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Using Student-Generated Questions to Promote Curiosity and Student Learning

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USING STUDENT-GENERATED QUESTIONS TO PROMOTE CURIOSITY AND

STUDENT LEARNING

by

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CHAPTER ONE

Introduction

Background

Since I entered the teaching profession in 2001, one question students commonly

ask is "Will this be on the test?" While I think I understand the roots of this question, the

question has always been troublesome to me. As a high school social studies teacher, I

know that high school students experience heavy pressure to get good grades from

parents, teachers, counselors and the media. This pressure shapes students' perception

that their future success highly depends on which university they get into. This pressure,

while well-intentioned, sends the message to the students that their schooling is about

getting the grade and point accumulation rather than their learning, self-improvement and

pursuit of their passions.

As an educator in the field of secondary social studies, I want students to be

curious and engaged with their learning. Engaged, curious students are developing

critical thinking skills through questioning. If a teacher can harness student curiosity,

there is an opportunity to facilitate learning that students themselves are interested in

intrinsically, creating a more engaging experience. This brings me to a question of my

own: *how might student-generated questions through the Question Formulation*

Technique (QFT) be used to boost student learning by promoting curiosity? Through this

investigation of curiosity and questioning, creating unit plans and resources for using

QFT, my aim is to show why and how teachers can better engage students in their

learning. QFT is a protocol developed by the Right Question Institute in which students go through the process of writing, prioritizing and investigating their own questions.

Within this chapter, I will be exploring further my experiences personally and professionally that have led me to focus on promoting student curiosity and why I believe that promoting curiosity is so important for student learning.

Roots of the Topic

Throughout my career in education, I have worked in many different places. I have held social studies teaching positions in Minnesota, Colorado and India. These districts have been different in student populations ranging from urban, rural, suburban and international. Engaging student curiosity has been an aim throughout my professional career, although each situation demanded different contexts as to how to promote curiosity.

For the first 6 years of my career, I rarely taught the same course more than once. Each time I moved to a new school and undertook new preps, I would design inquiry projects, where students investigated ideas or problems and presented their findings, with student choice and research. Through class discussions on controversial topics, projects proposing public policy solutions and current events assignments, I tried to find opportunities for students to drive their own learning. Looking back, I am proud of the attempts I made to create valuable opportunities for students to investigate relevant ideas. I also remember the challenge of always designing and implementing new to me curriculum. I knew that promoting curiosity and inquiry-based learning was an area I wanted to continue to explore.

While I have always tried to promote curiosity, I became much more systematic in that approach when I took a position at a school that included promoting curiosity in their mission statement. At the same school I began to teach within the International Baccalaureate (IB) program. According to the IB mission statement, "The International Baccalaureate aims to develop inquiring, knowledgeable and caring young people who help to create a better and more peaceful world through intercultural understanding and respect" (What is an IB Education, 2017, p. 6). Teaching within this program and its emphasis on inquiry gave me access to more meaningful professional development and collaboration around how to more effectively put curiosity at the center of my curriculum.

I was able to further focus on promoting curiosity through our school's social studies curriculum review process. Through that process, a team of K-12 social studies teachers researched best practices, developed our department philosophy within the context of the school's mission statement and reviewed curriculum models that best fit best practices and our department philosophy. The committee decided to adopt the College, Career and Civic Life (C3) Framework for Social Studies Standards from the National Council for the Social Studies (2013). Through the adoption and implementation of the C3 Framework, I was able to increase the focus of my curriculum on the first dimension of the C3 Framework, "Developing Questions and Planning Inquiries." Through piloting the implementation of the C3 framework, I focused on writing big idea questions and, more importantly, using those questions when introducing, reviewing and assessing student learning. I created assignments that explicitly asked students to write

guiding questions with instruction on how to write powerful questions. I began to assess students on their questions, not just their answers. Teaching within the IB framework and implementing C3 was a valuable opportunity to experience how I might systematically develop curiosity. While this was a valuable, engaging experience, when I moved to a new learning community, the systematic forces to focus on questioning and promoting curiosity were not present. I realized how valuable promoting and harnessing student curiosity are to student learning. I began to explore how I might emphasize student curiosity in the new setting.

I have also seen the value of promoting curiosity in my own life. Firstly, through the opportunity to live overseas and the ability to travel. In visiting different countries, my own curiosity was sparked regarding the historical context of the nations and culture of the nations. It also cultivated a curiosity about all the ways I have been enculturated as an American. I was motivated to learn more about the world through the wonderings I had. A second personal experience that has impacted me is to see the great value of curiosity in my two children. Hearing their questions and wonderings, then comparing that with older students who seem to have lost that spark, opened my eyes to the idea that more needs to be done to intentionally promote curiosity in our school systems.

While I have had personal and professional experiences that have helped me see the value of curiosity, I would like to increase the focus on curiosity in my current teaching position. I work at a large school that is affluent, with only 11% of students on free and reduced lunch, mostly white with 71% of the population identifying as white, and has taken a more traditional approach to curriculum (Institute of Educational

Statistics, n.d.). There is a substantial focus on high achievement at the school, high expectations for university admission and thus a big focus on getting high grades. While this focus on scoring high marks on assessments drives students to do well on assessments and learn the material and skills that are on the assessment, students undervalue the understanding itself and seem to have a hard time connecting their learning to the real world. I have worked to promote curiosity in my current position but it has not been a central part of my curriculum in the way that was in my previous school. This caused me to think about how I might take a more systematic approach in my current setting to engage my students in the richness of a genuine desire to learn.

The Significance of Curiosity

Beyond my own experiences, research supports the power of curiosity. Before considering the value of curiosity to learning, we must define it. According to Kidd and Hayden (2015), curiosity is the "drive for the state of information" (p. 4). The drive for the state of information has powerful effects on the learning process. Gruber, Gelman and Ranganath (2014), researchers at the University of California- Davis, undertook an experiment looking at the impact on brain activity when participants felt especially curious. Their findings illustrated the value of curiosity; not only is there far more brain activity during periods of high curiosity, but the participants were also more likely to remember unrelated information. They further stated that curiosity seems to create a "vortex" that sucks in what the learner is curious about, but also, what the learner is not curious about. Secondly, during periods of curiosity, the reward centers of the brain are lit up just as they would be when having a donut or a photo getting a like on facebook.

Clearly, curiosity plays a vital role in student learning both for the topics that peak the students curiosity and for the topics that may be more mundane. From the understanding of the role curiosity plays in learning, one can see how important it is to study how to better promote it through our practice.

While promoting curiosity yields big gains in learning, according to Engel (2013) who visited 5th grade classrooms looking for episodes of curiosity, "...children are spending hours a day in school without asking even one question or engaging in one sequence of behavior aimed at finding out something new" (p. 633). Far too many classrooms do not allow students to wonder and focus on committing facts to short term memory for a test.

Questioning is central to promoting curiosity. The power of questioning can be seen in any Presidential debate, city council meeting, student-parent-teacher conference or decision to make a purchase. Despite the clear importance of the skill, in many classrooms the onus of asking the questions falls on the teacher. This creates a student that can sit back and wait to respond to someone else's question, or worse, try to answer the question not with their thinking but with what the student thinks the teacher wants to hear. Creating and asking questions is what stimulates curiosity, not the retelling of a predetermined answer.

Asking students to generate essential questions for a unit could have big effects on their learning experiences. Students will need instruction and practice at generating and writing good questions. While this may be new to them, student-generated questions give the chance for students to take more control over their own learning and go in

directions they are most interested and boost engagement by making the curriculum more relevant to their own experiences. Through greater understanding of how teachers can harness student curiosity, teachers will have more tools in their toolkit to increase student engagement through relevance.

The Question Formulation Technique (QFT) is one tool that should be utilized by teachers to increase their emphasis on student-generated questioning. The protocol is nimble enough to be used in a wide variety of settings and leads to a "small but significant shift in practice" (Rothstein and Santana, 2011); students ask the questions. The protocol also provides a structure for students to develop their own skills of questioning and build confidence in their questioning skills.

As more teachers gain more information about how student curiosity can be harnessed, it is my hope that they will begin to provide more formal opportunities for students to generate questions. Though teachers are often focusing on covering the state and district mandated curriculum, I hope that teachers understand that a small investment in curiosity will have a big payout in student understanding of the concepts and curriculum they are expected to teach. It does not need to be curiousity or district approved curriculum; they should be used together to boost student learning.

Conclusion

Throughout my experience as a high school social studies teacher I have been looking for ways to increase engagement, relevance and foster curiosity. I believe that harnessing student curiosity is a powerful, though not well used, way to boost engagement and student learning. While I have used teacher-generated questions, I have

only minimally used student-generated questions. This led me to the question: *how might student-generated questions through the Question Formulation Technique (QFT) be used to boost student learning by promoting curiosity?* I believe that focusing my attention on supporting students in generating and investigating questions they write has the potential to continue my pursuit of empowering learners with the knowledge, tools and disposition to impact the world.

This capstone will include a total of four chapters. The next chapter, Chapter 2, the literature on promoting curiosity through student-generated questions will be reviewed. Chapter 2 will review the literature in several key areas; curiosity, inquiry and social studies, questioning and student generated questions. Chapter 3 describes the project and offers a rationale for that format. Finally, Chapter 4 is a reflection of learning and discussion of the implications of those learnings.

CHAPTER TWO

Literature Review

Introduction

As educators, we have seen the power of a student who is engaged with their learning and genuinely wants to know more about what they are learning. It is the rich conversations from insightful questions that move the learning beyond the "what's on the test" question to learning with the intention of better understanding our complex world.

Through Chapter 1, I described my personal and professional experience with promoting curiosity and the desire to know more about how to promote curiosity in my classroom through the research question: *how might student-generated questions through the Question Formulation Technique (QFT) be used to boost student learning by promoting curiosity?*

In Chapter Two, I review the literature relevant to the research question. First, the idea of curiosity must be defined and the need to promote curiosity will be established. Next, I will describe the connection between curiosity and inquiry-based learning in social studies. Then I will look more closely at the role that teacher questioning plays in classroom instruction. The last section of the literature review will justify the use of student-generated questions as well as discuss implementation of student-generated questions in the classroom. Throughout the literature review, the value of a classroom that promotes curiosity will be present.

Curiosity

As a starting point, it is critical that we examine curiosity. An examination of curiosity will provide the context for the premise of the question; that curiosity is a mindset to be encouraged. The examination will begin by discussing the definition of curiosity and its power in learning. Sources provide context as to why curiosity is a valuable mindset to cultivate for lifelong learners. Additionally, the impact a focus on curiously can have on engagement and student learning.

Definition and Elements

Though many will agree curiosity is a valuable trait, there is not as much agreement regarding the definition of curiosity. According to Eren and Coskun (2016), curiosity is the desire to gain knowledge, understanding and sensory information. According to Gade (2011), curiosity is the "pursuit of knowledge" (as cited in Philips, 2015, p. 153). Still others define curiosity as openness to try new things like foods, travel or explore new ideas. Curiosity appears in many contexts. It influences choices of leisure like what books one reads or where one goes for vacation. It influences career paths and progression. In an educational context, curiosity is what drives a student to learn. Teachers evaluate lessons on engagement. In other words, the teacher thinks about how interested their students were in participating in learning the curriculum. A lesson, unit or concept is supercharged when students are intrinsically curious.

While there is no doubt about the power of curiosity in the classroom, one needs to consider the roots of curiosity. Those in education focus on epistemic curiosity which "reflects a desire for new information that motivates exploratory behavior and knowledge

acquisition" (Litman, Hutchins & Russon, 2005, p. 559). There are varying views of how to describe curiosity. According to Eren and Coskun (2016), one can understand curiosity through two lenses. One is interest-type curiosity. This lens is that curiosity is rooted in the desire to know more about new and unusual information. The other is deprivation type. Litman, Hutchins and Russon (2005) described deprivation type as the realization of a gap between current knowledge and desired knowledge. In this view, an individual assesses their feeling of knowing and determines the worthiness of filling the knowledge gap.

Another view of epistemic curiosity comes from Paulo Friere. In *Pedagogy of the Oppressed* (2000), Friere made the case that curiosity is present at birth as spontaneous curiosity and that, through experiences, spontaneous curiosity moves to become epistemological curiosity. Friere contextualizes this transformation through an individual's search for understanding of power and struggle (Phillips, 2015). Furthermore, developing critical curiosity is a catalyst for critical consciousness. Critical consciousness, in turn, is the awareness of the influence of systems of oppression and motivation to take action to change those systems. Friere's work connects curiosity, awareness of the self and society, and social justice.

Benefits of Curiosity

While there are several ways in which researchers frame and define curiosity that were discussed in this chapter, one must investigate the benefits of curiosity.

Many take a very positive view of the impact curiosity has on student learning and the research supports this. According to von Stumm, Hell and Chamorro-Premuzic

(2011), who did a meta analysis of about 200 studies, curiosity had a major impact on academic performance. Through the study, the authors discovered that curiosity is as influential as a student's conscientiousness in their academic performance. Another study conducted concluded that it was easier for subjects to remember information they were curious about. Additionally, subjects also had improved memory for incidental topics as well (Gruber, Gelman & Ranganath, 2014). These two studies clarify that the research supports a strong connection between curiosity and improved student learning.

Curiosity, in the form of Friere's critical curiosity and critical consciousness, has been proven to have many positive outcomes for marginalized students. As discussed above, Friere (2000) argued that critical curiosity was an essential element to challenge the oppressive forces of the power structures in society. Friere argued that, through dialogue, students become critically curious about the systems of oppression and become more critically conscientious. Critical consciousness is the awareness of systems of oppression and, further, the desire to take action (Clark & Seider, 2017). Clark and Seider (2017) cited many positive outcomes of critical consciousness for marginalized students such as higher rates of engagement, academic achievement and civic participation. The impact of inspiring critical curiosity is clear for marginalized students.

Limiters of Curiosity

While the benefits are clear, there are many forces that constrain curiosity. For workers, there are pressures to meet deadlines. Students face practices to attend, jobs to go to, tasks to complete to help out around the house, and the ever present social media. With these forces in play, it is challenging to step back, move beyond our checklists and

consider what curiosities are present or emerging. There are several factors in the education system that also seem to limit the ability to uncover and pursue one's curiosity.

Another limiting factor is what Paulo Friere termed banking education. Friere explained in his book, *Pedagogy of the Oppressed,* the idea of the teacher depositing knowledge in their students. This philosophy of education creates a vision of the learner as a passive vessel waiting for deposits of information from the teacher. This model survives through the role of the teacher being the sage on the stage. In this model, there is no ownership for students. The instructional tools used are often linked to those that students shared with a researcher in reference to why they do not feel curious in school (Goodwin, 2019). According to Reino (2010), more often, teachers "killed" their curiosity with "badteaching," "being mean," "putting no effort into making things fun or interesting," and "drill and kill" activities that stifled "creativity and desire to think outside the box" (as cited in Goodwin, 2019, p. 81). Beyond educational philosophy, there are also systemic pressures which limit a teacher's ability to promote curiosity in the classroom.

One systemic pressure that may be impacting the level of curiosity in students is the current grading system. With so much emphasis on grades, students lose focus on the intrinsic value of learning. Students learn to focus on memorizing information on a test and lose sight of the power of understanding concepts that help them better understand the world. This can be seen in the fact that high school Grade Point Average (G.P.A) and college entrance exams only account for "20-25 percent of the variance in student achievement at university" (Goodwin, 2019, p. 80). Clearly a student can score well in

their courses but not be well prepared for university. Many are questioning how strongly grades actually reflect learning when teachers dole out extra credit points for bringing in tissue boxes. Moreover, according to Eren and Coskun (2016), attempting to spark interest by telling students information presented will be on the test was not an effective motivator for learning. The researchers did find that teachers that were able to use interest type and deprivation type curiosity did reduce boredom and associated reduced academic performance of boredom in students.

Another systemic pressure that limits creativity in the classroom is the number of standards that state governments and local school districts are adopting. Marzano and Kendall (1998) analyzed 160 nation and state level content standards that students are expected to know and be able to do. Through their analysis, they calculate that if 30 minutes of instruction time was dedicated to each standard, 9 additional years would be needed for students to learn them all (as cited in Tomlinson and McTighe, 2006). This overwhelming amount of content yields a content march that skims the surface of some very narrow ideas and little time to pursue student interests.

Teachers and students face a variety of forces in the education system that make it difficult to find time and energy to recognize and pursue curiosity. In order to harness the benefits of curiosity a more systematic approach is needed. Inquiry-based learning is one pedagogical tool that connects learning with student interest.

Inquiry Learning in Social Studies

A shift to reduce standards and deepen learning through the use of the Inquiry based learning began in 2013 when National Council of Social Studies (NCSS) released a

framework for social studies standards referenced in Chapter 1. The C3 Framework is intended to guide states as they adopt state standards that prepare the nation's students for college, career and citizenship. The focus of the framework was the Inquiry Design Model (IDM). Throughout this section of the literature review, an examination of the connection between inquiry-based learning as presented in the C3 Framework and curiosity will be conducted. Starting with a definition with inquiry learning and proceeding to discuss the elements of the Inquiry Design Model (IDM) the investigation will discuss how the IDM connects the student's interest with their learning. At the end of the section, focus is turned to the use of compelling questions that are used to spark the inquiry.

Definition of Inquiry Learning and Elements

Like many initiatives in education, Inquiry based learning is often written about and advocated for but not always clearly defined. According to the Education Resources Information Center (2020), inquiry is the method or process of seeking knowledge, understanding or information. The C3 Framework details this process through its Inquiry Arc which it described as "a set of interlocking and mutually reinforcing ideas that feature the four Dimensions of informed inquiry in social studies: 1 Developing questions and planning inquiries; 2 Applying disciplinary concepts and tools; 3 Evaluating sources and using evidence; and 4 Communicating conclusions and taking informed action" (National Council for the Social Studies, 2013, p. 17). Through its advocacy for the inquiry arc as the instructional model of choice, the National Council for Social Studies (NCSS) has placed inquiry as the central practice for social studies teachers.

In addition to these dimensions of the inquiry arc, inquiry can be looked at through the lens of types of inquiry. This lens allows a teacher to control the level agency. Some students, and teachers for that matter, might be most comfortable with starting with more control in the teacher's hands. According to MacKenzie (2016), in a structured inquiry, the students follow the lead of the teacher as the teacher guides them through the entire process. Controlled inquiry has a little more agency; the teacher chooses topics and provides resources for students to answer questions. Next, a guided inquiry, the teacher chooses the topic but students research and design solutions on their own. The type with the most student agency is called a free inquiry. In free inquiry, students choose their own topics without any guidance on the outcome. One might think that with the range of student agency, inquiry learning would be widely adopted.

Despite all the advocacy and entry points, challenges remain for inquiry-based learning. Teaching requires both content and pedagogical knowledge. While teachers may have the same content knowledge, the "what to teach," they may have different pedagogical knowledge. A teacher's background and experiences has an effect on both their content and pedagogical knowledge (Thacker, Lee, Fitchett & Journell, 2018). Depending on the location, grade level or discipline of social studies, teachers may have a different experience with both content and pedagogy. These differences in either content or pedagogical knowledge lead to different practices in the classroom. According to Mueller (2018), this could be due to a lack of knowledge about what inquiry education is. Mueller (2018) details 6 teachers' experiences with inquiry based learning in Kentucky not long after Kentucky adopted the C3 framework. She found little sophistication in

their definition or examples of inquiry learning. While there was little elegance, there was broad agreement that inquiry puts the student at the center of the learning process. Despite this agreement, the examples of inquiry undertaken had very different levels of student involvement. While very interesting, Mueller (2018) concluded by saying that "these teachers continue to lack confidence and coherence in their understandings." One can see that without confidence in an instruction model, teachers will continue to be hesitant to implement or advocate for its implementation.

Teachers' view of what high quality teaching looks like has also been a barrier to inquiry education. According to Ritchhart, Church and Morrision (2011), teaching for understanding must include considering thinking not just creating assignments and entering grades in a gradebook. The authors go on to describe the model that many teachers view as good teaching where the teacher is the vessel of knowledge and the key to good teaching is the ability to tell and answer all student questions. Further the classroom might be full of activity and assignments that are hands on but minds off, requiring little teaching. This model of teacher expert is very similar to Friere's banking education where students are not inquiring about how the world works but waiting to understand how the teacher describes the world.

After defining inquiry and discussing its elements and challenges, the connection to curiosity is clear. According to Dewey (1933) inquiries are prompted by "a state of doubt, hesitation, perplexity, mental difficulty" (as cited in Mueller, 2018). This is very similar to the definition of curiosity in terms of both interest type but more strongly, deprivation type curiosity. Diminution 1 of the National Council for the Social Studies

(2013) C3 framework, "Developing Questions and Planning Inquiries," supports this stage of the inquiry arc by stating that "Questions arise from students' innate curiosity about the world and from their efforts to make sense of how that world works" (p. 23). This is significant because the Inquiry Arc described in the C3 framework is rooted in harnessing the curiosity of students in order to deepen student understanding of how the world works.

C3 and Compelling Questions

Curiosity is seen in the inquiry arc through a compelling question. A compelling question has two components; rigor and relevance. Relevance means that the question elicits a response from students and engages them. Rigorous means the response to a compelling question requires the use of the tools of the social sciences to answer properly. According to Mueller (2018), these two attributes were essential in practice as well. Without relevance, students were not engaged in the inquiry process and without rigor, students were passionate but lacked the intellectual support for the topic. Rigor and relevance foster a sustained inquiry based in curiosity.

The C3 Framework also discussed supporting questions as a way to develop and sustain the inquiry process. "Supporting questions focus on descriptions, definitions, and processes about which there is general agreement within the social studies disciplines, which will assist students to construct explanations that advance claims of understanding in response" (National Council for the Social Studies, 2013, p.105). While compelling questions are broad, supporting questions support the development of the lines of inquiry

and conceptual lens. Moreover, students' curiosity about the compelling question will grow and change as they learn, leading to more and stronger questions.

When considering the research question, *how might student-generated questions through the Question Formulation Technique (QFT) be used to boost student learning by promoting curiosity?* Inquiry based learning is clearly a move to increase engagement and harness the power of curiosity in student learning. The C3 Framework for State social studies standards provides a model for inquiry that relies on compelling and supporting questions as a vehicle for application of disciplinary concepts of the social sciences. While the Inquiry Design Model creates a model for teachers to follow in moving their curriculum to an inquiry based model, concerns about coverage, pedagogical beliefs and pedagogical knowledge are limiting a deeper implementation of the inquiry model in classrooms across the U.S.

Questioning

When investigating the question, *how might student-generated questions increase engagement and promote curiosity,* one must consider the role that questions play in the classroom. Questioning is an important skill that is often used by teachers. Ask teachers about a practice they use in day to day instruction and they will likely include questioning. According to the online dictionary *Merriam-Webster,* a question is "an interrogative expression often used to test knowledge or an act or instance of inquiry." Additionally, a question can be defined as a matter of investigation, dispute or controversy. There are many uses of questioning in a classroom ranging from assessment, prompting interest, promoting deeper learning and supporting student discussions. While

questions are important and often used, questioning is a skill that takes time to develop. This section will investigate the value of questioning as an instructional tool. Throughout the section, literature will be used to support the idea of power of questions but will focus on teacher generated questions. The section will also discuss the types of questions that occur in a student's learning experiences.

In order to understand the importance of questioning, one only needs to look at the often used tool to evaluate teacher quality, Charlotte Danielson's framework (Walsh & Satties, 2015). The only instructional strategy that is included in Danielson's Framework is questioning. Danielson's rubric focuses on questions that promote student learning and encouraging all students to participate in learning through having their voice heard. This makes clear the power of high quality questioning in a classroom setting.

One reason teachers use questions is to gauge student learning. According to Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich, Raths and Wittrock (2001), "We know that teachers who can question effectively across the levels of Bloom's taxonomy are better able to determine the depth of children's thinking" (as cited in Seegar, Wood & Romans, 2018). This is important because teachers need to use a variety of questions ranging from lower levels of Bloom's taxonomy. Lower-level questions include asking students to identify or define key terms and concepts. Higher-level questions are questions that the teacher uses for more complex understandings like "analyze" or "evaluate." In this use of questions, the key is that the question measures understanding by being clear and concise, there is adequate wait time for students to consider answers and the questions are equitably distributed (Seeger, Wood & Romans,

2018). Despite the research that teachers should use a variety of questions in order to gauge student learning, the majority of questions asked in classrooms are factual in nature (Seeger, Wood & Romans, 2019). While there is room for factual questions such as what happens to crude birth rate when women gain access to education, too many factual questions trivializes learning and will lead students to participate only when they know the answer.

Broader Views of Questions

Questions can also be used to scaffold student reasoning and thinking. The extent to which a teacher uses questioning in this area reflects the teachers view of authority and knowledge in the classroom. When the teacher views students as receivers of knowledge in Friere's banking education previously mentioned, teachers regard questioning as a way to elicit responses that guess what is in the teachers head. From those responses, the teacher imparts their knowledge. As an alternative, teachers who view students as constructors of knowledge will use questions to build and develop student thinking, shared knowledge and lines of reasoning.

There are several ways that teachers use questions to scaffold for students in this way. According to Wang and Wang (2013), asking a student to paraphrase another student's response may elicit deeper understanding. More importantly, the teacher is able to move the conversation to understanding rather than be an evaluator of ideas. Another practice to promote deeper thinking through student voice is to use the question "What makes you say that?" According to Ritchhart, Church & Morrison (2011), the use of this question builds on what the student's current understanding and requires a line of

reasoning. Many teachers use the question "why?" when attempting to elicit a line of reasoning. Because the question, "what makes you say that" is grounded in students as constructors of knowledge, students are far more likely to offer a thoughtful response. Using "why" may elicit a student response based on what the student thinks the teacher wants to hear rather than a response grounded in their own perspective. According to Wang and Wang (2013), teachers also use catch and toss to support students' explanations. Catch and toss occurs when the teacher catches the main idea of the student and tosses the thinking back to the student. Phrases such as "Is that right?" allow the teacher to put the thinking back on the student while eliciting a deeper, more detailed response to a question. Through these practices, teachers use questions to facilitate student construction of knowledge, deepen meaning and support student development of lines of reasoning.

Beyond using questions to gauge student learning and scaffold student learning, one can use questions to frame the core ideas of curriculum. Through the framework of Understanding by Design, Wiggins and McTighe (2013) centered big ideas of units around essential questions. Wiggins and McTighe (2013) stated that:

> essential questions are questions which cause genuine and relevant inquiry into the big ideas of the core content, provoke deep thought, lively discussion, sustained inquiry, and new understanding as well as more questions. Essential questions require students to consider alternatives, weigh evidence, support ideas and justify their answers. (p. 73)

Essential questions are intended to help a student contextualize their learning and develop a broad understanding of big ideas of the core content of a course. According to Seegeer, Wood and Romans (2018), teachers need to design essential questions to help students connect current knowledge to new learning. Through this use of questions, questions need to be formulated to go beyond asking for the right answer to promote thinking. This represents a shift in thinking from current practice of a call and response in the moment to teachers crafting questions thoughtfully and intentionally to promote learning.

One other way that questions influence student learning is through participation in peer discussion. According to Gad (2000), student engagement drops when teachers are talking and many teachers talk a lot. Some research indicates that teachers talk for 70 to 80 percent of a class (Hattie as cited in Gewertz, 2012) In order to promote deep learning and promote student engagement, teachers turn to student discussion. Teachers craft questions for students to discuss in small groups, socratic seminars, fishbowl discussions and paired activities. Questions that go beyond finding the correct answer are essential for students to feel comfortable in participating and practicing skills of collaboration and discussion (Seegar, Wood & Romans, 2019). Prewritten questions also allow the teacher to organize and create scaffolding for students to discuss complex topics (Lennon, 2017). Student discussion also means that many students are talking and interacting with other students rather than focusing on saying what the student thinks the teacher wants to hear. As discussed previously in this section, the key to engaging, thoughtful discussions is open ended questions that are framed to elicit claims, evidence and reasoning to promote student voice rather than teacher voice.

Clearly questioning is a powerful tool to promote engagement, deepen learning and framing student learning. When considering the research question *how might student-generated questions through the Question Formulation Technique (QFT) be used to boost student learning by promoting curiosity?* questioning plays an important role. The research suggests that the most effective questions move beyond trivializing learning. At the same time, it is a challenge to break the model of asking fact based questions and using teacher centered practices. This duality causes one to consider one practical change that could open up student engagement and harness student curiosity: promoting students to the role of the questioner.

Student-Generated Questions

The role of curiosity, inquiry learning and teacher questioning have been discussed thus far in the investigation of the research question: *how might student-generated questions through the Question Formulation Technique (QFT) be used to boost student learning by promoting curiosity?* This section will dig further into the power of students writing their own questions and serve to connect the idea of a way to promote curiosity and engagement. The investigation through this section is meant to establish the extent to which students should receive instruction on creating questions and how effective a curriculum designed around student-generated questions can be at promoting curiosity, engagement and boost student learning.

Teaching the skill of questioning

It is critical that students learn the skill of questioning. This is particularly true as access to information has become ubiquitous. A smartphone holds access to infinitely

more information than bookshelves of 30 years ago. With this access comes the need for other skills to contextualize the information. This shift is recognized through inquiry learning and the C3 Framework discussed previously. Inquiry learning begins with a provocation, a question. We want our students to develop skills of inquiry they will use throughout their lives in their postsecondary education, jobs and through participatory democracy.

Teaching the skill of questioning will equip students beyond the classroom walls. Rothstien and Santana (2011) argued that teaching skill of questioning will lead to students becoming more independent learners who know how to formulate broad questions that drive to the heart of their learning. Universities demand students to be inquirers and businesses demand workers who ask the "right questions" (Rothstein & Santana, 2011, p. 13). The skill of questioning is also highly valuable to our democracy. The ability to ask the right questions can facilitate one's ability to interact with public institutions. The reality is that most interactions happen at the local level. That might be a town forum about light rail in the community, open house about a redevelopment project or a public meeting to discuss racism in schools. Certainly the ability to ask questions will elicit a more informational response. Beyond that, the skill of questioning gives confidence to participate in the decision making of the community. More participation can complexify the demoncratic process but ultimately a democratic society needs to be representative of the community. Thus more effectual participation will lead to a stronger democratic society.

While the skill of generating and using questions is key to those roles we are preparing students for, it is a skill students rarely have the opportunity to use. One study found that teachers ask 50.6 questions per hour and students ask 1.8 questions per hour. In fact, many teachers report getting students to ask questions is like "pulling teeth" (Rothstein and Santana, 2011 p. 9) After all formulating questions is no easy task. In one case study presented by Rothstein and Santana (2011) in their book, *Make Just One Change*, students consistently discussed feeling challenged, stimulated and exhausted by formulating, revising and prioritizing questions. According to Harris, the fact that there is no other species that asks questions demonstrates the level of cognitive complexity needed to formulate questions (as cited in Minigan, Westbrook, Rothstein, & Santana, 2017).

The shift required to teaching students to question is important but need not require an overhaul of curriculum materials or large investment of time. Considering the limiters to curiosity discussed earlier in Chapter 2, using student-generated questions may seem like time taken away from the content that teachers feel so much pressure to cover, however, using student-generated questions may be seen as a shortcut rather than a distraction. With practice, students "become more curious and engaged and take on new ownership of their learning" (Rothstein, Santana & Minigan, 2015). This will in turn lead to deeper and more effective learning. Through student curiosity, engagement and ownership, Rothstein and Santana (2011) said that teachers that integrate student-generated questions actually lightens their load. Students are doing the thinking rather than teachers doing the thinking and depositing the knowledge. Moreover, using

student-generated questions does not require expensive curriculum or consultant fees. Rothstein and Santana presented case studies that show shifting to student-generated questions has worked in urban, suburban and rural classrooms; well funded and underfunded schools.

While a shift to student-generated questions does not require huge investments, it can have a significant impact on students. Rothstein and Santana (2011) explained three impactful changes through a shift to student-generated questions. The first is students become more engaged. Rothstein and Santana describe how students are able to connect their interest to the content of the course. In traditional models, teachers tell students what they will learn. In doing so, the teacher limits the students opportunity to share what interests they have and how that might connect to the content. Further, the teacher continues to deliver instruction that fails to recognize how the curriculum might perpetuate what Paris and Alim (2017) called an "assimilationist and often violent White imperial project" (p. 1). Using student-generated questions allows for those marginalized students to focus their questions in ways in which their interests are at the center of the classroom, rather than the systemic elements that have traditionally influenced classrooms. Paris and Alim (2017) called for teachers to "honor, value and center the rich and varied practices of communities of color" (p. 6). Through student-generated questions all students can see their ideas in interests at the center of the learning. All students' curiosity is promoted and students design questions they are interested in.

Engagement also follows from ownership. According to one teacher involved in case study in *Make Just One Change*, using student-generated questions led her students

to take more ownership of their learning "than she had ever seen" (Rothstein and Santana, 2011, p. 10) The teacher explains, "They're more motivated to find out the answers to their own questions." It is not just the teacher's view. One student adds "You need to learn to do it, because when teachers tell you what to think you don't learn nothing" (Rothstein & Santana, 2011, p. 10). Using student-generated questions puts the onus and, thus the ownership, of learning on the student but teachers may still be hesitant to make the shift to student-generated questions without a model for teaching students to write questions.

Rothstein and Santana have developed a protocol to support students in their development of questioning. Their protocol, Question Formulation Technique (QFT) is based on their work with K12 educators in a variety of settings, adult literacy programs, work with parents and other community organizing. QFT is a process in which students generate questions, refine questions and prioritize their use. Rothstein and Santana (2011) described three thinking abilities students use in the QFT process. They are divergent thinking, convergent thinking and metacognition. Before discussing these processes further, it is important to know more about the steps of QFT.

The first step in the QFT process is developing and choosing a question focus, referred to as the "Qfocus." This is the stimulus the teacher selects that students will use to generate questions. The qfocus needs a clear focus that will guide the students to relevant curriculum, stimulates thinking but does not go too far in giving too much direction. One example might be, torture can be justified. It is important for the teacher to

spend time considering the pros and cons of a qfocus to encourage divergent thinking but guide students to focus on the important curricular purpose of the topic.

The next step is the rules for producing questions. Rothstein and Santana narrowed the rules to four:

1. Ask as many questions as you can.

2. Do not stop to discuss, judge or answer any of the questions.

3. Write down every question exactly as stated.

4. Change any statements to questions. (p. 19)

The authors went on to describe the need to help students process the rules. Additionally, the teacher's role moving toward the next steps is to remind students of the rules and redirect students when they stray from the rules. After introducing or reminding students about the rules, students work in small groups to generate questions. After generating questions in small groups, students work on improving questions. Here the focus is on recognizing the difference between open and closed ended questions. Students work with the teacher to uncover the advantages and disadvantages of the questions. Students use convergent thinking to clarify the inquiry and create a shared meaning of the questions they generated.The next step is to prioritize them. The teacher lays out guidelines for criteria depending on how the questions will be used. Students are then tasked with using the questions. The teacher describes the next steps depending on their curricular goals. The final step in the process is for students to reflect on what was learned, how it was learned and how their thinking has changed through writing and answering the questions.

Rothstein and Santana (2011) highlighted several key elements to effectively use the QFT process. One is to take time in designing the Qfocus. A second is that the teacher should not provide examples. Rothstein and Santana explained that with only one example, the divergent thinking and the cognitive load that goes with it will be limited. Third, it is very important that the teacher only validates questions rather than praise. Rothstein and Santana are very clear that praising a question is the equivalent to showing your hand in poker but it means that other students will begin to wonder if their questions are what the teacher wants. This means that they are no longer writing questions out of curiosity but writing questions to "guess what the teacher wants." Rothstein and Santana (2011) suggested a simple thank you in response to a student sharing a question. Last, they suggest that it is very important to not skip the reflection. The authors warn that without reflection, students will miss the opportunity to "name what they have learned…" (p. 120). Moreover, students are more likely to see QFT as only worth doing because it is "required by the teacher" (Rothstein & Santana, 2011, p. 120).

Through QFT, teachers are able to harness student curiosity, promote engagement and create ownership for student learning. The process allows for teachers to ask students to generate questions in a variety of contexts as well. QFT could be used to introduce a unit or concept, it could be used to support students beginning a research project, or it could be used to generate questions that will appear on a summative assessment. My project will provide examples of how QFT can be seamlessly integrated in my Advanced Placement Human Geography class in the aforementioned contexts.

Conclusion

Using student-generated questions in the classroom has the great potential to boost student learning. Using questions has long been a practice for teachers. That practice has often been limited to narrow, factual based questions. Student centered practices of inquiry based learning and UBD are moving educators to focus on more broad based questions that are rigorous and relevant. While the change to broader questions is a positive move toward harnessing curiosity, to continue centering teacher questions would mean that an opportunity is missed. The research uncovered in the investigation of my research question, *how might an emphasis on student-generated questions increase student engagement and encourage curiosity* shows that when students generate the questions, the benefits of curiosity can best be achieved. Students are more engaged. Moreover, students take ownership for their learning and perhaps most importantly, students learn a valuable skill to improve their college, career and civic readiness.

The next chapter will describe my capstone project. The project will include unit plans, lesson plans and other resources for teachers that are interested in implementing student-generated questions. My hope is that this project will show teachers how a relatively small change in practice can shift the culture of the classroom. Additionally, I hope to impact students who experience the shift in the classroom and beyond.

CHAPTER 3

Project Description

Introduction

As outlined in Chapter 1 and Chapter 2, curiosity is a powerful vehicle for generating interest, engagement and ultimately learning. While the importance of curiosity is unmistakable, there are challenges that seem to be preventing teachers from harnessing their students' curiosity. It was this paradox that prompted the research question, *how might student-generated questions through the Question Formulation Technique (QFT) be used to boost student learning by promoting curiosity?* Chapter 2 reviewed the relevant research surrounding curiosity, and how questions are used by teachers and students in a social studies classroom.

As with many philosophical beliefs, the widely held belief that curiosity is a powerful tool does not seem to translate to classroom practice. One reason theory does not match practice lies in the challenges of implementation. Rothstein and Santana (2011) tried to fill the gap through their QFT protocol. This project takes QFT one step farther to provide practical resources and demonstrate how QFT can be used to be a powerful shortcut to learning and engagement rather than one more initiative required of teachers through a unit plan centered on QFT. This chapter provides an explanation, timeline and rationale for the project, the theoretical frameworks of the project, and the setting and participants of the project.

Rationale

Curiosity is a powerful tool for teachers to harness in their classrooms. As discussed in Chapter 2, curiosity is shown to improve memory of specific and incentential knowledge. Moreover, von Stumm, Hell and Chamorro-Premuzic (2011) found that curiosity was as important as conscientiousness in students' academic success. The power of curiosity reaches beyond those that do traditionally do well in the classroom. As Clark and Seider (2017) found, marginalized students academic success was boosted through critical consciousness rooted in critical curiosity.

Given all of the forces pushing teachers toward coverage and a top down curriculum set at a state and federal level, there is a great need for teachers to have tools which allow them to harness their student interest. Additionally, students need opportunities to develop the mindset of curiosity. This project highlights one way teachers can challenge students to think critically about the curriculum and uncover what the students themselves are interested in. An emphasis on student-generated questions, through the QFT, provides a research tested approach to supporting students and teachers in shifting the ownership of questioning from the teacher to the student. Through my experience as a social studies teacher, I have often wanted to shift my instruction to harness student interest and make my curriculum more relevant. This curriculum project offers an opportunity to do so and provides resources to others that are looking to bridge their philosophical beliefs and practice.

Project description

      This section lays out the specifics of the curriculum project to create curricular materials that integrate QFT in a variety of ways. The curricular materials included are: a unit plan, individual lesson plans, slideshows, assignments, assessments and resources used to support the use of QFT. The materials were designed to show how QFT can be used to create big idea questions for the Political Patterns and Process unit of the Advanced Placement course. The unit is 12 days in a block setting and designed for a remote learning environment. Lesson's generally were created with a short synchronous session and independent learning structure for the balance of the block. At the beginning of the unit, students use QFT to create a big idea question, then track how each topic helps them respond to their question in preparation for the end of unit summative, a visual response to their big idea question.

      Though these curricular materials were developed for an AP Human Geography course, the intention was to provide practical resources that could be adapted to other social studies courses.The graphic organizer could easily be adapted to fit learning objectives for other subjects or units. Additionally, the QFT guide could be adapted depending on setting and the purpose for asking students to generate questions. Beyond an individual teacher's plan, the hope is this curriculum project will support teachers in moving to more student-generated questions as a framing for their instruction.

      In addition to the the Policial Patterns and Process unit plan, an example of how QFT might be used to drive an investigation rather than spark an investigation. In this setting, students have already been introduced to a major research writing project and

selected a topic. The project asks students to select a social problem, evaluate solutions and recommend how to solve the social problem. Here, QFT is used to support students in brainstorming the supporting questions that need to be investigated to evaluate and recommend solutions. Students use the questions they generate to drive the beginning of their research process. QFT is used in a single lesson. This demonstrates the versatility of QFT and student generated questions. This resource would also be beneficial to support students who are preparing for a debate, discussion or presentation. With these resources in mind, one must now turn to the theoretical frameworks of the project.

Theoretical Grounding

This project was grounded in several theoretical frameworks. The first is the constructivist perspective. According to Creswell and Creswell (2018), the constructivist approach is that one tried to make meaning to understand the world in which they live. Through this lens, one can see that constructivism and curiosity are clearly linked. The idea that curiosity is a skill to be built and harnessed is rooted in the idea that people seek to make meaning about the world around them. From a teaching perspective, the constructivist perspective explains the desire to find meaningful resources to uncover the relationship between practice and student curiosity.

Centering student questions in one's practice also represents a shift in theoretical approach. As discussed in Chapter 2, teachers often ask the questions in the classroom. Those questions are often fact based and the teacher is looking for a specific answer. Shifting to student questions changes the orientation of learning to the student and away from the teacher. Another shift in the orienting lens of education is the shift away from a

fact based set of standards to inquiry based learning focused on skill development and conceptual understanding of a discipline.

Another orienting lens was the Understanding by Design (UBD) Framework for unit planning. According to Tomlinson and McTighe (2006), Understanding by Design focuses on students developing "powers of mind" (p. 1) and understanding of content standards. UbD, through its structure of first determining desired results, then determining how to plan instruction so that students achieve those results, places the highest importance on understanding the big ideas of the curriculum. Use of this orientation for a unit plan creation in the curriculum project means that great care was taken to center the content standards and achieve the desired outcomes set forth in the unit plan.

Timeline

Through enrollment in GED 8490: Capstone Project in the fall of 2020, I have completed this project. The course runs from August 31, 2020 to December 10, 2020. There are several key tasks to complete. The first key deadline to meet was to revise Chapters 1-3. These revisions were completed through the help of my content and peer reviewer by October 17th. The next step was to write the unit plans and lesson plans as described above. In doing so, other resources will be created to support the implementation of QFT. This step will require several weeks to complete. Completion of these unit plans and lesson plans occurred by November 23. Finally, Chapter 4 was drafted and revised and final revisions were made over the course of the final 2 weeks of the course.

Setting and Participants

This curriculum project was designed for a high school in the western suburbs of an metropolitan area in the upper midwest. In terms of geography, the district covers 38 square miles and has 12,990 students. The high school is one of the largest in the state with nearly 3,700 students (Institute of Educational Statistics).

The student population at the high school has a relatively low, though increasing, population of non-white students. In fact, 71% of the student body is white and 29% is non-white, nearly half of the non white population identifies as Asian, mostly East and South Asian. While across the country there are more non white students in the United States than there are White students, that is not the case at this school. The high school is also highly affluent, with only 11% of students receiving free and reduced lunches.

The focus of this curriculum design project is Advanced Placement Human Geography. The course is an elective course offered to students in grades 9-12 by the social studies department. Students who enroll in this course have completed the one term elective course, Human Geography. The course is a 9 week course and currently one section is offered. The audience for the course is varied as students sign up for it for a variety of reasons, students who are interested in global affairs are encouraged to sign up through the school's registration guide. There is also a broad range of ages of students which impacts the skills students have developed. Some students are just transitioning to the high school setting while others are in their final year of their k-12 education.

Impact of the unit plan could be seen in several ways. Student surveys could be given to gauge the extent to which students felt the teacher encouraged curiosity, student

questions and students felt they were able to pursue their interests. Moreover, student exemplars of the end of unit assessment assess the question students create thus assessing the skill of questioning.

Summary

Curiosity is an important habit of mind that can be cultivated through the QFT protocol. Through this curriculum design project, teachers will be able to access lesson plans, unit plans and other resources to implement QFT. Through QFT teachers will be able to harness student curiosity and develop students inquiry skills. Moreover, students will be in control of their learning. In the examination of the research question, *how might an emphasis on student-generated questions increase student engagement and encourage curiosity* I have found that student-generated questions certainly impact engagement and encourage curiosity. In Chapter 4 I will discuss my major learnings from completing the project, most influential literature to the creation of this project and how I hope that this project can impact students through closing the gap between philosophy and practice.

CHAPTER FOUR

Chapter Overview

High school students face many pressures that can distract from the focus on the intrinsic value of learning. The pressure to get good grades and to be successful after high school can lead to a focus on how to earn points rather than a focus on learning and development of skills. Teachers also face many pressures to cover an overwhelming amount of curriculum, prepare students for tests that focus on rote memorization and award points. As a teacher, I have always been interested in trying to bring the focus back onto the learning rather than the grades or curriculum covered. It is this desire to find practical ways to harness and encourage our natural desires to learn that led me to the question: *how might student-generated questions through the Question Formulation Technique (QFT) be used to boost student learning by promoting curiosity?*

After reviewing the relevant literature, I created a 12-day unit plan for an Advanced Placement Human Geography course. In that plan, I integrated the use of QFT to support students writing their own big idea questions, track their responses throughout the unit, and create a big question visual at the end of the unit. Additionally, I created an activity to illustrate how QFT could also be used to promote a deep dive into researching a topic the student has selected.

Chapter 4 is a reflective summary of the Capstone project process. This reflection includes a look at the major learnings that have occurred, how the literature discussed in Chapter 2 influenced my project, the implications of the project as well as the limitations of the project. Also in Chapter 4, I offer what I think the broader impact of my project is

in terms of how the project will benefit other teachers and what needs further investigation.

Major Learnings

The capstone process was extremely engaging and led to some takeaways that will shape the course of my personal and professional growth. As a researcher, I was reminded how important it is to seek out literature that furthers your professional goals. In saying this, I mean that I often find myself caught in the day to day minutiae of teaching. This process afforded me the opportunity to go beyond the day to day lesson design to consider how I might make a more systemic change to my instructional practice to help students learn authentically and create a more rich classroom environment. Moreover, I was reminded how interested I am in tracking the learning of my students through a variety of methods. It is important to me to assess and reassess what I am doing. Through reading the literature of other researchers and considering how I will know if my practices are effective, I became more aware of how I might better collect information.

As a teacher, I was reminded of the importance of unit planning and lesson design. As mentioned, I find myself falling into the trap of the day to day tasks of teaching. For me, this means that I may stray away from articulated learning outcomes. By using the UBD framework to create a unit plan, I was reminded to really focus on the learning outcomes. This has also meant better communication of those learning outcomes though more emphasis on how we are going to learn and why we are going to learn this curriculum.

In Chapter 1, I stated that I have always wanted students to be curious and engaged in their learning. While that is true, I did not realize the power of curiosity in learning. Before this project, my sense was based on my own intuition. Now I realize that the power of student curiosity is rooted in research. I also deepened my understanding of the power of curiosity to reach each and every student. Promoting student-centered curiosity means that students are pursuing their interests regardless of social group. Students in marginalized communities should question the systems that are in place. Moreover, students should question the curriculum that political entities have approved. By promoting curiosity, teachers can develop this critical consciousness of each and every student as well as move their curriculum to be more culturally sustainable.

Reflection on the Literature Review

The literature review was an important opportunity for me to investigate the relevant research into curiosity. Through my review of the relevant literature, I was able to solidify my understanding of curiosity, consider the role it plays in the classroom and dig deeper into practical practices that can influence teachers to include more student questioning in their instructional practices.

Power of Curiosity

Several sources were extremely significant in helping me develop my understanding of the power of curiosity. Gruber, Gelman and Ranganath's (2014) work suggested that when students are curious, they learn more about the subject of their curiosity and, also, incidental information as well. I found this to be really important in illustrating how important a tool curiosity is for teachers to harness. To me, this means

that students will learn the curriculum of the course even if it is not specifically what they are interested in. This was really influential to my capstone project because it motivated me to consider practical changes to classroom practices to harness this powerful learning tool.

Another key source that illuminated the power of curiosity is Paulo Friere's work. Two important takeaways from his work emerged. First, that development of critical questioning, and thus critical consciousness, was significant to reaching marginalized students. This reinforced the idea that curiosity is a powerful tool in reaching students who historically have not been as engaged in school. Second, the power of curiosity was illustrated by the need for critical questioning to promote civic engagement and social justice. Curiosity is central to a student questioning the power structure that institutionalized oppression. In other words, curiosity is the first step to dismantling systematic oppression.

Reviewing this literature was influential to my understanding of how important curiosity is and the necessity for more instructional practices that harness and develop curiosity in students.

The Gap Between Theory and Practice

Another area that jumped out at me through the literature review was the idea that teachers often recognize the importance of curiosity in powerful learning but their practice does not often mirror this belief.

Several sources highlighted the reality of classroom practice. Mueller's (2018) research that after the adoption of the C3 Framework, which is based on inquiry and

curiosity, teachers were hesitant to implement inquiry-based learning due to a lack of confidence and coherence in understanding the practice. Additionally, Ritchart, Church and Morrison (2011) described teachers who view good teaching as the ability to tell and answer student questions. Ritchart, Church and Morrison went on to describe a classroom that is hands-on and minds off. Finally, Rothstein and Santana's (2011) description of questioning in the classroom illustrated the reality of classroom practice by finding in their study that teachers ask 50.6 questions per hour and students ask just 1.8. This research pushed me to find a practical practice that could be integrated into instructional practice to shift the balance back to student-centered questioning.

Through the literature review, the power of curiosity became clear. Though this power was clear, it also became clear that there are many limitations that teachers face, including their own perceptions, that prevent them from effectively harnessing and developing students' curiosity in their instructional practice. I wrote my unit plan with the idea that using the Question Formulation Technique (QFT) was an effective, practical, minimally invasive way to harness and develop student curiosity.

Implications

Through the creation of this project, I have reaffirmed my belief that teachers can impact change from a grassroots level. This project demonstrates that a teacher can make one shift in their instructional practice to increase the number and quality of questions students ask. Through this, students will take more ownership of their learning and develop their critical questioning skills. While it is clear that teachers are at the center of making the shift, school districts have an important role to play.

School districts should encourage teachers to adopt practices that support inquiry, curiosity and student centered questioning through professional development and instructional coaches. QFT is well explained by Rothstein and Santana (2011) in *Make Just One Change* as a low cost, minimally invasive change that fits the shift that needs to occur. QFT does not require an adoption of expensive curricular materials but does require affording time to teachers to revise unit plans and daily lessons. That said, a teacher need not rewrite their whole curriculum but, rather, they would look for opportunities to integrate QFT in their setting. Offering professional development courses on days designated for professional development would be an effective way to introduce the idea. Most significantly, time should be dedicated to teachers to develop one activity, lesson or unit that incorporates QFT.

Limitations

My capstone project demonstrates the way in which QFT can be incorporated into a content-heavy Advanced Placement course however, the project is limited in several ways.

The most significant limitation stems from the context with which the curriculum is developed. This unit plan is developed for a remote learning environment. This influenced the activities and support the students received throughout the unit. Certain activities are more challenging through a conference class. Class and small group discussions are challenging to conduct due to student anxiety of seeing themselves on the screen, weak internet connections or the likelihood that the student is in an environment where other members of the household are speaking, working or learning. In some ways,

the unit plan is designed to demonstrate the versatility of QFT but the lack of the richness of student conversations around their questions might limit its effectiveness.

Another limiting factor was my experience with the content. While I have been teaching for almost 20 years, this is my first time teaching AP Human Geography. Significant time was spent creating and compiling instructional materials and resources. I did not have the experience and bank of materials that comes with years of teaching a course.

The time to create and compile resources that fit the remote learning environment led to a change in the scope and timeline for completing the project. Initially, I planned to create 3 separate ways QFT can be used in a classroom setting where students create different types of questions: a unit plan where students create essential questions, a lesson plan with questions to spark interest and an end of unit project where students create driving questions. As I was working, I decided to integrate the unit plan and end of unit project idea so that the unit plan centered around using the essential question the students create to create a response at the end of the unit.

Next Steps

The completion and submission of this project should add to the conversation about how to inspire students to wonder, learn and act. While states have adopted the C3 Framework, teachers value curiosity and student voice, the factors that limit teachers in using instructional practices that harness and promote student curiosity are still prevalent. Combating these factors will take continued action and discussion of how to best incorporate student interest into teacher practice.

Based on my experience as a classroom teacher and with creating this project, more collaboration is needed between administrators, instructional coaches, teacher teams and individual teachers. Further projects that illustrate how an organization can create a culture of teaching and learning that curiosity is at the center of the school culture. I am left wondering, what might it look like if the building and district goals were not centered on ACT results or Advance Placement scores but rather students developing their curiosity. I believe that those results would still be strong, maybe even stronger, but with a focus on the vehicle of curiosity rather than the result puts the emphasis back on learning.

While the systemic approach to change is important, the project has given me keen insight into how I might further the conversation within my own sphere of influence. I work with several teams of teachers and have already been sharing how we might better use QFT to boost our student learning and support students in developing their sense of curiosity. Through those discussions, the focus has shifted to how do we support students in sustaining inquiry to deepen their investigation into complex subjects. I hope to continue to be a voice within my professional learning community that reminds my colleagues that we can make minimally invasive changes that can have a big return for students.

Summary

Throughout this chapter, I have offered my reflections on my experience creating my capstone project in response to my research question: *how might student-generated questions through the Question Formulation Technique (QFT) be used to boost student*

learning by promoting curiosity? I discussed my major learnings, revisited the literature that was most influential in the creation of this project, the implications and limitations of the project and next steps.

The capstone project process was an important part of my professional learning journey. Taking the time to be a learner, researcher and creator has been a powerful experience as I think about what I want for my students and society. Our society relies on our education system to prepare them for social, civic and economic success. I believe that a cornerstone of our system should be experiences that harness and promote curiosity and I will continue to look for ways to honor that belief.

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