must be permitted the opportunity to create meaning of concepts from their perspective and understanding of language through a dialogic struggle between voices. The use of more exploratory questions, live video conferencing, and small groups created dialogic opportunities for students to support creating their understanding of course content. All participants,

crossing demographic and academic categories, discussed that they could better understand course material through dialogue in their small collaborative groups.

The exploratory talk the students engaged in was evident to others that entered the classroom. During one observation, an administrator remarked, unprompted, that he found it very interesting and encouraging how students “proposed hypotheses in response to the hypothetical situations, discussed the merits of each and revised their hypothesis accordingly” (C. Davis, personal communication, March 31, 2021). As he watched the face-to-face students interact with the online students through Teams, he could see examples of exploratory talk and dialogism: students analyzing different scenarios and attempting to create meaning through verbal negotiation. The evolution of the lesson structure had created more opportunities for students to engage in exploratory talk and demonstrate the verbal negotiation that underlies Bakhtin’s dialogic theory.

The effect of new dialogic lesson structure on social constructivism.

Engaging in dialogism was not the only aspect that supported student learning resulting from my revised lesson structure. Working in small collaborative groups also allowed Vygotsky’s social constructivism learning theory to be applied. Vygotsky’s (1978) ZPD describes the space between what an individual can do on their own and what they can do with the support of others. Wegerif (2013) believed that dialogic pedagogy could support students in progressing through their ZPD. All the participants in the study described instances where the opportunity to engage in dialogic pedagogy allowed them to gain support from others and, through dialogue, were able to learn the course material more effectively than if they lacked social support in their learning.

By grouping students in small groups on separate Teams channels, I wanted to create the support structure necessary for students to progress through their ZPD. Marcus described a barrier to gaining the support he needed to progress his learning in traditional face-to-face classrooms or hybrid classrooms. He stated that “I feel like if you're just reading slides, you might have a question you might not understand something you can't really, yeah, you can ask you like the teacher, but I feel like it's a lot more comfortable just asking people your age.” Alex also expressed his frustration with gaining support in the hybrid learning environment. Due to teachers having two groups of students (face-to-face students and online students), he often felt that his questions were overlooked as teachers attempted to provide lectures, respond to face-to-face students, and monitor online students. Many students discussed disconnection because of their status as online students and did not feel supported in their learning progress.

Returning to Mercer and Littleton's (2007) different types of talk, cumulative talk and exploratory talk, both support social constructivism. Students agreed with each other, added information to other students' thoughts and ideas, and used dialogue to develop an understanding of the course material. The students used cumulative talk to explain concepts to one another, provide affirmation to each other's ideas, and reassure group members that they were progressing in the right direction. These examples of cumulative talk helped students become more confident about their learning and supported their progress through the ZPD.

Nicole's experience. Nicole provided a specific example of how her group was able to help her progress through her ZPD. She recalled one lesson where math was involved, and she honestly stated during her interview that “I really don't like math, and I

kind of like tune out sometimes.” However, when confronted with a situation that involved math, she gained support from her group members as they explained how to complete the mathematics to address the problem. Nicole stated:

“In a smaller group, they can really break down things easier. Sometimes I find myself like, I understand it better when it is explained from a student, like someone my age, more than with a teacher. They will say the same thing, but I'm like, Oh my God, I understand it from this person.”

This instance shows Nicole's progression through her ZPD with the support of her peers. The structure of dialogic pedagogy and students' ability to quickly ask each other in small groups allowed them to have greater levels of support than a whole-class, monologic lesson structure.

Jennifer's experience. Jennifer reflected that in contrast to a focus on listening and memorizing, dialogic pedagogy “does help me understand, so I feel like that does make like my scores in general higher 'cause I actually know what I'm talking about.” Having the opportunity to interact with classmates and discuss course content was highlighted in one of her responses, with her sharing that “I feel like I understand more because I was saying how [in other classes] I would just be on my own and confused” but when the provided opportunity to interact in a small group “if somebody else understood something, I'd ask the group, and they would explain it to me in the best way that they could.”

This level of social support represents social constructivism and individuals helping each other progress beyond their ZPD. She recalled a particular example when

students were attempting to determine which pollutant may have been responsible for contaminating a water supply, with Jennifer stating that:

“One of my group members would say like mercury, and I would say lead. So then we would like to try and work together and see if there's like any agreement we can come to and see why that would be the best answer.”

In this example, the students were attempting to determine where a coal-burning power plant might be located based on different metal concentrations in the soil. I observed the group discussing this:

Jennifer: Well, what metal is released by burning coal? Is it lead or mercury? I think it is lead.

Group Member 1: Would it be [location] B because it has the most mercury?

Group Member 2: Yes! Because burning coal releases mercury.

Jennifer: Oh, ok, so if it is closer to the power plant, there will be more mercury because it is released by burning coal.

Group Member 1: Yes, because burning coal releases mercury, so the closer it is to the power plant, the more mercury will be in the soil.

Jennifer had a misunderstanding about the pollutants released by the combustion of coal. Progressing through this exercise, Jennifer was able to engage in a dialogue that helped her develop a better understanding of the pollution associated with burning coal through the support of her group members. This exchange represents dialogism in that individuals proposed ideas and revised their knowledge due to the verbal discussion. It also represents social constructivism because Jennifer gained support from her peers, who understood the material and helped her progress beyond her ZPD.

Marcus's experience. When observing Marcus' group, I also saw how the group could support each others' learning and progression beyond the ZPD. In one lesson, as I joined the group's Teams channel, they were attempting to understand how geothermal energy sources could produce electricity:

Group Member 1: "I don't get that....what is a closed system?"

Marcus: "If you look at Slide 34, see how the water is pumped into the Earth in a pipe, heated, and then returns to the surface?"

Group Member 1: "Yeah..."

Marcus: "It is a closed system. The water enters Earth, is heated, and then returns to the surface. It is a closed system because the water never leaves, just gets heated for use."

Group Member 1: "Oh, ok, that makes sense, so you could use that warm water in a home?"

Marcus: "Yes."

As Marcus shared that it can be uncomfortable to ask questions in a whole-group setting, he described that "I feel like it's a lot more comfortable, just asking [questions to] people your age." Due to the small-group environment, Marcus' actions indicated how students could support each other beyond their ZPD compared to a whole-class setting where a student may not gain the level of support they need creating a lost learning opportunity.

Cameron's experience. Cameron also noted how the social aspect of dialogic pedagogy supported his learning. Cameron stated that:

“I feel like the group discussion really does help me as a student because not only is it me just talking, it's other people talking. If someone needs help, I will help them to the best that I can with what I know in the class. And if I need help, my teammates can always help me.”

In addition to supporting his engagement and learning, Cameron saw APES as a place to freely explore concepts, be supported in his education, and support others in learning.

Ava's experience. Ava noted that having multiple perspectives in each group also enhances her experience in the course. She stated that “because people have different levels of like skills and different levels of learning and when you place people into a group they can help each other out.” Ava's identification of students helping other students is a reflection of Vygotsky's social constructivism.

Being a high-achieving student, Ava often was a leader in her small group, helping others. When observing her group, Ava was often the first to propose ideas, respond to other's ideas, and offer guidance to support other students to fill in prior gaps in knowledge. One such example was when students had to examine a topographic map to determine the optimal location to build a hydroelectric dam in one such situation. When other students did not know how to read the map, Ava demonstrated how to read the map providing significant support to her group members. This peer support that Ava showed allowed others to progress beyond their ZPD, representing social constructivism.

Summary. Creating a new lesson structure to implement dialogic pedagogy created more opportunities for students to ask questions, receive feedback, and progress beyond their ZPD. This new lesson structure helped students better understand the course material than a whole-class, monologic lesson structure where the students, like Alex and

Ava, discussed a disconnect between students online and in the classroom. The creation of small groups, where students could engage with each other through live video conferencing, provided the social experience that Vygotsky believed was critical to learning.

The effect of new dialogic lesson structure on motivation.

Ryan and Deci (2020) described three factors influencing an individual's confidence: autonomy, competence, and relatedness. An individual's perceived level of each factor directly affects their overall motivation towards a task (Ryan & Deci, 2020). My new lesson structure promoted dialogism and social constructivism and could also positively affect all three criteria increasing student motivation creating a more positive learning environment.

In my previous lesson structure using discussion boards, student motivation dropped quickly. The lack of group interactions, the lack of individual support, and the requirement of posting replies resulted in students providing little more than compliant participation. Other hybrid classes were not having a much different impact on student motivation to learn either. Ava, a model student, admitted that "in an online setting, everyone wants to just shut down their cameras and go to sleep and have no motivation to go to school." The long periods of lecture and lack of support led students like Jennifer to feel frustrated. She stated that "When they just give you information, in my opinion, there's a lot of stuff for me to memorize which I really don't memorize very well." Ava described that she was not genuinely learning in most of her classes but instead stated:

"I don't have to work for it. I don't have to do anything. It's just like I'm memorizing what they're giving me, which isn't really learning it, and after I take

the test, I'm going to forget it. That's what's going to happen. That's what happens with most kids.”

These types of responses do not represent students’ confidence in their ability to develop mastery. They see it as memorization, not mastery. Students felt that a monologic pedagogy, especially in a hybrid learning environment, was not supporting their learning, and they could not achieve success. This lack of competence affected their motivation.

It was not just a lack of competence that affected their motivation either but relatedness as well. Cameron felt no connection to the classes stating that “I feel like nowadays most classes, we're just kind of stuck just like at home. Then we just maybe turn camera on, barely participate.” It was not just Cameron either who discussed that being online resulted in feelings of isolation but also provided an opportunity to truly disengage from the class because of the lack of proximity. Marcus stated that “If a teacher just delivering content, it is really boring, especially if you don't like the subject, then it's like you're not going to be paying attention. You're going to be on your phone.” Alex stated that he found himself in many of his classes “[on] my phone or like doing multitasking or you know, find something else to do.” Hybrid learning created a new challenge for teachers because of the need to develop strategies to motivate students to engage in class instead of multitasking, playing with phones, or just sleeping as students described.

Finally, students felt they had no autonomy over their learning in the hybrid learning environment if the teacher used a monologic pedagogy. Melissa stated that “Most of my teachers just talk, and I have to listen.” Melissa’s word choice in “having to listen” is important and reinforces Freire’s concept of an oppressive classroom power

structure. Teachers position themselves as the natural opposite of students' perceived ignorance. Jennifer had a similar sentiment stating that "I feel like I'm not actually learning because like it's just there, we're not really understanding like why we just know it, it's just there...just because they said so." Students learn because "they said so." Students see teachers, not themselves, as controlling their learning. Without feelings of competence, relatedness, and autonomy, students felt little motivation to learn.

Increased competence. One aspect of Ryan and Deci's SDT is competence, the sense that an individual can progress and develop mastery in a situation (2020). The scaffolded lesson structure of beginning with leading questions to introduce a student to the course content and the support of MKOs in their small group would positively impact a student's competence and provide more substantial feelings of perceived ability.

Alex spoke to the fact that as he progressed in the course, he felt that he was "becoming a better student and getting better grades and all that." Melissa described that she was "getting to actually understand the answer rather than just [get] the answer." Nicole also expressed that engaging in discussion has made her extend her thinking beyond just the right answer but why the answer is correct. She stated that "I'm not gonna just have to be like "oh it's B" I'm gonna be like "it's B because..." [dialogue] helps me explain myself more."

Jennifer, in particular, felt greater motivation that emerged from more significant feelings of relatedness and competence, two of the tenants of SDT. The connections she made with her group, the sense of belonging in her group, and her perception that she could be successful in the course all increased her perceived level of motivation. She described that "I feel like because I have to talk to my group, I'm motivated to actually do

the work instead of like just waiting and then going to look online for answers.” Her feeling of motivation is different compared to classes that do not provide an opportunity to engage in dialogue because “when I don't have to actually collaborate, I'm not really motivated 'cause I'm like ‘I'll do it later since I don't have to do it right now.’” In addition to being more motivated to engage in the course, having group members has increased her understanding, with Jennifer reflecting that:

“Being alone, like I said, makes you like you'd be more confused and you'll spend like more time, just like overthinking things and then probably getting it more wrong than like if you discuss it together. It kind of gives you more options, so I think it makes learning a lot like easier.”

Although she perceived herself as having a strong academic background, Jennifer said that the opportunity to engage in discussion allows her to move “beyond understanding [and] I feel like that does make like my scores in general higher 'cause I actually know what I'm talking about.” Jennifer's sense of competence increased due to dialogic pedagogy and my lesson structure and increased her motivation in the course.

All participants expressed similar concepts that demonstrated that being placed into small groups and discussing information resulted in helping them develop a greater level of understanding than if they were working independently or just listening to a lecture. Alex expressed a substantial change in how he viewed himself, stating that engaging in dialogic pedagogy “made [him] feel more of an advanced student that I could have been...I unlocked potential I didn't know I had working with these kids.” The participants’ feelings of an increased ability to learn and master the information presented in the course because of dialogic pedagogy helped increase student motivation.

Increased relatedness. Ryan and Deci's (2020) SDT was the perception of relatedness, an individual's sense of belonging, and connections with others. The ability to connect with others represents a deficiency in online and hybrid course settings (Raes et al., 2020). Students often have fewer opportunities for engagement in these settings than traditional face-to-face settings resulting in feelings of disconnection (Raes et al., 2020). According to SDT, students who feel greater relatedness would feel greater motivation levels, which is pivotal to examine in this study. Putting students into small collaborative groups and allowing them to interact in discussion helped the participants build their relatedness and increase their motivation in the course.

Ava described that after working with her group for many weeks, their group had become a "little community, and you have to be part of it. You can't just be the little house shut down in the corner." Alex had similar emotions sharing that having group dialogue "made me feel like I was actually in a real class like I haven't had that kind of fun or that kind of like interaction in such a long time. So that's what makes me feel motivated." Small groups provided connections for students, especially when the online experience could be isolating, and the opportunity to feel bonded with each other and the class, thus increasing motivation.

The effect of the new lesson structure and dialogic pedagogy had a significant impact on Cameron's learning experience. At the beginning of the year, Cameron felt detached from the class and isolated at home. As the lesson structure changed, so did Cameron's attendance and engagement. Cameron stated that:

“What I love about us having to be in groups is that we are we're engaged in the class, we're not just laid back in here, and you talk, like all the classmates can talk and can discuss about what we're learning.”

His feelings of connection and belonging increased, and his motivation increased as well. Cameron's attendance became routine, his grades increased, and while he achieved a 'C' in the first semester of the course, he achieved an 'A' in the second semester of the course. Cameron needed a sense of relatedness to be motivated and unlock his potential to learn in the course.

The bonds that some groups built were quite strong as well. Jennifer shared that she felt that she could “kind of depend on my group in a way just like for help. I still feel like I have like my independence like as a learner like I still have my own ideas and stuff, but I kind of depend on my group to help me if I feel like I'm lost.” A sense of community, trust, support, and, dare I say, fun emerged from the groups throughout their time together. As the academic year wound down, the classes reached their last day of group work. As I watched the students in the classroom and entered different Teams channels, I saw individuals thanking each other, recalling stories from the year and laughing, and discussing how they would miss each other. I had not seen that type of connection in students in a traditional academic year before. These students, physically separated and so easily disconnected from each other, had developed relationships and a sense of belonging with each other. Creating opportunities for small groups to engage in dialogue and support each other in learning had formed strong bonds and increased the perception of relatedness for students increasing their motivation.

However, we cannot forget Marcus and Nicole's story in this regard. While they had developed strong connections in their groups by the end of the year, they also provided an example of how ineffective grouping can inhibit learning. As discussed in her experience with dialogic pedagogy, Nicole did not feel connected with her previous group. She felt anxious to share her thoughts and struggled to build connections, reducing her motivation and engagement, and ultimately her learning. This example helps to signify the importance of this aspect of Ryan and Deci's SDT in that for a student to be motivated, they must have that connection and feel a sense of belonging. Until a teacher fulfills the student's need for relatedness, a student will not be as motivated and less likely to engage and benefit from a dialogic pedagogy.

Increased autonomy. Ryan and Deci (2020) described autonomy as the sense of ownership and initiative individuals feel towards a task. In a monologic pedagogy where the teacher is the primary source of information and is the center of instruction, dependency replaces autonomy. Jennifer described that "we are just given the information in these classes," and Ava stated that "I don't have to work for it. I don't have to do anything." Melissa reflected on the experience poorly, saying that "I'm just sitting there listening to a teacher." The teacher owns the information and imparts it to the students. The students feel little ownership or initiative.

In my new lesson structure, the release of control over the lesson's progress to the students in their small groups would provide them greater autonomy over their learning. Students had the opportunity to discuss the information with each other instead of just receiving it from a teacher. Students now controlled how they would progress through the

questions, questions they had, and conversations they wanted to have in their small collaborative groups.

Cameron pointed out how greater autonomy increased his desire to be involved in the class, sharing that “I’m not just gonna like sit there and say let [his group members] talk. I want to engage because what I want to do is learn.” Melissa had similar feelings stating that because of the use of dialogic pedagogy, “you want to be able to like contribute to the discussion, so you’re obviously more motivated to understand this information so that you can give your input rather than just listening to other students.”

Ava noted that increased autonomy allowed students to personalize their learning more. She stated that more autonomy “helped me go maybe a little bit beyond what even [the course gave] us to learn because just being able to talk in small groups, you know some people can share their information that they know just far beyond what we’re learning in class.” Cameron also noted this enhanced ability for students to personalize their learning because students are allowed to discuss the topics presented more openly, providing students the opportunity to connect their learning to prior knowledge. He stated that open discussion “helps like connect [course content] to other things. Like if we have, uh, if we’re talking about a certain topic in class, we can relate to past things that we’ve learned or what we want to learn. And it just helps me engage more in the lesson.” Students were no longer as limited in their pursuit of knowledge but had much greater freedom to be authors of their learning.

Alex described that the use of a dialogic pedagogy “just made me want to be in the class,” and he found himself preparing for class ahead of time, unlike other classes,

by previewing the information. As the course progressed through the year, Alex said that this class has become “more like me doing like a passion thing almost” than a class.

Each of these participants’ responses indicated that instead of having a passive role in learning, a dialogic pedagogy created a desire to be involved in the learning process. They wanted to take ownership of their knowledge and be involved in the lesson, like Cameron and Melissa discussed, instead of just receiving information. Alex spoke about feeling more initiative to engage in the lessons describing that unlike in classes that use a monologic pedagogy, using a dialogic pedagogy made him want to engage in the class instead of engaging in behaviors that distracted him from learning. Teachers who create opportunities for students to become involved in learning will increase their student’s feelings of autonomy in the learning process and motivate them to engage in the lessons.

Summary. The revised lesson structure promoted more significant dialogic exchanges between students and provided more support for students as they progressed beyond their ZPD. These two student actions increased students’ feelings of autonomy, competence, and relatedness. They increased student motivation, aligned with Deci and Ryan’s SDT, compared to my initial attempt to implement a dialogic pedagogy through discussion boards. Students expressed that their level of motivation was significantly enhanced in my revised hybrid APES course in comparison to my initial lesson structure and other hybrid monologic courses that they experienced.

The effect of dialogic pedagogy on the student learning experience.

The students who participated in the study described that they developed a greater understanding of course material and felt greater motivation due to dialogic pedagogy in

APES than their other hybrid courses that often relied on monologic pedagogy and teacher-centered instruction (Table 4.2).

Table 4.2 Participants' perception of the learning experience

	Average
Prior to this class, how would you quantify your feelings of personal satisfaction with the school as a whole	2.4
How would you quantify your feelings of personal satisfaction with this class?	4.8
How would you quantify the level of motivation you feel in this class?	4.28
How would you quantify the level of motivation you feel in this class compared to other classes?	4.57
How would you quantify the level of engagement (the degree of attention, curiosity, interest, optimism, and passion) that you feel in this class?	4.71
How would you quantify the level of engagement (the degree of attention, curiosity, interest, optimism, and passion) that you feel in this class compared to other classes?	4.85
How would you quantify the learning experience you have in this class?	4.71
How would you quantify your learning experience in this class compared to other classes?	4.87

The positive learning experienced by students was not limited to a particular demographic or academic background either. I invited fifteen students to participate in the study; seven students chose to participate. The participants represented various demographic groups with individuals representing different genders, ethnicities, grade levels, economic status (student qualifies for Free Reduced Lunch), and learning modalities (Table 4.3). The use of dialogic pedagogy should be an inclusive practice and

empower students who are often disenfranchised (Segal et al., 2017a). Therefore, the demographic variation of the participants was an essential aspect so that the data represented a greater variety of perspectives on the experience of engaging in dialogic pedagogy in a hybrid course.

Table 4.3 Participant demographics

	Modality	Age	Gender	Ethnicity	Grade	FRL Status
Alex	Online	16	Male	Latino	11th	Yes
Ava	Online	16	Female	Latino	11th	No
Cameron	Online	17	Male	Latino	11th	Yes
Jennifer	Online	16	Female	African American	11th	Yes
Marcus	Face-to-Face	17	Male	Latino	12th	Yes
Melissa	Online	16	Female	White	11th	No
Nicole	Online	17	Female	White	11th	No

Participants also represented a variety of academic backgrounds. The weighted GPA accounts for the academic grade increased by a difficult factor (honors courses are weighted +1, and AP courses are weighted +2). Participants ranged from the maximum of 6.0 - 5.0 to lower ranges of GPA 3.99 - 3.0. Participants also reported a variety of experience in AP courses, the average grade they receive in AP courses, the average grade they receive in science courses (that may or may not be AP courses), and their final APES grade was reported (Table 4.4). Previous research has shown that students who experienced academic success in online classes were students with strong educational backgrounds (Park, Martin, & Lambert, 2019). Therefore, finding diversity among the academic background of the participants was essential to gain a greater perspective about

how the use of dialogic pedagogy in a hybrid course was affecting students of a variety of academic backgrounds.

Table 4.4 Participant academic background

	Weighted GPA	AP Classes	AP Grades	Science Grades	APES Grade
Alex	3.99 - 3.0	2-3	B	C	B
Ava	6.0 - 5.0	6+	A	A	A
Cameron	4.99 - 4.0	4-5	A	A	B
Jennifer	4.99 - 4.0	4-5	A	B	A
Marcus	3.99 - 3.0	6+	C	B	B
Melissa	4.99 - 4.0	2-3	B	B	B
Nicole	3.99 - 3.0	2-3	B	B	C

As the COVID-19 pandemic forced teachers to rapidly shift from face-to-face instruction to various types of remote learning, creating a positive learning experience became a new challenge. Having begun implementing a dialogic pedagogy in a face-to-face format during the previous academic year, I had to rethink how to facilitate a dialogic environment in a hybrid setting. There were two student actions that I wanted to see my students engage in: dialogic exchanges aligned with Bakhtin's dialogism and social constructivism as described by Vygotsky. My first attempt at using discussion boards to facilitate these two actions was unsuccessful as few examples of dialogue or social constructivism occurred. However, as I revised the lesson structure, I observed examples of verbal negotiation among students and progression through students' ZPD. Students described how these actions significantly impacted their ability to understand and retain the course content and improve their learning experience compared to other

hybrid and traditional learning experiences. Additionally, as a result of these two student actions, students reflected that they experienced more significant levels of autonomy, competence, and relatedness that increased their motivation through the lens of Deci and Ryan's SDT. The lesson structure created to facilitate dialogic pedagogy in a hybrid APES course enhanced the students' learning experience.

CHAPTER 5

SUMMARY

This study investigated students' lived experiences participating in a hybrid APES classroom in which a dialogic pedagogy was employed. The initial problem of how a teacher could implement dialogic pedagogy into a hybrid course and its effect on student learning led to the research question: How does a dialogic pedagogy affect students' learning experience in a hybrid Advanced Placement Environmental Science course? This action research study addressed the research question through the following research objectives:

1. To understand how the experience affects student understanding and application of course content.
2. To understand how the experience affects student motivation.

The investigation of the research question and the study's objectives used qualitative methods to collect data from student participant surveys, semi-structured interviews, and observations. These data sources allowed me to analyze the lived experience of APES students engaging in dialogic pedagogy in a hybrid learning environment through the theoretical lens of dialogism, social constructivism, and self-determination.

Summary of research findings

An analysis of the data strongly suggests that using a dialogic pedagogy in a hybrid APES class positively impacted the student learning experience. Implementing a dialogic pedagogy in a hybrid learning course provided an opportunity for students to

increase their understanding of course content, have greater levels of support beyond their ZPD, and increase their motivation. I observed, and the students reflected on how they used dialogue and exploratory talk, aligned with the theory of dialogism, by sharing their thought processes, listening to others, participating in verbal negotiation, and revising and enhancing their understanding of the course content. Students engaged in the centrifugal (divergent) and centripetal (convergent) thought processes that reflected students verbally negotiating and developing knowledge as they sought to understand new concepts.

The students also discussed that being in small collaborative groups allowed them increased support in their learning as they could ask for and receive guidance from their peers to progress in their learning beyond their ZPD. A greater sense of autonomy, competence, and relatedness emerged due to dialogic pedagogy, causing increased motivation in the students to engage in the course. Overall, the student participants discussed that dialogic pedagogy created a positive learning experience in the hybrid learning environment.

Suggestions for future research

While this action research study focused on using dialogic pedagogy in a hybrid learning environment, schools will transition back to face-to-face instruction in Central Florida in the 2021-2022 academic year. Additional research studies could focus on how dialogic pedagogy impacts the student learning experience in an APES course in a physical classroom. The physical presence of all the students could potentially affect the dynamics of the groups and possibly impact students' learning experience.

Another area of research that I or others could conduct into dialogic pedagogy is the English language learner's learning experience (ELL). While I did seek ELL participation in this study, this study included none (my one ELL student declined to participate). As the number of ELL students increases in classrooms, especially in Central Florida, knowledge about the learning experience of these students will become increasingly valuable to support their learning.

A similar investigation could focus on Exceptional Student Education (ESE), which includes students with learning disabilities. Again, I did seek ESE student participation in this study, but no ESE students (1 student) chose to participate. Investigating how dialogic pedagogy affects ELL and ESE students' learning experience, understanding course content, and motivation would be valuable information. Schools and teachers continue to look for ways to support ELL and ESE students.

Reflection and action plan

Shifting the power structure in the classroom. Implementing this action research study has been a transformational experience. Entering the teaching profession through an alternative teacher education program, I had no training in teaching or learning. For many years I replicated how I was taught back when I was in high school and believed that this represented effective instructional practice. My classes revolved around the use of lectures, with some other activities interjected periodically. My classroom resembled a traditional classroom with students in rows of desks, notebooks out, pencils in hand, and myself at the board with a slide deck of information ready to disperse for their benefit. I was in direct control as a leader in my classroom.

During my research study, I have attempted to transition my classroom from a monologic, teacher-centered pedagogy to a dialogic pedagogy. Reflecting on how leadership, control, and pedagogical decisions are associated, I have realized that a critical part of that transformation was my approach as a leader in my classroom. In monologic classrooms, the teacher is the primary contributor to the classroom discourse (Nystrand, 1997). The teacher is often lecturing to students, or they are completing individual seatwork (Nystrand, 1997). This monologic, teacher-centered approach characterizes Freire's banking system of education. In a banking system of education, teachers fill students with knowledge and position students as passive, docile depositories of information; the lack of power held by the students results in their oppression (Freire, 1993). This system places teachers in a vertical, top-down leadership approach where the leader-leader directs the student-followers.

The situational approach to leadership could be applicable in a monologic classroom. In this approach, Northouse (2019) describes that leaders must first analyze their followers' developmental level from a D1 level, marked by low competence and high commitment, to a D4 level, characterized by high competence and high commitment. Once the followers' development level is determined, the leader prescribes one of four leadership styles from S1 directing (high directive and low supportive behaviors) to S4 delegating (low supportive and low directive behaviors) (Northouse, 2019). Freire (1993) described that teachers often consider students' ignorance as absolute to justify their existence and importance. Therefore, a teacher using the situational approach with a monologic pedagogy would likely see their students as D1 followers who have little competence and require an S1 directing leadership style. In a

classroom, this directive S1 style probably includes the teacher directing students on how to learn, what to learn, and when to learn it by the teacher in firm control. There is a clear power structure with the teacher having complete authority and the students as passive recipients of instruction.

However, there is an open and shared dialogue between all classroom members in a dialogic classroom as students' actively build their understanding of course content (Farooq & Benade, 2019). In this dialogic approach, the teacher's role is to facilitate, not direct, the students' progress towards learning goals. This approach provides autonomy and provides the students' authorship over their learning (Matusov & Miyazaki, 2014). As Johnston (n.d.) describes, the adult is not the only teacher in the classroom. I created a space where my voice was not dominant, which Cameron noticed, stating, "you talk, like all the classmates can talk and can discuss about what we're learning." The power to introduce knowledge, question others, evaluate responses, and create new understanding is to be shared among all members of the learning community. When a power shift in a classroom occurs, it recognizes students as competent and co-creators of knowledge (Freire, 1993). Freire (1993) describes that orienting students as co-investigators in dialogue and learning with the teacher creates educational freedom and empowerment for the students, reversing the oppression of the banking system of education.

Traditional leadership approaches that perceive leadership in a vertical plane would not be applicable in a dialogic classroom. The leader is not in absolute control and directing followers, but rather is empowering and supporting the followers as they work towards common goals. Reflecting on implementing dialogic pedagogy, I recognize the relationship between myself, the leader, and my students are critical to the learning

experience. Therefore, when I consider leadership approaches that would support dialogic learning, I believe that servant leadership would be an applicable leadership approach.

In the servant leadership approach, leaders serve the greater good of their followers and society (Northouse, 2019). Servant leadership is opposed to more traditional leadership styles, where leaders focus on maximizing their own personal or organizational interests instead of their followers (Lu, Zhang, & Jia, 2019). In the servant leadership approach, leaders are responsive to their followers, empathize with them, and support them to help them reach their full potential (Northouse, 2019). Followers do not follow the leader towards their goals; the leader provides the support needed for followers to work towards goals. This different approach to leadership mirrors the shift from a teacher-centered, monologic classroom, where the teacher directs the students, to a student-centered, dialogic classroom where the teacher supports the students as they work with greater autonomy towards learning goals. As I implemented dialogic pedagogy, I saw a shift in my role. I became an active listener and asked more questions that acknowledged the students' thought processes and encouraged them to deepen their understanding. I was no longer telling students what to learn or how to process it, but I was responsive to their needs and promoted their personal development of knowledge.

My role as an active listener also aligns with the concept of the teacher engaged in a simultaneous, although different, dialogue with the students when using an instrumental dialogic approach (Matusov & Miyazaki, 2014). My role is to listen to students actively, support their learning through the use of additional questions, and improve my “pedagogical knowledge about how to teach better — e.g., how the teacher can address better students' old, known, and new, emerging, misconceptions” (Matusov & Miyazaki,

2014, p. 7). A servant leader focuses on learning how to support their followers, engage in a dialogue with them, listen to them, and address their individual needs to help them succeed.

Previous research has analyzed using a servant leadership approach in classrooms, providing a model for utilizing this approach while implementing a dialogic pedagogy. Using the servant leadership approach emphasizes student development and student welfare above the teacher's personal goals (Noland & Richards, 2015). As Stein (2020) described, each student requires individual attention to succeed, and classrooms cannot be seen as simply collections of students for the teacher to direct as a whole. Teachers that see students as individuals and pay attention to their concerns, fears, and goals and provide support accordingly are more effective (Stein, 2020). Attempting to create a student-centered, dialogic classroom requires me to shift my leadership approach. I must acknowledge each student as an individual, with individual needs, that I must place above my own needs and welfare as I support, instead of directing them towards their goals.

In a dialogic pedagogy, students are empowered as thinkers and encouraged to actively participate in classroom dialogue as they use their dialogue to construct understanding (Mercer and Littleton, 2007). Observing the participants in the study, when they were engaged in dialogue, their knowledge of course content and their feelings of motivation increased. Alex, for example, reported that he felt more confident, more intelligent, and able to unlock his full potential as a result of his experience with dialogic pedagogy.

The shared dialogue between teacher and student is in opposition to the more authoritarian discourse present in teacher-centered, monologic classrooms, which does

not support meaningful learning as much as dialogue does (Vrikki, Wheatley, Howe, Hennessy, & Mercer, 2019). In the servant leadership approach, leaders support and form relationships with followers rather than directing their actions. Stein (2020) stated that the best teachers lead students by acknowledging the validity of students' ideas instead of demanding acceptance of concepts by students. Again, in a dialogic pedagogy and a servant leadership approach, the traditional power structure of classrooms is transformed, making the students the focus of the space and co-creators of knowledge.

As Porath (2016) described in a case study of two elementary teachers, attempting to alter the expectations and role of teachers in their classrooms can create a cultural dilemma. Like the two teachers in the case study, I attempted to introduce more authentic dialogue in my classroom and position myself as a co-creator of knowledge with my students (Porath, 2016). I also gave my students space to disagree and be authentic in their responses, not merely attempting to provide me the 'right' answer (Porath, 2016). The new classroom culture created a dilemma for myself and my students, who had to learn this new power structure. It took time to acclimate to the new dynamic, as shown by the early discussion board postings. Given time, however, students began to adapt and see themselves and their group members as more active contributors to knowledge development and relied less on me. Implementing dialogic pedagogy is not merely using a new strategy but requires a more dramatic cultural shift to a constructivist and dialogic classroom that requires time, support, practice, and acclimation.

As a teacher, I must continue to seek ways to empower students and ensure that they are co-creators of knowledge in the classroom. Through this study and the analysis of the participants' experience, I have realized how a shift in the power structure can

significantly impact the student learning experience, increasing both student understanding of course content and student motivation.

Increasing the frequency of exploratory talk. Throughout my observations, there was a direct relationship between the type of talk and the questions presented to students. Ernst-Slavitt and Pratt (2017) described that while asking questions may seem simple, asking questions that effectively support student learning is a complex and nuanced skill. Recall or retrieval type questions resulted in greater frequencies of cumulative talk, with students agreeing with each other.

Problem-solving type questions where students had to apply course material resulted in more frequent dialogic exchanges and exploratory talk. Johnston (n.d) described that promoting students thinking together starts with “Engaging problems or discussions in which children are likely to disagree or bring different perspectives” (p. 1). Porath (2016) described that teachers must “[Give] the students the space to disagree” (p. 886). The essence of exploratory talk is ambiguity. Students have differing perspectives, possibilities, and knowledge in response to questions that fuel the divergent and convergent voices that distinguish authentic dialogue. Exploratory talk positively affects children’s reasoning because of constructive critiques that occur and dialogue that help students make meaning and develop critical thinking and problem-solving skills (Mercer, Hennessy, & Warwick, 2019).

Observing exploratory talk as students worked to understand course content was encouraging and exciting. There were many examples of exploratory talk during the data collection period and presented in Chapter 4. Two such examples observed were Ava’s group engaging in exploratory talk to understand the relationship between human activity

and nitrogen oxide and sulfur dioxide release and Nicole's group to understand solar energy utilization for different purposes. In their interviews, the participants continually shared their enjoyment and appreciation for the opportunity to engage in dialogue with their group members as they worked to understand the course material. Therefore, activities need to be continually analyzed and modified to create more exploratory talk opportunities. Students can continue to improve their understanding of course content and develop additional critical thinking skills.

Increasing the amount of exploratory talk resulting from more problem-solving and application-type activities will also be important as schools progress in the digital age. As Wegerif (2013) described, traditional print-based education relies on transmitting knowledge from one individual to another. The Internet has disrupted that model, and digital technology provides opportunities for creating knowledge through dialogue and collaboration between individuals, not just a place for information retrieval (Wegerif, 2013). The use of retrieval-type questions or generic worksheets in school often results in students simply looking up the answers online. As Jennifer described, the use of activities that do not require critical thinking and do not stimulate students' curiosity and motivation resulting in students "going to look online for answers." Teachers often become frustrated when students just Google answers, but if questions merely require readily available answers, perhaps the teacher's behavior requires modification instead of the students' behavior. Presenting real-world or creating hypothetical situations that include data, maps, and problems requires a significant investment but promotes exploratory talk and motivates students to engage in the lesson because Google cannot just retrieve the information. The Internet has disrupted the traditional education model,

and I must continue moving towards a problem-based model of education that promotes exploratory talk to provide the best learning experience for my students.

Increase the effectiveness of collaborative groups. The participants in the study frequently spoke about the importance of having a small collaborative group that created a positive learning experience for them. The small collaborative groups created a space for dialogue to exist and increased support levels aligned to the theory of social constructivism. Ava provided a metaphor of how she viewed the small groups concerning her learning experience:

“It kind of reminds me of like, I’m a music student, so I go to orchestra. It reminds me of that. In orchestra, we all have to be able to agree, and we all have to be able to disagree and write our notes. And we have to work together as a group to be able to write or create music instead of just following one person. ‘cause if we just followed one person in orchestra, that orchestra would go down, and there’d be no soul in it.”

The small collaborative groups work together to create understanding. If the group does not develop those connections, the group loses its soul and its ability to create understanding.

Some participants did experience this loss of the group’s soul when their group was not functioning efficiently and negatively impacted the learning experience. The idea of a group’s soul aligns with the concept of relatedness in SDT. If students do not feel connected and a sense of belonging to a group, motivation can decrease, resulting in a loss of engagement. Therefore, building feelings of relatedness is one area that teachers

can improve to support the effectiveness of the small collaborative groups and each student's learning.

Alex revealed that at the beginning of the year, transitioning to a classroom where the instructional pedagogy revolved around dialogism instead of the more traditional monologic approach, the idea of small collaborative groups engaging in dialogue “seemed to have been something like really scary.” Alex was not alone as Jennifer expressed similar reservations about how the academic year began. Therefore, I must implement strategies to support students' transition to a dialogic pedagogy early in the academic year.

Throughout the year, the functionality of groups needs to be continually analyzed and improved, specifically when group composition is changed. Throughout this academic year, the frequency of changing the makeup of small groups decreased as I worked to find effective groups for all students. However, in the future, as I change the composition of groups, there must be time reserved to allow students to begin to build the connections and sense of belonging that build student's feelings of relatedness. As Alex noted, “once we started like moving around people and like fitting people that like seem to fit better brains wise with each other, everything started to seem more exciting and...easier to like obtain like knowledge-wise.” Nicole was another excellent example of how the group dynamic can impact student motivation and learning. She did not appear to have the same feelings of relatedness with one group as she did with another. Once she changed groups and felt more connected, her motivation increased, resulting in improved learning. Supporting collaborative groups at the beginning of and throughout the

academic year is an essential step in supporting a positive learning experience for students.

Teachers may use one strategy to support effective collaborative groups to provide feedback to the groups on the group's ability to function. A teacher establishing small collaborative groups of students can be similar to establishing and leading small teams. Northouse (2019) described that in team leadership, leaders could help teams succeed by maintaining the focus on the goals, supporting collaboration, allowing team members to build confidence, setting priorities, managing the team performance, and exhibiting their competence in the work's technical aspects. One aspect essential to leading teams' health and functionality is feedback (Northouse, 2019). Therefore, one strategy I could implement in the future is to provide feedback, weekly or bi-weekly, to the group about their effectiveness as a group without considering their academic progress. Giving feedback to each group about its functionality may be a system that could provide support to develop more effective collaborative groups.

Increase interactions between groups. Some students reported that one frustration they had with implementing a dialogic pedagogy was when groups would create misunderstandings of course content. Ava, Alex, and Jennifer all expressed similar experiences. Their small groups would engage in exploratory talk, developing an understanding of a concept to discover later that they had misunderstood an aspect of the concept. A system that could address this aspect of the student experience may allow whole groups to interact, share their understandings of concepts, and engage in another round of exploratory talk. With the frequency of these types of misunderstandings being relatively low, the opportunity for whole groups to engage in exploratory talk between

the groups may serve as another opportunity for students to propose ideas, analyze each other's ideas, and create or revise their understanding of information. Additional student-led dialogue would also continue to empower the students and place the students at the center of the learning process. The students can engage in dialogue instead of relying on the teacher to be the sole distributor and evaluator of knowledge.

Limitations

There were several limitations of this study that prevent it from being generalizable to all teachers and classrooms. While action research aims not to create generalizable data, the small sample size of seven students cannot represent the learning experience for all of my APES students. Each student will have an individual learning experience. However, as I surveyed students at different points of the year to gain feedback on their perception of the course's instruction and their level of learning, the data was positive on the whole and was similar to the data of the study's participants.

A second limitation of the study was the population that the participants represented. An Advanced Placement course is going to have different students than other levels of instruction. Schools often sort students into classes with varying levels of rigor (AP, honors, regular) based on their perceived academic ability and past academic performance. While dialogic pedagogy positively impacted APES students' learning experience, teachers with different classes may have different experiences with implementing dialogic pedagogy.

A third limitation was the participants themselves, as purposive sampling was used to gather insight into students with divergent experience in APES compared to their other academic classes. Only students who volunteered participated in the study. A total

of 15 students were contacted and asked to participate in the study. Therefore, the seven that did choose to participate may have been more inclined to express higher levels of motivation and engagement than other students.

Finally, a fourth limitation would be me. As an insider in this research process, I have interacted with these students. I am professionally invested in the students' knowledge of the course content, and I control the participants' academic grades. Therefore, my presence as a researcher may have impacted the participants' responses and my observations of the phenomenon during dialogic pedagogy.

Conclusion

This action research study sought to investigate students' learning experience engaged in dialogic pedagogy in a hybrid APES course. Through the theoretical framework of dialogism, social constructivism, and SDT, this study analyzed the students' learning experience to determine how dialogic pedagogy in a hybrid APES course affected the students' understanding of course material and their feelings of motivation. The findings support that implementing this instructional approach positively impacted the students' learning experience, increasing their knowledge of information and motivation.

As teachers and schools rapidly acclimated to the COVID 19 pandemic, hybrid classrooms became increasingly common but were a new modality that few people experienced in their careers. The transition presented a unique opportunity to rethink how teachers and schools approach instruction and improve students' learning experience. According to previous research, instead of a teacher-centered, monologic pedagogy, shifting towards a more dialogic pedagogy represented an instructional approach that

could increase student understanding and motivation, especially among online students who have experienced difficulty in those areas.

The use of dialogic pedagogy positively impacted the student learning experience, but it required a fundamental shift in approaching and viewing instruction. Instead of seeing myself as the guardian of knowledge and bestowing it upon students, the change towards a dialogic pedagogy required an alteration to the power structure present in the classroom. I became a servant leader who provided students opportunities to initiate, engage, and interpret dialogue as they supported each other's development of knowledge. This shift in the power structure created an environment that allowed students to develop their understanding and develop greater motivation due to greater autonomy, competence, and relatedness.

As hybrid learning may or may not become a fixture in the education system in the aftermath of the COVID 19 pandemic, the findings from this study provide valuable information for the future of teaching in the digital age. Teaching and learning must shift from the traditional model in which information is transmitted to students to memorize and retrieve when commanded. Digital technology has created a world in which people are creators of knowledge and content. Education must adapt to this change and become a place for students to become creators of their knowledge and learn how to utilize the more widely available information than humanity has ever had before. Whether my students are in an online, hybrid, or traditional classroom in the future, my pedagogy will focus on using dialogue to provide all students the opportunity to have a beneficial learning experience that aligns with the current digital age. I will continue to seek out, implement, and refine additional classroom practices and strategies that create dialogic

opportunities for students to ensure that I meet my students' evolving needs. Such a massive shift in education may not be easy; as teachers, we must choose between what is right for our students and what is easy for us. I hope my research will serve as an example of what education could be if we placed the students at the center of their learning.

REFERENCES

- Alexander, R. (2000). *Culture & Pedagogy*. Blackwell.
- Alexander, R. (2008). *Essays on pedagogy*, Routledge.
- Au, W. (2013). High stakes testing and curriculum control. In D.J. Flinders & S.J. Thornton (5th ed.). *The Curriculum Studies Reader*. (pp. 295 - 312). Routledge.
- Bailey, J. (2020). Reopening resilient schools: With a hybrid learning model and proper safeguards, schools can successfully open. *Education Next*, 20(4), 1–17.
- Bakhtin, M.M. (1981). *The dialogic imagination*. University of Texas Press.
- Bakhtin, M.M. (1984). *Problems of Dostoevsky's poetics*. University of Minnesota Press.
- Bakhtin, M.M. (1986). *Speech genres and other late essays*. University of Texas Press.
- Bansal, G. (2018). Teacher discursive moves: conceptualising a schema of dialogic discourse in science classrooms. *International Journal of Science Education*, 40(15), 1891–1912.
- Black, L., & Hernandez-Martinez, P. (2016). Re-thinking science capital: the role of “capital” and “identity” in mediating students’ engagement with mathematically demanding programmes at university. *Teaching Mathematics & Its Applications*, 35(3), 131–143.
- Cavagnetto, A.R., Hand, B., & Premo, J. (2020). Supporting student agency in science. *Theory Into Practice*, 59(2), 128–138.

- Champion, K., & Gunnlaugson, O. (2018). Fostering generative conversation in higher education course discussion boards. *Innovations in Education and Teaching International*, 55(6), 704–712.
- Chandra Handa, M. (2020). Examining students' and teachers' perceptions of differentiated practices, student engagement, and teacher qualities. *Journal of Advanced Academics*, 31(4), 530–568.
- Charmaz, K. (2006). *Constructing grounded theory*. Thousand Oaks: Sage Publications.
- Creswell, J.W. (2013). *Research design: qualitative, quantitative, and mixed methods approaches*. SAGE Publications.
- Creswell, J. W. & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches*. SAGE Publications.
- Dailey-Hebert, A. (2018). Maximizing interactivity in online learning: Moving beyond discussion boards. *Journal of Educators Online*, 15(3).
- Deci, E.L., & Ryan, R.M. (1985). *Intrinsic motivation and self-determination in human behavior*. Plenum.
- Delaney, D., Kummer, T., & Singh, K. (2019). Evaluating the impact of online discussion boards on student engagement with group work. *British Journal of Educational Technology*, 50(2), 902–920.
- Dewey, J. (1916). *Democracy and education*. The Free Press.
- Emdin, C. (2016). *For white folks who teach in the hood...and the rest of y'all too*. Beacon Press.

- Ernst-Slavit, G. & Pratt, K. (2017). Teacher questions: Learning the discourse of science in a linguistically diverse elementary classroom. *Linguistics & Education*, 40, 1–10.
- Farooq, S., & Benade, L. (2019). Constructing a dialogic pedagogy in virtual learning environments: A literature review. *New Zealand Journal of Teachers' Work*, 16(1/2), 7–13.
- Florida Department of Education (2020). *DOE Order NO. 2020-EO-06*. Retrieved from <http://www.fldoe.org/core/fileparse.php/19861/urlt/DOE-2020-EO-06.pdf>
- Freire, P. (1993). *Pedagogy of the Oppressed*. Continuum.
- Frohlich, D. O. (2020). Quick fix: requiring students to end discussion posts with a question. *College Teaching*, 68(1), 1–2.
- Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology*, 95(1), 148–162.
- Gee, J. P. (n.d.) Discourse, small-d, Big D. Retrieved from <http://jamespaulgee.com/pdfs/Big%20D,%20Small%20d.pdf>
- Gee, J. P. (1996). *Social linguistics and literacies: Ideology in discourses*. Routledge.
- Gee, J.P. (2000) 'Discourse and socio-cultural studies in reading', in M. Kamil, B. Mosenthal, P. Pearson and R. Barr (eds) *Handbook of Reading Research, Volume III*, London: Lawrence Erlbaum Associates.
- Gershon, L. (2015). A short history of standardized tests. JSTOR Daily. Retrieved from <https://daily.jstor.org/short-history-standardized-tests/>

- Halverson, L. R., & Graham, C. R. (2019). Learner engagement in blended learning environments: A conceptual framework. *Online Learning*, 23(2), 145–178.
- Herr, K., & Anderson, G. (2015). *The action research dissertation: A guide for students and faculty*. Sage.
- Hooks, B. (1994). *Teaching to transgress*. Routledge.
- Johnston, P. (n.d.). Literacy, learning, thinking and classroom communities. Retrieved from:
https://www.judsonu.edu/uploadedFiles/___Judson_Public/Academics/Graduate/Master_of_Education_in_Literacy/Peter%20Johnston.pdf
- Johnston, P. H., Ivey, G., & Faulkner, A. (2011). Talking in class: Remembering what is important about classroom talk. *Reading Teacher*, 65(4), 232–237.
- Kadir, M.S., Yeung, A. S., Ryan, R.M., Forbes, A., & Diallo, T.M.O. (2020). Effects of a dual-approach instruction on students’ science achievement and motivation. *Educational Psychology Review*, 32(2), 571–602.
- Kramer, M. W. (2017). Forum: The lecture and student learning. Sage on the stage or bore at the board? *Communication Education*, 66(2), 245–247.
- Ladson-Billings, G. (2009). *The Dream-Keepers: Successful teachers of African-American children*. Jossey-Bass.
- Lieberman, M. (2020, November 11). *How hybrid learning is (and is not) working during COVID-19: 6 case studies*. Education Week. Retrieved from:
<https://www.edweek.org/leadership/how-hybrid-learning-is-and-is-not-working-during-covid-19-6-case-studies/2020/11>

- Linder, K.E. (2017). Fundamentals of hybrid teaching and learning. *New Directions for Teaching & Learning*, 2017(149), 11–18.
- Littleton, K., Mercer, N., Dawes, L., Wegerif, R., Rowe, D., & Sams, C. (2005). Talking and thinking together at key stage 1. *Early Years: An International Journal of Research and Development*, 25(2), 167–182.
- Lu, J., Zhang, Z., & Jia, M. (2019). Does servant leadership affect employees' emotional labor? A social information-processing perspective. *Journal of Business Ethics*, 159(2), 507–518.
- Machi, L.A., & McEvoy, B.T. (2016). *The literature review: Six steps to success*. Corwin.
- Martin, F., & Bolliger, D.U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online Learning*, 22(1), 205–222.
- Martinez, K. (2019). 17 tweets about discussion board posts that are brutally honest. Retrieved from: <https://www.buzzfeed.com/kellymartinez/students-on-discussion-board-posts-who-are-honestly-trying>
- Matusov, E. (2009). *Journey into dialogic pedagogy*. Nova Science Publishers.
- Matusov, E., & Miyazaki, K. (2014). Dialogue on dialogic pedagogy. *Dialogic Pedagogy*, 2.
- Mercer, N., Hennessey, S., & Warwick, P. (2019). Dialogue, thinking together and digital technology in the classroom: Some educational implication of a continuing line of inquiry. *International Journal of Educational Research*, 97, 187 - 199.

- Matusov, E., Smith, M., Soslau, E., Marjanovic-Shane, A., & von Duyke, K. (2016). Dialogic education for and from authorial agency. *Dialogic Pedagogy*, 4.
- Mercer, N., & Littleton, K. (2007). *Dialogue and the development of children's thinking: a sociocultural approach*. Routledge.
- Merriam, S.B., & Tisdell, E.J. (2016). *Qualitative research: A guide to design and implementation* (4th Ed). Jossey-Bass.
- Miles, M.B., Huberman, A.M., & Saldana, J. (2013). *Qualitative data analysis: A methods sourcebook*. Sage.
- Nalipay, M.J.N., King, R.B., & Cai, Y. (2020). Autonomy is equally important across East and West: Testing the cross-cultural universality of self-determination theory. *Journal of Adolescence*, 78, 67–72.
- National Education Policy Center. (2019). Virtual schools in the U.S. 2019. Retrieved from <https://nepc.colorado.edu/publication/virtual-schools-annual-2019>
- Newmann, F. M., Smith, B., Allensworth, E., and Bryk, A.S. (2001). Instructional program coherence: What it is and why it should guide school improvement policy. *Educational Evaluation & Policy Analysis* v. 23 no. 4 p. 297-321.
- Ng, B.L.L., Liu, W.C., & Wang, J.C.K. (2016). Student motivation and learning in mathematics and science: A cluster analysis. *International Journal of Science and Mathematics Education*, 14(7), 1359–1376.
- Noland, A., & Richards, K. (2015). Servant Teaching: An exploration of teacher servant leadership on student outcomes. *Journal of the Scholarship of Teaching & Learning*, 15(6), 16–38.
- Northouse, P.G. (2019). *Leadership* (8th edition). Sage Publishing.

- Nystrand, M. (1997). *Opening dialogue: understanding the dynamics of language and learning in the English classroom*. Teachers College Press.
- Orange County Public Schools. (n.d.). Lake Nona HS 2019-2020 report card. Retrieved from https://www.ocps.net/schools/school_report_cards__2019-20_/lake_nona_h_s_2019-20_report_card
- Porath, S. L. (2016). Conceptual, pedagogical, cultural, and political dilemmas of implementing a constructivist workshop approach to teaching literacy. *Teachers and Teaching: Theory and Practice*, 22(7), 879–891.
- Park, E., Martin, F., & Lambert, R. (2019). Examining predictive factors for student success in a hybrid learning course. *Quarterly Review of Distance Education*, 20(2), 11–27.
- Raes, A., Detienne, L., Windey, I., & Depaepe, F. (2020). A systematic literature review on synchronous hybrid learning: gaps identified. *Learning Environments Research*, 23(3), 269–290.
- Ryan, R.M., & Deci, E.L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78.
- Ryan, R.M., & Deci, E.L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, N.PAG.
- Ruthven, K., Mercer, N., Taber, K. S., Guardia, P., Hofmann, R., Ilie, S, Luthman, S., and Riga, F. (2017). A research-informed dialogic-teaching approach to early

- secondary school mathematics and science: The pedagogical design and field trial of the "epiSTEMe" intervention. *Research Papers in Education*, 32(1), 18–40.
- Schiro, M.S. (2013). *Curriculum theory. (2nd ed.)*. Los Angeles, CA: Sage
- Segal, A., Pollak, I., & Lefstein, A. (2017a). Democracy, voice and dialogic pedagogy: The struggle to be heard and heeded. *Language and Education*, 31(1), 6–25.
- Segal, A., Snell, J., & Lefstein, A. (2017b). Dialogic teaching to the high-stakes standardised test? *Research Papers in Education*, 32(5), 596–610.
- Senge, P. (2012). *Schools that learn: A fifth discipline fieldbook for educators, parents, and everyone who cares about education*. Crown Business.
- Sherry, M. B. (2019). Emergence and development of a dialogic whole-class discussion genre. *Dialogic Pedagogy*, 7.
- Singh, J. (2017). Enhancing student success in health care programs: Active learning in a hybrid format. *Journal of Instructional Pedagogies*, 18.
- Skaftun, A., Igland, M.-A., Husebø, D., Nome, S., & Nygard, A. O. (2018). Glimpses of Dialogue: Transitional practices in digitalised classrooms. *Learning, media and technology*, 43(1), 42–55.
- Snell, J., & Lefstein, A. (2018). “Low ability,” participation, and identity in dialogic pedagogy. *American Educational Research Journal*, 55(1), 40–78.
- Stein, L. (2020). Teacher leadership: The missing factor in America’s classrooms. *Clearing House*, 93(2), 78–84.
- Tate, E. (2019, May 28). Despite poor performance, virtual school enrollment continues to grow *EdSurge*. Retrieved from <https://www.edsurge.com/news/2019-05-28-despite-poor-performance-virtual-school-enrollment-continues-to-grow>

- Toro-Troconis, M., Alexander, J., & Frutos-Perez, M. (2019). Assessing student engagement in online programmes: Using learning design and learning analytics. *International Journal of Higher Education*, 8(6), 171–183.
- Truxaw, M. (2015). Dialogic discourse in linguistically diverse elementary mathematics classes: Lessons learned from dual-language classrooms. *NERA Conference Proceedings 2015*. 13.
- Truxaw, M. P. (2020). Dialogic discourse to empower students in linguistically diverse elementary mathematics classrooms. *Teacher Education Quarterly*, 47(3), 120–144.
- Tytler, R. & Aranda, G. (2015). Expert teachers' discursive moves in science classroom interactive talk. *International Journal of Science & Mathematics Education*, 13(2), 425–446.
- UNESCO - United Nations Education, Scientific, and Cultural Organization (n.d.). School closures caused by coronavirus (COVID-19). Retrieved from <https://en.unesco.org/covid19/educationresponse>
- University of Cambridge [CambridgeEDUC]. (2018, January 12). CIE | Making the most of educational dialogue | Neil Mercer [Video]. YouTube. Retrieved from <https://www.youtube.com/watch?v=xGmNJUeso6g>
- University of Huddersfield (n.d.). Themes and codes. Retrieved from: <https://research.hud.ac.uk/research-subjects/human-health/template-analysis/technique/themes-and-codes/>
- Vrikki, M., Wheatley, L., Howe, C., Hennessy, S., & Mercer, N. (2019). Dialogic practices in primary school classrooms. *Language and Education*, 33(1), 85–100.

Vygotsky, L.S. (1978). *Mind in society: Development of higher psychological processes*.

Harvard UP.

Wegerif, R. (2013). *Dialogic: Education for the internet age*. London: Routledge.

Wright, G.B. (2011). Student-centered learning in higher education. *International*

Journal of Teaching and Learning in Higher Education, 23, 92–97.

Yu, E. (2020). Student-inspired optimal design of online learning for Generation Z.

Journal of Educators Online, 17(1).

Yun, H., Park, S., Kim, D., Jung, E., & Yoon, M. (2020). The influence of academic level

and course delivery mode on the use of motivational regulation strategies and

learning engagement. *Australasian Journal of Educational Technology*, 36(3),

89–103.

Xiao, J., Sun-Lin, H.-Z., Lin, T.-H., Li, M., Pan, Z., & Cheng, H.-C. (2020). What makes

learners a good fit for hybrid learning? Learning competencies as predictors of

experience and satisfaction in hybrid learning space. *British Journal of*

Educational Technology, 51(4), 1203–1219.

APPENDIX A

LESSON SAMPLE

Causes, effects, and ways to reduce acid deposition

Individual Leading Questions

1. One major cause of acid rain is the emission of _____ from gasoline automobiles.
2. One major cause of acid rain is the emission of _____ from coal-burning power plants.
3. In order to form acid deposition, a pollutant must react with _____ to form the acid.
4. There are three areas of the pH scale. A measurement of 0-6 is considered _____. A measurement of 7 is considered _____. A measurement of 8-14 is considered _____.
5. The pH of clean rain is _____ while acid rain is _____.
6. One of the biggest impacts of acid deposition is the impact on soils. The excess H^+ ions from the acid cause _____ to be mobilized (released) which causes plant root damage and ultimately death.
 - A. Lead
 - B. Mercury
 - C. Aluminum
 - D. Arsenic
7. The biggest direct threat to humans from acid rain is
 - A. Damage to buildings
 - B. Skin irritation
 - C. Lung irritation
 - D. Eye irritation
8. _____ is often used to attempt to reverse the soil or water acidification process
 - A. Calcium carbonate
 - B. Calcium chloride
 - C. Calcium bicarbonate
 - D. Calcium glyceride
9. Limestone, calcium carbonate, reacts with acidic compounds. This results in

- A. Increasing the acidity of the acids
- B. Neutralizing the acidity of acids
- C. Converting acids to bases

10. "The lake is becoming more acidic" is equivalent to saying

- A. The pH is falling to 1
- B. The pH is rising to 14
- C. The pH is neutral
- D. The pH has not changed

11. Which of the following fossil fuels would least likely lead to acid deposition?

- A. Coal
- B. Natural gas
- C. Nuclear
- D. Petroleum

Group Exploratory Questions

12. Examine the following table that shows the electricity use from four households. The electricity is provided by a coal-burning power plant in the area.

Home	House 1	House 2	House 3	House 4
Electricity use per month in kWh	1100 kWh	1000kWh	1500kWh	800kWh

Identify which home will contribute the most to acid deposition and describe why electricity conservation can have a direct impact on the amount of acid deposition assuming that the electricity is coming from a coal-burning power plant

13. Examine the following table which shows the percentage of private vehicles (no carpooling, no busing) driven by students to get to school each day at different high schools.

School	North High	South High	West High	East High
Percent of students who drive private autos	25%	15%	10%	20%

Identify which school would contribute the least to acid deposition and describe why carpooling or taking public transportation can have a direct impact on the amount of acid deposition

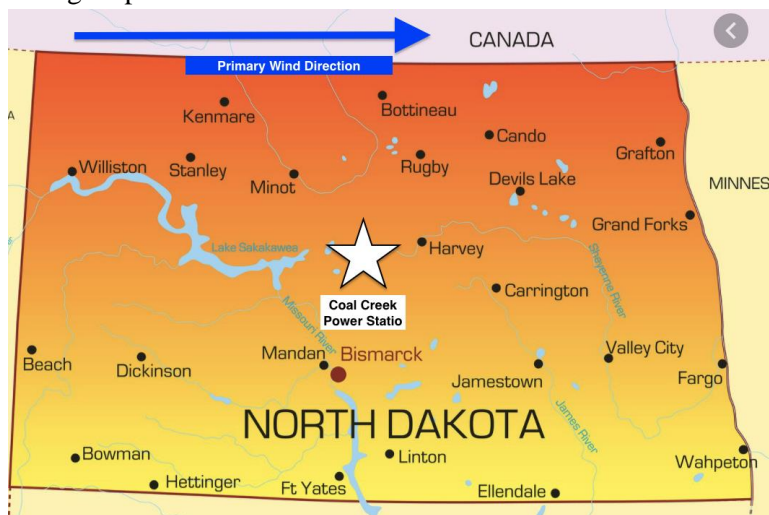
14. Humidity is a measure of the amount of moisture in the atmosphere. Examine the table below:

Month	January	March	June	September
Average% Humidity	55%	65%	75%	70%

Identify which month would have the greatest levels of acid deposition and describe how the humidity in the atmosphere would impact the quantity of acid deposition experienced

15. List the two chemical reactions that indicate the formation of acid rain

Examine the following map



A study is conducted to determine the impact of the Coal Creek Power Station. Samples of the aluminum content in the soil are taken from all around North Dakota.

16. Identify the independent variable(s) in this experiment

17. Identify the dependent variable(s) in this experiment

18. Identify which location, Bismarck, Carrington, Dickinson, or Minot, would have the highest levels of H^+ ions in the soil as a result of the Coal Creek Power Station and local ponds/lakes and describe your reasoning

19. Describe how an area whose bedrock was primarily limestone would affect the amount of acidity in the soil.

20. Examine the following table of populations:

Bismarck	Fargo	Minot
72,000	121,000	48,000

Identify which location where you may find high levels of nitrogen oxide in North Dakota and describe your reasoning

21. Describe why acid deposition is classified as a secondary pollutant.

APPENDIX B

PARENT/GUARDIAN RESEARCH CONSENT

THE UNIVERSITY OF SOUTH CAROLINA

PARENT/GUARDIAN RESEARCH CONSENT

Title:

Dialogic discourse and student learning in AP Environmental Science

Key Information About This Research Study

Your student is being invited to volunteer for a research study conducted by Blake Alspach. I am a doctoral candidate in the Department of Curriculum and Instruction, at the University of South Carolina. The University of South Carolina, College of Education is sponsoring this research study. The purpose of this study is to investigate the effects that using digital technology has on dialogic discourse and student learning. Your student is being asked to participate in this study because you are a current student in Advanced Placement Environmental Science. This study is being done at Lake Nona High School and will involve approximately 5 to 10 volunteers.

Brief Description of Research Study

The purpose of the research described below is to investigate the effects of using instructional strategies encouraging dialogic discourse in an AP Environmental Science course. During this study, students will receive their normal instruction. During their normal instructional time, I will be observing students engaged in collaborative groups and the discourse that occurs between the students. I will also be asking participants to complete a short survey to collect information on the participant's demographics and academic background. Finally, I will be interviewing students to document their perspective on the use of dialogic discourse in AP Environmental Science. The risks to students in this study are minimal, but the benefits could include an improved understanding of course content, critical thinking skills, problem solving, and communication ability. Please read the rest of this form before deciding if you will allow your student to be in this research study.

Because you are the parent or legally authorized representative of a student in this classroom, I am seeking your permission to let your student participate in this research study. Involvement in the study is voluntary, so you may decide whether to let your student participate or not. I will also ask your student if they want to be in the study, and I will only collect information if both you and your student agree. Before making your decision, please read the information below and ask me any questions that you have about the research; I will be happy to explain anything in greater detail.

Details of the Student's Involvement

Students in AP Environmental Science will be participating in classroom instruction that will promote dialogic discourse over a three week period from January 18, 2021 to February 5, 2021. Students will be engaging in collaborative groups while they progress through course material. While the students are working in their collaborative groups, I will be monitoring their dialogue and facilitating the dialogue as necessary. My observations of the students engaging in the collaborative groups will serve as a source of data for the study. Even if your student does not participate in the study, the students will still be active in the lesson by engaging in dialogue with other students, however, I will not use any data about their participation in my study.

In addition to observing their engagement on discussion boards, participants will complete a survey to gather some demographic information and information on their academic background. I will also be interviewing the participants of the study for approximately one hour to document their perspective on the effects of engaging in dialogic discourse on their learning experience. The interviews will be conducted outside of normal school hours using Microsoft Teams. These interviews will be recorded using Microsoft Teams and saved on a secured laptop for later playback and transcription of the audio of the interview. The student's survey and interview responses will serve as additional sources of data for my study.

Privacy and Confidentiality

This study will take place while students are in their classroom, so they will not have privacy during the exercises or while being observed. However, to ensure confidentiality I will not reveal any private information about your student to anyone unless required by law to do so. My observation records will be in my possession at all times, and only I will know which records go with which student. In any reports I make about this study, I will not use your student's name or any other information that could be used to identify him or her directly or indirectly. Three years after my study is completed, I will destroy all of the information I collected that identifies individual students.

Risks and Benefits of Participation

Collaborative groups have been used for a variety of purposes in classrooms and your student may have experienced working with collaborative groups previously in this course or other courses. They may or may not have experienced instructional strategies that promote dialogic discourse but these instructional strategies have been used in a variety of classroom settings from elementary school to graduate school settings.

There are no rewards or extra credit grades for students who take part in this study, and no penalties of any kind if they do not take part. However, being in this research study might have important educational benefits for your student. Research has shown that increased levels of dialogue in classrooms can support student achievement in the classroom.

Participant Rights

You have the right to ask any questions you have before, during or after the study, and I encourage you to do so. If you do not want your student to be in this study, there will be no penalties or loss of benefits that he or she is entitled to. If you agree to let your student be in this study and later change your mind, you have the right to take them out simply by contacting me at the email address below, and I will destroy any research data collected about your student. This research has been approved by the University of South Carolina Institutional Review Board, a committee responsible for ensuring that the safety and rights of research participants are protected.

Contact Information

For more information about this research before, during or after your student's participation, please contact me (balspach@email.sc.edu) or my university supervisor, Dr. Todd Lilly (LILLYT98@mailbox.sc.edu). To report any unanticipated problems relating to the research that your student experiences during or following participation, contact my university supervisor, Dr. Dr. Todd Lilly (LILLYT98@mailbox.sc.edu). Please return this form to me by January 11, 2021.

Before signing this form, please ask me any questions you have about participation in this study.

To be Completed by Participant's Parent/Guardian

I have read all of the information on this form, and all of my questions and concerns about the research described above have been addressed. I choose, voluntarily, to permit my student to take part in this research study. I certify that I am at least 18 years of age.

Print name of student

Print name of parent or legally authorized representative

Signature of parent or legally authorized representative

Date

I understand that my student's participation in this research will involve being audio recorded during the interview process (check all that apply):

___ I permit my student to be audio recorded

Signature of parent or legally authorized representative

Date

To be completed by Researcher

I confirm that the legally authorized representative of the student named above has been given an opportunity to ask questions about the study, and all the questions asked have been answered to the best of my knowledge and ability. A copy of this Consent Form has been provided to the student's legally authorized representative, and I will keep the original for a maximum of three years.

Print name of the researcher

Signature of researcher Date

APPENDIX C

STUDENT RESEARCH CONSENT FORM

THE UNIVERSITY OF SOUTH CAROLINA

STUDENT RESEARCH CONSENT

Title:

Dialogic discourse and student learning in AP Environmental Science

Key Information About This Research Study

You have been invited to volunteer for a research study conducted by Blake Alspach. I am a doctoral candidate in the Department of Curriculum and Instruction, at the University of South Carolina. The University of South Carolina, College of Education is sponsoring this research study. The purpose of this study is to investigate the effects that using digital technology has on dialogic discourse and student learning. You have been asked to participate in this study because you are a current student in Advanced Placement Environmental Science. This study is being done at Lake Nona High School and will involve approximately 5 to 10 volunteers.

Brief Description of Research Study

The purpose of the research described below is to investigate the effects of using instructional strategies encouraging dialogic discourse in an AP Environmental Science course. During this study, students will receive their normal instruction. During their normal instructional time, I will be observing students engaged in collaborative groups and the discourse that occurs between the students. I will also be asking participants to complete a short survey to collect information on the participant's demographics and academic background. Finally, I will be interviewing students to document their perspective on the use of dialogic discourse in AP Environmental Science. The risks to students in this study are minimal, but the benefits could include an improved understanding of course content, critical thinking skills, problem solving, and communication ability. Please read the rest of this form before deciding if you want to participate in this research study.

I am seeking your permission to participate in this research study. Involvement in the study is voluntary, so you may decide whether to participate or not. I will only collect information if you agree. Before making your decision, please read the information below and ask me any questions that you have about the research; I will be happy to explain anything in greater detail.

Details of the Student's Involvement

Students in AP Environmental Science will be participating in classroom instruction that will promote dialogic discourse over a three week period from January 18, 2021 to February 5, 2021. Students will be engaging in collaborative groups while they progress through course material. While the students are working in their collaborative groups, I will be monitoring their dialogue and facilitating the dialogue as necessary. My observations of the students engaging in the collaborative groups will serve as a source of data for the study. Even if you do not participate in the study, you will still be active in the lesson by engaging in dialogue with other students, however, I will not use any data about your participation in my study.

In addition to observing their engagement on discussion boards, participants will complete a survey to gather some demographic information and information on their academic background. I will also be interviewing the participants of the study for approximately one hour to document their perspective on the effects of engaging in dialogic discourse on their learning experience. The interviews will be conducted outside of normal school hours using Microsoft Teams. These interviews will be recorded using Microsoft Teams and saved on a secured laptop for later playback and transcription of the audio of the interview. The student's survey and interview responses will serve as additional sources of data for my study.

Privacy and Confidentiality

This study will take place while students are in their classroom, so they will not have privacy during the exercises or while being observed. However, to ensure confidentiality I will not reveal any private information about your student to anyone unless required by law to do so. My observation records will be in my possession at all times, and only I will know which records go with which student. In any reports I make about this study, I will not use your student's name or any other information that could be used to identify him or her directly or indirectly. Three years after my study is completed, I will destroy all of the information I collected that identifies individual students.

Risks and Benefits of Participation

Collaborative groups have been used for a variety of purposes in classrooms and your student may have experienced working with collaborative groups previously in this

course or other courses. They may or may not have experienced instructional strategies that promote dialogic discourse but these instructional strategies have been used in a variety of classroom settings from elementary school to graduate school settings.

There are no rewards or extra credit grades for students who take part in this study, and no penalties of any kind if they do not take part. However, being in this research study might have important educational benefits for your student. Research has shown that increased levels of dialogue in classrooms can support student achievement in the classroom.

Participant Rights

You have the right to ask any questions you have before, during or after the study, and I encourage you to do so. If you do not want to be in this study, there will be no penalties or loss of benefits that he or she is entitled to. If you agree to be in this study and later change your mind, you have the right to be taken out of the study by contacting me at the email address below, and I will destroy any research data collected about you. This research has been approved by the University of South Carolina Institutional Review Board, a committee responsible for ensuring that the safety and rights of research participants are protected.

Contact Information

For more information about this research before, during or after your participation, please contact me (balspach@email.sc.edu) or my university supervisor, Dr. Todd Lilly (LILLYT98@mailbox.sc.edu). To report any unanticipated problems relating to the research that you experience during or following participation, contact my university supervisor, Dr. Dr. Todd Lilly (LILLYT98@mailbox.sc.edu). Please return this form to me by January 11, 2021.

Before signing this form, please ask me any questions you have about participation in this study.

To be Completed by Participant

I have read all of the information on this form, and all of my questions and concerns about the research described above have been addressed. I choose, voluntarily, to take part in this research study.

Print name of student

Signature of student

I understand that my participation in this research will involve being audio recorded during the interview process (check all that apply):

☐ I permit to be audio recorded

Signature of student

Date

To be completed by Researcher

I confirm that the legally authorized representative of the student named above has been given an opportunity to ask questions about the study, and all the questions asked have been answered to the best of my knowledge and ability. A copy of this Consent Form has been provided to the student's legally authorized representative, and I will keep the original for a maximum of three years.

Print name of the researcher

Signature of researcher Date

APPENDIX D

INTERVIEW PROTOCOL

Time of Interview: _____ **Date:**

Place: _____

Interviewer: _____

Participant Identification Number: _____

Script:

I'd like to thank you once again for being willing to participate in the interview aspect of my study. As I mentioned before, my study seeks to investigate the experience of students engaged in dialogic discourse in a hybrid AP Environmental Science classroom setting. Our interview today will last approximately one hour during which I will be asking you about your experiences with engaging in dialogic discourse in a hybrid course and your perspectives on the effect that it has had on your learning. Remember, your participation in the study is voluntary and will have no effect on your academic performance in the course.

Prior to this interview, you completed a consent form indicating that I have your permission to record our conversation. Please know that I will do everything I can to protect your privacy. Your identity or personal information will not be disclosed in any publication that may result from the study. Notes that are taken during the interview will be stored in a secure location. Are you still ok with me recording (or not) our conversation today? ___Yes ___No

- *If yes: Thank you! Please let me know if at any point you want me to turn off the recorder or keep something you said off the record.*
- *If no: Thank you for letting me know. I will only take notes of our conversation.*

Before we begin the interview, do you have any questions? [Discuss questions] If any questions (or other questions) arise at any point in this study, you can feel free to ask them at any time. I would be more than happy to answer your questions.

Questions:

1. What is your overall impression of participating in collaborative small groups to engage in dialogic discourse with your classmates in your AP Environmental Science course?
2. How has participating in collaborative small groups to engage in dialogic discourse in AP Environmental Science changed your perspective of yourself as a student if at all?
3. How has participating in collaborative small groups to engage in dialogic discourse in AP Environmental Science changed your perspective of yourself as a scientist if at all?
4. How did your participation in collaborative small groups to engage in dialogic discourse affect your engagement in your AP Environmental Science course?
5. How did your participation in collaborative small groups to engage in dialogic discourse affect your motivation in your AP Environmental Science course?
6. How did your participation in collaborative small groups to engage in dialogic discourse affect your level of understanding of the content presented in your AP Environmental Science course?
7. How did your participation in collaborative small groups to engage in dialogic discourse affect your academic achievement in your AP Environmental Science course?

8. Describe the aspects of participating in collaborative small groups to engage in dialogic discourse that positively affected your learning in your AP Environmental Science course?
9. Describe the aspects of participating in collaborative small groups to engage in dialogic discourse that negatively affected your learning in your AP Environmental Science course?
10. How has the experience of participating in collaborative small groups to engage in dialogic discourse been similar or different to other academic courses you have been enrolled in?
11. In comparison to other academic courses where the teacher is primarily responsible for delivering content, how has participating in collaborative small groups to engage in dialogic discourse to build their own understanding of course content affected your learning?
12. In comparison to other academic courses where the teacher is primarily responsible for delivering content, how has participating in collaborative small groups to engage in dialogic discourse affected your engagement in the classroom activities?
13. In comparison to other academic courses where the teacher is primarily responsible for delivering content, how has participating in collaborative small groups to engage in dialogic discourse affected your motivation?
14. Is there anything you would like to add about engaging in dialogic discourse in collaborative small groups in your AP Environmental Science course?

I'd like to thank you once again for being willing to participate in the interview aspect of my study.

Would I be able to contact you at the end of the data analysis to present my findings to you so that you could verify that my interpretation of your responses was accurate?

☐ *Yes*

☐ *No*

Thank you again. This concludes our interview.

APPENDIX E

PARTICIPANT SURVEY

Section 2 of 6

Demographic Information

Description (optional)

Age *

Short answer text

.....

Gender *

☐ Male

☐ Female

☐ Non-binary

Ethnicity *

1. African-American

2. Asian

3. Caucasian

4. Latino or Hispanic

5. Native American

6. Native Hawaiian or Pacific Islander

7. Two or More

8. Other/Unknown

9. Prefer not to say

Do you qualify for free/reduced lunch? *

☐ Yes

☐ No

+

📄

Tt

📷

▶

☰

Academic Information



Description (optional)

Grade Level *

- ☐ 9th
- ☐ 10th
- ☐ 11th
- ☐ 12th

Do you qualify for any of the following educational services (choose all that apply) *

- ☐ 504
- ☐ ELL
- ☐ ESE
- ☐ Gifted
- ☐ None of the above

What is your current weighted GPA? *

- ☐ 6.0-5.0
- ☐ 4.99-4.0
- ☐ 3.99-3.0
- ☐ 2.99-2.0
- ☐ 1.99-1.0
- ☐ .99-0



In AP courses, indicate the average overall grade you have received in the course *

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ F

In other science courses, indicate the average overall grade you have received in the course *

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ F

After section 3 Continue to next section



You - as a person

Description (optional)

How would you describe yourself as a student? *

- ☐ I am a strong student in all my academic courses
- ☐ I am a student who succeeds in some academic courses and struggles in others
- ☐ I am a student who often struggles in academic courses

On a scale of 1 to 5, prior to this class, how would you quantify seeing yourself as a scientist or a strong science student? *

	1	2	3	4	5	
I did not see myself as a scientist or strong science student	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I saw myself as a scientist or strong science student

After this semester, how would you quantify seeing yourself as a scientist or a strong science student? *

- ☐ I see myself as more of a scientist or strong science student
- ☐ I do not see any change in myself as a scientist or strong science student
- ☐ I see myself as less of a scientist or strong science student

On a scale of 1 to 5, prior to this class, how would you quantify seeing yourself as a critical thinker and problem solver? *

	1	2	3	4	5	
I did not see myself as a critical thinker or problem solver	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I saw myself as a critical thinker and problem solver

After this semester, how would you quantify seeing yourself as a critical thinker or problem solver? *

- ☐ I see myself as more of a critical thinker or problem solver
- ☐ I do not see any change in myself as a critical thinker or problem solver
- ☐ I see myself as less of a critical thinker or problem solver

On a scale of 1 to 5, prior to this class, how would you quantify your feelings of personal satisfaction with school as a whole *

1 2 3 4 5

I do not enjoy school and learning very much ☐ ☐ ☐ ☐ ☐ I love school and learning

On a scale of 1 to 5, prior to this class, how would you quantify your feelings of personal satisfaction with this class? *

1 2 3 4 5

I do not enjoy this class or learning in this class ☐ ☐ ☐ ☐ ☐ I greatly enjoy this class and learning

After this semester, on a scale of 1 to 5, how have your actions changed in regard to promoting and practicing sustainability and conservation *

1 2 3 4 5

I have not changed my actions or behaviors in regard to sustainability and conservation ☐ ☐ ☐ ☐ ☐ I have changed a significant amount of my behaviors or actions to practice sustainability and conservation

After section 4 Continue to next section

Reflection

Description (optional)

On a scale of 1 to 5, how would you quantify the amount of new information that you have learned this semester? *

	1	2	3	4	5	
Learned little to no new information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Learned a large amount of new information

On a scale of 1 to 5, how would you quantify the level of motivation you feel in this class? *

	1	2	3	4	5	
I have little to no motivation in this class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I am highly motivated in this class

On a scale of 1 to 5, how would you quantify the level of engagement (the degree of attention, curiosity, interest, optimism, and passion) that you feel in this class? *

	1	2	3	4	5	
I do not feel engaged in this class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I am highly engaged in this class

On a scale of 1 to 5, how would you quantify your feelings of being able to be successful in this class? *

	1	2	3	4	5	
I do not feel I can be successful in this class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I feel like I can be successful in this class

On a scale of 1 to 5, how would you quantify the learning experience you have in this class? *

	1	2	3	4	5	
I strongly dislike my learning experience in this class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I greatly enjoy the learning experience in this class

Reflect on your semester as a whole



Description (optional)

On a scale of 1 to 5, how would you quantify your learning experience in this class compared to other classes? *

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

On a scale of 1 to 5, how would you quantify the level of engagement (the degree of attention, curiosity, interest, optimism, and passion) that you feel in this class compared to other classes *

	1	2	3	4	5	
I feel less engaged in this class than other classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I feel more engaged in this class

On a scale of 1 to 5, how would you quantify the level of motivation you feel in this class compared to other classes? *

	1	2	3	4	5	
I feel less motivation in this class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	I feel greater motivation in this class

APPENDIX F

LESSON SAMPLE

Divergent Plate Boundaries

Background Information	<p>Volcanoes are erupting right now on Earth. Earthquakes are always happening as well. Don't believe me? Check out the US Geological Service volcano page and earthquake page. Yeah, they are always happening.</p> <p>However, why do they happen where they happen? What impact on the environment does each have? How is the theory of plate tectonics involved with volcanic and seismic activity? This investigation will focus on the causes of volcanoes and earthquakes, the environmental impacts of each, and the overall theory of plate tectonics.</p>
Learning Goal	Describe the geological changes and events that occur at convergent, divergent, and transform plate boundaries

<p>Inquiry Question(s)</p>	<p>You have probably learned about the theory of plate tectonics. The Earth's surface is not a single shell of rock but instead is many large "plates" that move across Earth's surface over time. Some plates have both continental crust (less dense) that forms land, some plates have oceanic crust (more dense and compact) that forms the ocean floors, and some plates have both. However, what happens when these plates meet? How does that impact the geological events/features of Earth's surface?</p> <p>Today you will be examining divergent boundaries. One of the Earth's largest divergent boundaries is found in the Atlantic Ocean.</p> <ol style="list-style-type: none"> 1. Describe the motion of tectonic plates at a divergent boundary like the one in the Atlantic Ocean. 2. Did you know the island of Iceland is on top of the mid-ocean ridge? It is covered in volcanoes. A volcano is defined as a location where magma reaches the surface of the Earth. Describe how/why volcanoes occur at divergent boundaries 3. The longest mountain chain in the world is the Mid-Atlantic Ridge which is along the divergent boundary in the Atlantic Ocean. How do the volcanoes found along divergent boundaries form underwater mountain chains like the Mid-Atlantic Ridge? 4. Have you ever heard of seafloor spreading - how is seafloor spreading related to divergent boundaries? What does that mean for North America and Europe? What does that mean for the Pacific Ocean? 5. How is the African Rift Valley connected to the concept of divergent plate boundaries? 6. True or false: Earthquakes will occur along divergent plate boundaries
----------------------------	--

Classwork	<p>1) Conduct an investigation into the inquiry question(s) above.</p> <p>2) Post your response to the guided inquiry questions in your group's discussion board using the guidelines for quality discussions. Note, you may need to use the internet to perform additional research (check your sources!).</p> <p>3) Review your classmates' posts in your group and reply to each using the guidelines for quality discussions.</p>
Homework	<p>1) Continue the discussion in discussion board as needed</p> <p>2) Complete the concept check using textbook or class resources</p>