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Increasing Engagement in Youth in a Juvenile Detention Facility: Teaching Science for Social Justice

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Increasing Engagement in Youth in a Juvenile Detention Setting:
Teaching Science for Social Justice

A Project Presented to
The Graduate Faculty of
Minnesota State University Moorhead

By
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Abstract

Science is a subject that lends itself well to an inquiry-based approach to teaching instead of memorizing facts and ideas. However, there are still teachers who are not utilizing student-centered methods that allow students to practice science as they learn the concepts. While many students can still pass their courses, unique populations of underrepresented students struggle to engage with the material as it is presented. In this study, the researcher utilized a social justice approach to teaching science to her classes in a juvenile detention facility to measure their engagement levels. She did this by allowing the students to engage in scientific activities that were meaningful to them in order to refine their conceptual knowledge of science and practice real-world skills while learning science in order to increase their self-reported levels of engagement with the material. The study showed that student engagement levels increased by 20% during the study and students reported an ability to utilize skills that will be an asset to them in their family and community settings through a deeper understanding of the science content.

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Chapter 1

Introduction

Science is meant to be an engaging subject. Its wonders are limitless, and it lends itself naturally to inquiry. For many students, however, the sheer amount of background knowledge is daunting. Students who fall behind in school often struggle to keep up with their grade level peers. Students with lower reading levels might wrestle with the use of scientific vocabulary. Historically, science was known as a subject for white, cisgender males. There are not many minority scientists who stand out in their fields in early days of science in the United States that students can look up to. Female students often tend to be apprehensive about a subject wherein women have been historically bullied and even abused by male scientists. Minority students often feel underrepresented and find it difficult to become engaged with the content and the class (Upadhyay, 2010).

Teachers working in juvenile detention systems are often found in the unique position of seeing students from many different backgrounds with various levels of need. Students are placed in classes based on their living pod families, not which grade they are in. In any given class, there may be students ranging anywhere from grade six to grade twelve. Within a class, students' ability levels vary greatly. There may be sixth grade students that read at grade level, but also, for example, twelfth grade students who are still emerging readers and eleventh grade students who can't read at all. It is always challenging, but maybe more so in that environment, to keep students of all levels engaged in class so they may learn the content. In order to keep all students engaged in class, it is necessary to find a way to hold their interest, regardless of their grade and ability level. By utilizing social justice teaching in my classroom, I believe that

students will not only be more engaged, but also be better prepared to be good citizens once they leave their placements and are out in their communities.

Brief Literature Review

Teaching science from a social justice perspective is a relatively new topic with a minimal amount of research. Yet, the research that has been done brings up several valid points. It is the teacher's responsibility to create an environment where students can engage with the class. Winter (2007) explained that science emphasizes quantitative investigation and logic, but rarely focuses on the issues of society. When students don't feel connected to the material or to the class, they do not engage with it. In order to increase that engagement level, Rodriguez and Morrison (2019) recommend utilizing some form of problem-based learning. They found that marginalized youth respond better to a connection between themselves and their community and want to learn the concepts that they can apply to various social issues.

Dimick (2012) found through her research and experimentation that students had more positive reactions and classroom experiences when they took active roles in their science learning. This finding, congruent with many other studies, showed that when students participated, they learned more and were more engaged with the necessary background information that they were unable to access in lecture-based science classes. After reviewing literature, the researcher understood the significance of this concept and has been able to learn how students were positively impacted by a more problem oriented and social justice focused classroom environment.

Statement of Problem

There have been many resources utilized in engaging students in their science classes. Teachers have started teaching science based on video games, storylines, and naturally occurring

phenomena. While these solutions initially capture the attention of students, they often do not remain focused on the scientific concepts they are learning. Instead, they turn to the instant gratification of earning badges and rewards. Students can memorize scientific content, but soon forget it without ever actually understanding the how or why behind the ideas. Students don't care to read through a textbook. Even if they do, finding answers to textbook questions don't engage students and make them want to learn. With science, like any subject, the school day should never be the end to their learning until the next class period.

Keeping students engaged in any situation can be a difficult task, especially when they do not connect with the subject and have issues going on in their personal lives. Students in juvenile detention centers are often directly facing past trauma issues, such as homelessness, court and probation, histories of abuse and abandonment, addictions, gang violence, and just not being able to be at home with their families and friends. This can make focusing on school more complicated. In order to engage students more fully in science class, the researcher has decided to try teaching science classes through a social justice lens to offer them more connections between the topic and the communities the students belong to on the outside of the detention center.

Purpose of the Study

Many teachers have one simple wish for their students and that is for them to become knowledgeable, empathetic, and productive members of their communities. The researcher had the same hopes for her students. Students in the juvenile system often have bleak outlooks for their own lives, but the goal of the research was for them to maintain their sense of wonder about the natural world and to want to do well in their communities. The purpose of the research was twofold. First, as an attempt to gain the information needed to teach science to students through

the lens of social justice. Secondly, to utilize the information to increase levels of student interest and engagement in the classroom.

In order to teach science classes from a social justice perspective, teaching methodology was switched to create a classroom that was more student led. Valadez and Moineau (2010) completed a study where their students were able to assist in creating the content and activities for their own class. The students utilized situations and activities that would help them to be more responsible and able to help out other members of their community. For example, in order for them to make posters about sexually transmitted diseases (STDs) for their community, they first needed to learn about STDs, the damage they can do, and how to prevent them from occurring and spreading. This idea came from the students after being given a handout of possible topics they could choose from. When students have a say in creating the content, they are more engaged because they get to learn about topics of interest to them. In order to increase engagement in my science classes, student choice will be a prominent factor in building relationships with them and keeping the engagement levels high.

Research Design

According to Fraenkel et al. (2019), ethnographic research emphasizes the documentation and portrayal of everyday experiences through in-depth interviews and continual observations in order to capture the entire depiction of what is happening. Ethnographic research has the unique ability to capture an accurate picture of subjects in their natural setting to gain a better understanding of a situation.

Participants

Students in the facility came from Minnesota, North Dakota, and Wisconsin. These students were between the ages of 12 and 18. Students typically stayed for a minimum of a 30-day evaluation, up to several years. They come to the facility with mixed ability levels. Some are non-readers and some are excellent readers. At the time this study took place, there were a total of 71 students ranging from 5th grade to 12th grade. 88% of students were at least one grade level behind in credits. There were also four students who could not read simple words, and two students on the Autism Spectrum. There were 60 students working on their Biology credit, one student working on 5th grade general science, 7 students working on Physical Science credits, 2 students completing their Chemistry credits, and one student studying for her General Equivalency Diploma test. The facility houses students based on their level of needed security, with more privileges given to students in nonsecure classes and extended privileges given to those in the independent living program.

In this facility, behavior levels were assigned by county staff outside of school hours and school scores of 1,2,3, or 4 were given out by their teachers for each class. A 4-score meant that the student exceeded expectations for participation and had an exceptional attitude and communication with peers and staff during that class period. A 3 score was earned by students who are behaving at an expected level of respect for others and an expected level of class participation. Level 2 scores were earned for minor behavior issues, such as not paying attention in class, refusing to work, disrespectful attitude toward teachers and other staff, and unauthorized computer use. A level 1 score was the result of students being removed from class due to more serious behavior infractions, such as fights, threats, using social media websites and other more serious violations. Daily school scores were met with consequences from the facility staff.

Students who earned 1 or 2 level scores had an earlier bedtime, were not able to purchase commissary items that evening, and were in charge of daily laundry in their living areas.

Sampling

Convenience sampling was utilized due to students already being divided into their family groups throughout their school day. These students and their groups were utilized since the researcher had already obtained background information on each of them and had been working directly with these students. All classes were studied, since varying times of the day may cause engagement levels to differ.

Setting

This study took place in a juvenile facility where students live and attend school. Surrounding the facility is a vibrant city with urban and metro populations combined for an approximate count of 45,000 people. Students come from a three-state area based on placement recommendations and court orders. Students may enter the facility by state or county request. Students come here for many reasons, including 30,60-, or 90-day treatment programs, court orders from probation violations, legal sentencing, awaiting a foster placement, homelessness, removal from current living space, violence and aggression, transfers from lower-level security facilities, etc.

The facility has beds for almost 100 students and is currently at 70% capacity. Classes contain a maximum of 17 students, who remain in their family (living pod groups) for each of their classes. Students attend Math, Science, Social Studies, Art, Physical Education, Language Arts, and Personal Finance classes. Students are 28% Caucasian, 43% African American, 24% Hispanic, and 5% Asian/other. Most students are in grades 6-12, and 88% of students have IEPs.

Students in certain programs are allowed day or weekend passes based on maintaining their behavior levels and school scores. Students stay inside unless being taken out for an appointment or court. The independent living students also have bicycles that they may use unsupervised to go to the park or a job that they are allowed to hold during after school hours.

Informed Consent

Protection of human subjects participating in research will be assured. Participant minors will be informed of the purpose of the study via the Method of Assent (See appendix A) that the researcher will read to participants before beginning the study. Participants will be aware that this study is conducted as part of the researcher's master's degree Program and that it will benefit her teaching practice. Informed consent means that the parents or legal guardians of participants have been fully informed of the purpose and procedures of the study for which consent is sought and that parents understand and agree, in writing, to their child participating in the study (Rothstein & Johnson, 2014). Confidentiality will be protected through the use of pseudonyms (e.g. Student A) without the utilization of any identifying information. The choice to participate or withdraw at any time will be outlined both verbally and in writing.

Significance of the Study

This research was important not only to students, but also to teachers and the fields of science and education. Students spend a lot of time going through the motions of doing schoolwork and being assessed. Often, they are doing the minimum that needs to be done in order to pass their classes and then forgetting what they have learned. In order to get more interest and buy in from the students, they need to be engaged in their classes. In order for that to happen, they need to have a classroom environment in which it is safe to try new things. Students need to learn and practice skills that will help them out in their future. Rodriguez and Morrison

(2019) found that marginalized youth respond better to the concepts taught in a science class when the youth are presented these concepts in a problem-based learning curriculum.

Another study completed by Eppley (2016) stated that her social justice-based science class allowed students to grow in their sustainability reasoning and in their potential to do social justice work within their community, by learning about the qualities and characteristics of their watershed community. Students learned through the concepts how to care for their community and extract resources sustainably, but they also learned how to be vocal about their communities needs in a socially acceptable way. Teaching Science from a social justice perspective not only engages students in a way which helps them learn science concepts, but also how to be advocates for social issues in their communities. This also helps teachers how to attain their goals of helping students grow up to be productive members of their communities and share their skills with others.

Limitations

The limitations to this study were few, with no harm to the participants. With any ethnographic study, the research required participants to have a trusting relationship with participants and non-bias from the researcher. Data was triangulated carefully and participants displayed the ability to be honest with their survey data. In ethnographic research, the observer is not always able to observe every nuance completely the entire time and so research data was based on what the observer saw. This study was limited to the progress and attitudes of only the sample but was meant to better inform the researcher of the benefits to running the class for maximum student engagement.

Conclusion

It is the responsibility of the teacher to keep students engaged in science class. With science being a subject that is more difficult for some students to remain interested in than others, teachers are looking at newer ways to raise engagement levels in their science classes. One of these ways is by teaching science from the perspective of social justice. Research has shown that when students are involved in a project that is beneficial to them in their surroundings, they have more interest in completing the project. Thus, they have a reason to learn the concepts necessary to complete the projects, increasing their engagement. This increases their learning. By teaching science from this perspective, students were also learning the skills required to become productive members of society. In the following chapter, extensive literature was provided that supports teaching science for social justice and a theoretical framework by which this study is deemed relevant.

Chapter 2

Literature Review

Introduction

Youth in a juvenile facility often have histories of trauma that hinder their progress in academics and their motivation to learn science concepts. In order to make the classroom more engaging to this population of students, teaching science from the perspective of social justice might be helpful. By teaching social justice science and monitoring the engagement and satisfaction levels of students during the course of the first unit, the researcher was hopeful that students would learn concepts in order to utilize them in real world skills.

Students from minority groups are often underrepresented in math and science classes. Finkel (2018) suggested that these students found science topics boring because they were unrelated to how students lived their personal lives outside of the school building. Also, while they were living in detention facilities, they felt disconnected from the outside and searched for ways to connect with their own communities. When students were not engaged with what they learned, it was difficult for them to retain the content knowledge they were required to learn and to even learn it in the first place. Finkel also explained that females, especially, can be turned off from science due to the historical culture of oppression and abuse in the fields of science. She argued that changing the ways science was taught would require placing learners in the positions of community members by increasing their responsibilities and roles. McCarther and Davis from the University of Missouri, Kansas City state that populations of underprivileged youth who have experienced social injustices make up a significant percentage of students in the U.S. school systems. These students include students of color, refugee and immigrant students, LGBTQ

populations, transgender students, and students who are living with disabilities (2015, p. 51).

With such a large group of underprivileged youth in our school systems, teachers must do more than simply share scientific knowledge with their classes. They must fit their teaching to the populations of students that they are teaching in order to reach all students, build relationships with them, and engage them in the content.

Review

What is Social Justice Education?

Many scholars of education have attempted to define social justice in terms of teaching and learning. J.P. Rossouw (2015) attempted to clear up the requirements for successful school systems and summed them up into three main themes: quality education, social justice, and accountability. He discovered that there is a lack of thorough research in social justice teaching. He attempted to define social justice teaching as laying foundations for a society where the government is based on the will of its people and every person is equally protected by law. In schools, this begins with working through severances with the past and allowing for basic human rights. He stated that it is a process embodied by individuals living out a set of values towards other people. Like Rossouw, Cochran-Smith et al. (2009) also stated that regardless of its great appeal, there is variation in how social justice concepts are thought of and taught. The concepts are ambiguous, at best. Kelly et al. (2004) completed a study in a Vancouver secondary school where veteran schoolteachers defined social justice teaching as creating an “inclusive and respectful teaching and learning environment” (p.41). They allowed students to try out ideas, provided multiple perspectives on issues relevant to society, and gave students opportunities to engage in activities that were meaningful to their perspectives. Cochran-Smith, et al. (2009) also

attempted a similar definition of teaching from a social justice perspective. They stated that social justice teaching is when teachers advocate for students whose work supports efforts and effects in social changes. In their explanation of social justice teaching, educators Dennis Francis and Adre le Roux stated that it is not only a process, but also a goal to allow for the complete and equitable participation of all students that is mutually formed to fulfill their needs.

According to Garii and Rule (2009), social justice brings opportunities to teachers and students to remedy the oppression and marginalization of society. They recognized it as a robust tool that offers students the chance to participate more fully and succeed and claim that teachers who teach from this perspective create a classroom environment more supportive of inquiry and understanding. Carol Brandt (2004) stated that science was and still is predominantly a political, male-centered subject with human bias. It has been slow to change and often alienates females and students from oppressed backgrounds. Social justice education allows students who don't normally have voices to use their voices for positive change. It connects students to the relational pieces of science content and offers a context for using science. Social justice teaching isn't something simply suited for the arts but opens quantitative subjects up to narratives of students' lives and offers a different route of teaching (Brandt, 2004). The issue with teaching science from a social justice perspective is that there is not a concrete methodology for putting it into practice (Dimick, 2012). There is not one definition for social justice teaching. It is still a new field with little research, and it is taught differently depending on the teacher. According to Cho and Womans (2017), teaching through social justice concepts had different definitions for different concepts because the changes that societies undergo affects the way that social needs are prioritized.

Why Teach Science From A Social Justice Perspective?

Science is a field that tends to bypass the complex social, rhetorical, and cultural wisdom of students in order to teach them how to find evidence and produce solid reasoning (Upadhyay, 2010). In turn, it is necessary for teachers to help connect students to science through students' own significant experiences and home cultures. Winter explained that, "academic encounters with social and cultural issues are rare in lecture halls and laboratories" of the science fields (2007, p.97). These fields tend to emphasize quantitative exploration and logic, but not societal issues. If students are unable to see themselves in the curriculum, they will tune out. In a review of grade twelve exit exams in South Africa, results were poor (Edwards, 2011). South Africa is in need of producing more engineers and scientists and even with a push to improve education and generate more learner success, they are still feeling the effects of apartheid on Bantu education.

While looking at social justice concepts, Rodriguez and Morrison (2019) studied the need for clarity in arguments utilized to inform the how and why of social justice pedagogy. It was found that marginalized youth respond better to scientific concepts when they are utilized in problem-based learning. Studies were conducted in urban communities where students learned the benefits of recycling by cleaning up their outdoor recreation areas. This included scientific concepts such as the water cycle, water treatment, the recycling process, and environmental stewardship all while cleaning up their public spaces. The students had something they could be passionate about and proud of, instead of sitting inside their classroom and attempting to learn through textbooks. Student disengagement is a hindrance to their learning and work avoidance is high among African American students (Seiler et al., 2010) and often among female students and

other minority groups who do not see themselves and situations congruent to their lives within the science curriculum.

Bunyamin (2019) agreed with Upadhyay (2010) that there is something lacking in the field of science education. In fact, his paper started with his statement of agreement in Uphadhyay's assertion that learning, "as a moral act needs to be based in the context of a local community" (Bunyamin, 2019, p. 355). He continued to explain that for teaching to be equitable, it must be social justice and equity oriented. It simply makes the content more approachable and equitable in the context of their lives.

Increasing Student Engagement

A study done in a rural community brought students of an Appalachian watershed community together to serve their community. In this place-based inquiry, students were studied to find out how they utilized their own experiences and knowledge to consider impacts on their watershed. These students were supported by their teachers in learning new scientific concepts about the effects of their actions on the watershed community. These civically engaged students grew in their scientific literacy during the study and it created the potential in them to create behavioral modifications related to sustainability in their communities (Eppley, 2016). These students came from a place that no one thought mattered and grew in their ability to reason sustainably and the potential to do sustainable work for their community.

Valadez and Moineau (2010) conducted a five-year study of pre-service teachers at south California university who developed and applied a science curriculum to parents of ESL students. Specifically, this curriculum was built to be rich in context, scientifically accurate, and sensitive to the parent and student cultures. The course, built by the pre-service teachers in a

class required for them to acquire their licensure, was designed to give them practice in developing lesson plans and curriculum. The pre-service teachers utilized backwards design to prepare activities and lessons with end learning targets in mind. They put on an ESL family Science Night for families where parents are taught how to carry out simple science projects and experiments at home with common household items. The pre-service teachers were, in a sense, learning through a social justice lens in order to teach their students through this method as well. They noted that collaboration with other colleagues was a challenge but allowed them to find a middle ground that used all of their collective talents to solve a problem for the good of their community. It was noted by the researchers and students that the project had a “maturing effect for many of the students” (Valdez & Moineau, 2010, p. 11). The pre-service teachers, as students, were incredibly involved and engaged because they were working together towards a common goal, and that is how students in classrooms should be run. Valdez & Moineau also noted that the field is still young and requires more research and an actual framework for teaching social justice within science classes.

Alexandra Dimick, an educator from Buffalo University in New York (2012) stated that it is imperative in social justice education that students are empowered when it comes to learning opportunities. She built her study around nine students in an environmental science class from an urban charter school and the science teacher, Mr. Carson. Mr. Carson had shown an interest in educating his students on not only science content, but also doing his part to ease some of the environmental injustices in the community. He built his curriculum around sustainability activities, including a field trip on the Green River, one of the most polluted, yet beautiful rivers around. He created action projects, such as identifying pollutants, doing river water quality experiments, and creating posters about river sustainability. Dimick examined whether student

voices were heard through the projects and if their input was valued. She paid attention to group dynamics and concluded that students were more empowered socially, politically, and academically than in other classes through surveys and observations. Dimick (2012) found through observation, survey, and participation levels that students in Mr. Carson's class readily participated in the Green River project activities and had positive reactions toward the class when they had a part in designing the activities and choosing the subject. These findings are congruent with Valadez and Moineau's research and Eppley's research in concluding that students taking an active participatory role have higher engagement levels. She also reinforced, along with Valadez and Moineau, that social justice teaching requires constant reflection from students and teachers and the field itself is still new and more research is needed in this field.

Theoretical Framework/ Critical Pedagogy

Teaching through a social justice lens incorporates various pedagogical styles. However, there seems to be one pedagogy that stands out among the rest and is mentioned in most of the research found on teaching science for social justice. Brazilian educator Paulo Freire has been influential in the fields of education, nursing, social work, and many other fields. Freire offered an idea for a problem-posing or liberating education by which he believed both teachers and students had something of significance to contribute to their educational situation. Instead of simply receiving the content delivered by their teachers, students would utilize their class time building on their knowledge base by utilizing the skills and ideas they bring with them from their own lives. In utilizing this theory, dialogue is a central pedagogical process, (Roberts, 2017). Under this type of pedagogy, knowledge is more of an active fabrication than a fixed body of knowledge.

Edwards (2011) utilizes Freire's argument that since objective reality comes from the actions of humans, that reality can also be changed through actions of humans. In other words, oppression should create action. Problem-posing education offers students the chance to create their own power and the classroom should be an environment in which they are enabled to do so. Authoritarian classrooms create a power struggle between student and teacher, while liberatory classrooms strive for the "emergence of consciousness" (Edwards, 2011, p. 101). Freirean pedagogy lends itself to dialogic practices in and out of the classroom and dialogic practices require justice in order to be practiced equitably. Students learn better when they work collaboratively and talk together productively, (Patterson, 2019). This seems to be what Freire was getting at in his pedagogy. In order for these productive conversations to happen, equity is a critical piece of the puzzle, so students feel safe collaborating in these environments.

Hypothesis

Based on the above reviewed literature and the theoretical framework of Freire, the researcher believes that switching to a social justice centered pedagogy will increase the interest and engagement level of students in her science classes in ways that utilize skills necessary for the students' futures..

Conclusion

Students in a juvenile residential program often have histories of past trauma, whether it be abuse, substance use, homelessness, lack of support system, or other issues. These students may have more happening in their lives than the average teen and often have large gaps in their educational history. It is difficult to get these students interested in the science concepts being taught in class. In order to teach these students more effectively and make the teaching more

relevant, teaching through the lens of social justice was utilized in order to empower them and give them some ownership over their own learning. When students are engaged, they retain more of the concepts that they are learning and by engaging students in solving real world problems that impact them, teaching would be more effective. Based on the critical pedagogy of Paulo Freire, teaching students is not simply delivering content, but engaging students at their levels and involving them in learning skills that will eventually give them the scaffold to be productive citizens.

Chapter 3

Methods

Introduction

This study was completed to better inform the researcher on teaching science through the practices of social justice. The literature presented in chapter two strongly suggested that it would increase the engagement level of the students. Engagement is the key to creating a culture of interest wherein students work more with scientific concepts and, in turn, retain more of a conceptual understanding of the content and utilize it in solving real-world problems that allow them to practice skills they will need in their futures.

In order for students to best retain scientific information, it is better for them to work with the content instead of memorizing it. Most science classes offer students the opportunity to explore the content and interact with it. The researcher chose ethnography in order to show what was happening with students in her classroom since quantitative methods would not show the levels of engagement as realistically as observations and student interviews. For this reason, the researcher chose to show her points of focus throughout the study. Ethnographic studies also made up a large portion those highlighted in the literature review and seemed to be the best fit for a study of similar magnitude and process as outlined above.

Research Question(s)

How will teaching science from a social justice perspective increase engagement in students in a juvenile detention program?

Instrumentation

The instruments utilized in the outlined study were participant observations and a survey. This study relied heavily on participant observations from the researcher in order to best identify how many times in each class period that a student was off task. Semi-structured interviews were used to gauge how a particular participant was feeling about the activity the participant was engaged in and how the participant felt that he or she was utilizing scientific knowledge in the learning activity. Finally, surveys were used to show if students felt they were engaged during class. Surveys were given to each student at the end of their science class daily. The survey provided each student with questions meant to be a measure of personal engagement in the daily lesson and how they were using their time in class to practice their skills. Anecdotal records from the researcher were also used to describe what a participant did or said to describe a situation in a concrete manner.

Data Collection. Baseline data was collected using the instrumentation outlined above. This data was collected the first two weeks that teaching science for social justice was implemented in the science classrooms. Baseline data collected the week before the curriculum was implemented measured how often and for what amount of time students felt that they were engaged in class. Then, after the implementation of the curriculum, data was collected during a week-long introductory unit of study.

Data Analysis. Observations, interviews, and surveys were compiled for each participant and behavior was compared to show how often disengaged behaviors appeared during classes in order to show how student engagement changed from baseline measurements throughout the course of the study.

Research Question(s) and System Alignment.

The table below (i.e., Table 3.1.) provides a description of the alignment between the study Research Question(s) and the methods used in this study to ensure that all variables of study have been accounted for adequately.

Table 1

Research Question(s) Alignment

Research Question	Variables	Design	Instrument	Validity & Reliability	Technique	Source
RQ1	DV: Student engagement levels	ethnographic research	observations interviews surveys	ethnographic research methods were utilized to depict student activities and feelings about the curriculum	participant interviews observations surveys	participants researcher participants
	IV: social justice teaching			Baseline data were compared to date while the curriculum was utilized to measure engagement		

Procedures

Students began the school year with the Pearson curriculum being utilized for science courses for the first two weeks of class. Due to the Covid-19 pandemic, students were utilizing Edgenuity, an online program for their individualized science courses. Data were collected through a student survey shown in Appendix B to show how participants felt about their participation, knowledge base, and engagement levels while the curriculum was being used. Observations were collected by the researcher as to how often each student displayed off task behaviors and the nature of those behaviors. At the end of class during this week-long period of data collection before the social justice curriculum was implemented, students handed in a daily survey.

When the student driven social justice curriculum was implemented, it was utilized to supplement the regular curriculum with activities and problem-based scenarios. Students were first asked to spend several class periods brainstorming topics that they were interested in learning. Students were again observed for 45 minutes daily for a two week period and surveyed at the end of each class period to measure their perceived engagement levels. They were asked how much of the class period they felt they were engaged, how much they enjoyed the class period, if they felt that something was learned in class, and if they used any class time to practice a skill that would benefit them and how it was practiced. The data was then analyzed to see if students believed their engagement increased and it was compared to the data on the student observation form in Appendix B to see if their behaviors aligned with their thoughts.

Ethical Considerations

To protect the participants of this study, consent was obtained from the legal guardians of the students and the detention facility in order for students to participate. The facility, legal guardians, and participants were notified verbally and in writing of their ability to end their participation in the study at any time. The facility, legal guardians, and the students were informed verbally and in writing of the purpose and subject matter of the study. They were also reassured that their privacy and the identities of participants will be kept confidential at all times before, during, and after the study. All involved parties were informed that the study had the potential to benefit the education of participants but would not harm the students of the facility in any way.

Conclusion

The objective of this chapter was to better inform on the logistics and procedures of the study. Demographics were described, the setting was introduced, and the method of the study, instruments, and methods of analysis were summarized. The following chapter will include a summary of the results and analysis of data collected.

Chapter 4

Results

There is no doubt that teaching diverse populations of students can create challenges for teachers working in juvenile detention facilities. Among these challenges are a low level of education among incarcerated students, the emotional labor that is required of teachers who teach in these facilities, and the interactions with on-site facility staff (Flores & Barahona-Lopez, 2020). In order to measure the effectiveness of teaching science from a social justice perspective, the researcher built a social justice centered science curriculum with her 5th through 12th grade students. The curriculum was used in the classroom during the study and student data were collected in order to measure the amount of time that students spent on and off task during their science class through teacher observation and how these mixed-grade incarcerated students felt about the class was revealed through student questionnaires.

Data Collection

Data were triangulated and calculated through teacher observations, student surveys, and informal interviews. Baseline data were collected through student observations during the week before the study was conducted. Study data were collected for the two week period that the social justice curriculum was being implemented and then compared to the baseline data to see if there were more or less off and on task behaviors for students. The study period lasted three weeks from the beginning of baseline data collection through the two weeks of the intervention.

Results

Observations

During the week before the social justice curriculum was implemented, students were observed as they went about their daily classroom activities. On average, students were observed having more off-task behaviors each class period than on-task behaviors. Off-task behaviors included wandering, off-topic conversations, reading books not assigned by teachers, focusing on drawing and doodling, searching the internet during work time, and other work avoidance behaviors. Table 2 displays the number of off task behaviors for individual students before the social justice curriculum was utilized during their science class.

Table 2

Student Behavior Before Social Justice Implementation

	Grade/Program	On Task Behaviors	Off Task Behaviors
Student A	8th .Secure Treatment	7	15
Student B	11th. Secure Detention	8	17
Student C	6th. Secure Treatment	9	8
Student D	10th. Secure Treatment	6	19
Student E	10th. Non Secure	11	28
Student F	7th. Non Secure	9	17
Student G	9th. Ind. Living	11	3
Student H	10th. Ind. Living	8	12

Note: This table shows a comparison of on and off task behaviors during the week before the social justice curriculum was implemented.

These off-task behaviors were observed during the week of observation before the student-centered social justice curriculum was implemented. Students would often come to class and spend the class period interacting with peers as if the teacher was not in the room and they were able to have free time to use their chromebooks to browse the internet for clothing or watch cartoons while the teacher was assisting other students. Sometimes students napped or used the time to enter into verbal or physical altercations with their classmates.

During the week before the intervention was implemented and the baseline data were collected, students worked with the researcher to decide which topics would be taught from a social justice perspective. In a study completed in an environmental science class in New York, students were observed to have participated willingly and reacted positively to the chance to work on projects when they had a role in creating the projects. In this specific study, for example, students tested water in a nearby river and were then asked what should be done with their findings. The students offered up the solutions of signing a petition, calling the U.S. Environmental Protection Agency, and creating public service announcements. This aspect of political empowerment allows students to be part of creating the content they are going to learn (Dimick, 2012). Some of the interests the students had were based on the concepts of nutrition and planting a garden, cell biology and skin color, creating a recycling program, learning about how genetics can affect health, and bacteria and gut microbiomes.

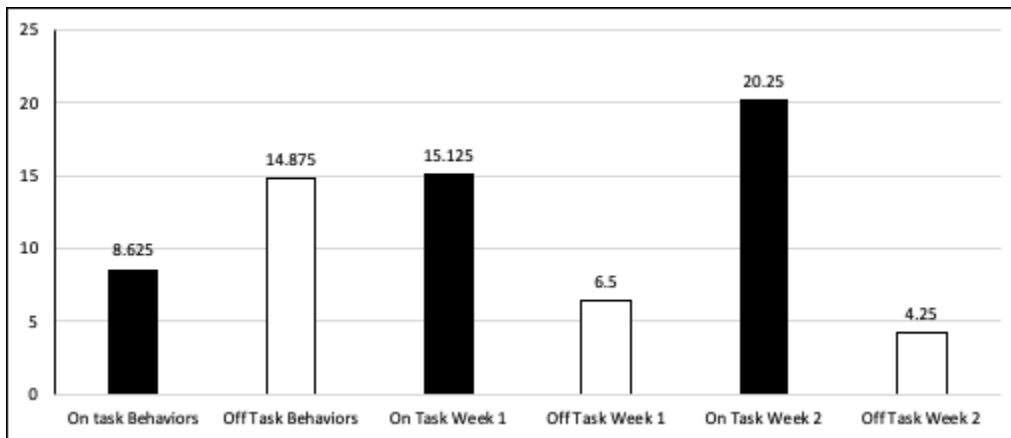
The data in Table 3 were collected during the two week period that the social justice curriculum was applied. The data have been broken down by week.

Table 3*Student Behavior During Social Justice Implementation*

	Week 1		Week 2	
	On Task Behaviors	Off Task Behaviors	On Task Behaviors	Off Task Behaviors
Student A	16	11	23	4
Student B	11	12	14	7
Student C	19	3	26	4
Student D	14	7	17	5
Student E	22	9	26	4
Student F	15	4	19	5
Student G	11	2	16	2
Student H	13	4	21	3

Note: This table shows a comparison of off and on task behaviors during the first two weeks that the social justice curriculum was implemented.

After all individual student data were collected, they were averaged together to create a visual representation of the average number of times that students were on and off task. Figure 1 shows the breakdown with percentages.

Figure 1*On Task vs. Off Task Behaviors*

Note: The first two columns indicate baseline data.

From the data in Figure 1, on task behaviors, such as participation, following along, not avoiding assigned work or interrupting teachers or other students, increased 6.5% in the first week and 5.125% in the second week, for a total increase of 11.625%. As far as off task behaviors, there was a decrease of 8.375% and a 2.25% decrease in the second week of social justice science teaching. This decreases the number of off task behaviors by 10.625%.

Besides simply observing the students on and off task behaviors, the researcher made note of observed exchanges and interactions between students and also interactions between the students and the researcher and interactions between students and other adults (e.g. social workers, parole officers, nursing staff, and county corrections staff). Table 4 is a comparison of noted behaviors before the social justice curriculum was implemented and while it was in place. Not all interactions were recorded, but all highlighted observations are listed below by students to show a behavior comparison before and during the implementation of social justice curriculum. Positive noteworthy behaviors were underlined in the table to distinguish them from the negative behaviors.

Table 4*Qualitative Student Observations*

Student	Before	During
A	took chromebook into corner to watch cartoons, unwilling to participate in class, unwilling to work with others, napping, shredding pencil erasers during lesson, kept trying to download music, <u>came to class ready to learn</u> , <u>helped peer with diagram</u>	<u>invited a peer to work together</u> , <u>told story about experiences with food shortages</u> , <u>looked up community garden resources</u> , <u>took ownership of preparing garden plot</u> , <u>developed working relationships with two new people</u> ,
B	verbal altercation with peer, cracked chromebook screen, throwing paper, worked on art project entire class period, sleeping, <u>participated in discussion</u> , kept calling county staff to be removed from class	<u>volunteered to be group discussion leader</u> , <u>assigned group tasks</u> , name calling, antagonizing peers, stealing classroom materials,
C	<u>helping peers with assignment</u> , <u>passing out materials</u> , meowing during work time, writing song lyrics repetitively, wandering, had pencil taken away for poking peers with it	<u>spent much time motivating peers and keeping people on task</u> , <u>worked with student D on data collection</u> , <u>took the initiative to set up meetings about nutrition with staff</u> , <u>compiled grocery lists with health foods</u> , running around the room making cow noises. poking peers with paper clip
D	completes no work on daily basis, swearing, gang signs, death threats to teacher and staff, physical altercation with peer, punched peer in face, grabbed peer by neck, asking questions unrelated to topic, stories about gunfights, <u>read book quietly during choice time</u>	<u>worked multiple days on collecting data from peers about what they thought healthy eating was and what they learned</u> , still displayed verbal aggression, <u>encouraged students to sign up for vegetables they wanted to plant</u> , <u>worked up a budget for the garden</u>
E	antagonizing peers, flashing gang signs, hiding school materials in pants, drawing gang signs on chromebook cover, coloring gang signs on computer app., pulling hair, laying on floor and yelling, shooting noises, rolling assignment up and pretending to smoke it during video, sleeping, stole pencils from classroom	flashing gang signs, taking pictures of class with chromebook app., <u>made a list of community resources for healthier eating</u> , <u>took on a leadership role within group for anti-racism presentation</u> , <u>independently learned about cell cycle to teach the class</u>
F	working on art project during class, throwing water on others, work avoidance, cheating, taking peer's work, logging into chromebook as a peer, <u>asked teacher for extra work</u> , <u>helping peers understand concepts</u>	cheated on quiz, <u>volunteered to explain photosynthesis to class</u> , <u>created presentation</u> , <u>found articles about food shortages for everyone to read</u> , <u>suggested display for the hallway and took lead on the project</u>

Student	Before	During
G	<u>worked independently, completed assignments</u> , ignored teacher and peers, did not speak to teacher, closed chromebook when teacher asked if help was needed, asked to leave class for a sick day, spent 27 mn in bathroom	3 bathroom breaks in one class period, work avoidance, yelling in teacher's face x2, <u>asked to learn how to research healthy gut microbiomes, volunteered to teach the class what was learned</u>
H	refused to complete any assigned work except coding, refused to open textbook, assaulted peer, caused disruption so another student could cheat, spent entire class period looking for apartments online	<u>asked for a break to work on self-regulation skills, asked peer to share story about family, took ownership of preparing garden plot, volunteered to read news article aloud, shared story about food scarcity in family and worked to generate solutions</u>

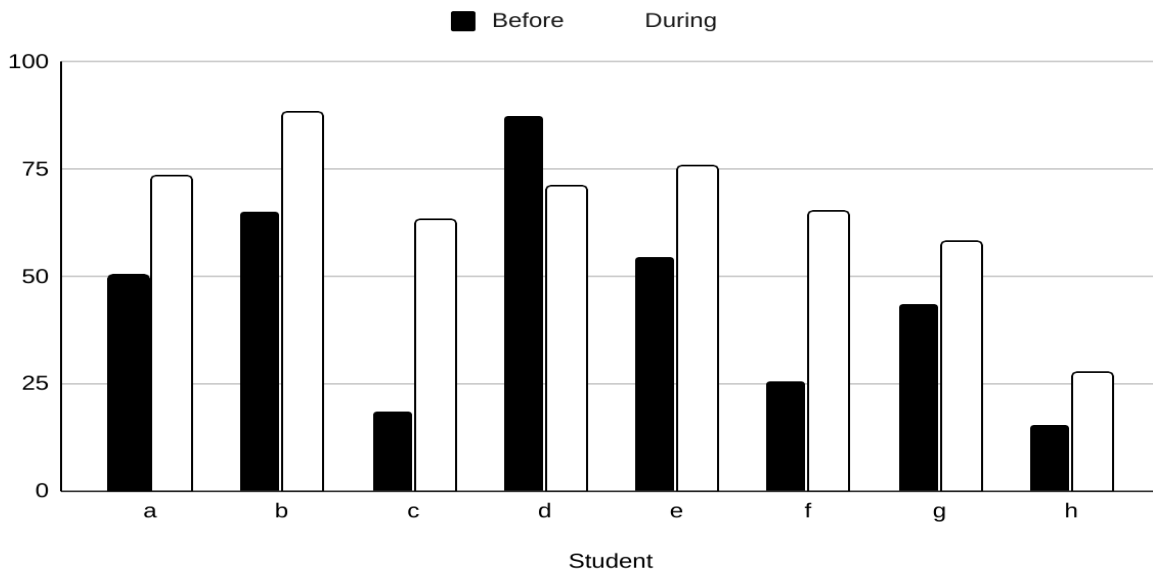
Note: Positive displayed behaviors were underlined.

Surveys

Students were given the opportunity each day during the week before the social justice curriculum was created and also during each day of the first two weeks of the social justice curriculum implementation to fill out a survey. The survey from Appendix B was utilized to show students' perceptions of their learning. Students took the survey daily as an exit ticket during the last ten minutes of class. They were given enough time to answer the questions and write comments on their paper. At the end of the research period, student answers were placed in a table and the results are listed below in Figure 2. Figure 2 shows the students' own perception of their levels of engagement before the social justice program was implemented and during the implementation of the social justice curriculum as well. Data are an average of their weekly "before" responses and then an average of the daily responses over two weeks in the "during" column.

Figure 2

Percent Engagement Based on Student Perception



Note: Values are rounded to the nearest 0.25 %

All but one student reported an increase in their engagement levels over the first two weeks that the social justice teaching curriculum was utilized. This student reported a decrease and stated, however, that there was no change from the “before” to the “during”. The self reported scores show an average of 45% engagement before the social justice curriculum and a 65% engagement level during the social justice teaching, which is an increase of 20% average engagement score for the students in this study.

Other Survey Results

Question four of the student survey in appendix B asked the students if they had learned something in class that would be a good skill for their future. Students often replied that they were working together in groups and acknowledged that was a skill they will need in the

workforce or when they return to their families. Student A, who was often observed sitting in a quiet corner of the classroom watching cartoons on his laptop during the week before switching to the student-led curriculum, reported that he enjoyed taking the lead on creating the outside garden space because he can create a garden for his family and community once he is released. He told the researcher that now he can help supply his family with fresh vegetables in order to cut down on the fast food they eat. It was acknowledged by the student that his family ate fast food frequently because it was affordable and kept them from feeling hungry. He also stated that he learned to practice patience while working with others in class and that skill would be helpful when his first child is born in the next few weeks. Student A also commented that “it wouldn’t do me no good to spend time learning about volcanoes, but I can take home what I know about good dirt and how to grow my own green beans in different soil types to feed my fam what we can’t buy at the store.”

Student B often displayed behaviors of work avoidance before the study by asking to be removed from class and taking multiple sick days. She broke her laptop screen during the “before” portion of the study and spent most class periods working on her art project. During the study, however, Student B began taking initiative by organizing daily discussions with her class members that often centered around how the group was progressing on their project, but occasionally focused on how the students were feeling. She often brought up pride and spoke about how she was proud of her work. This is aligned with the aspect of political empowerment that allows students to be part of creating their own content (Dimick, 2012). Students who take on a leadership role or are part of something that was their idea tend to want to see that through. Student B stated that she sees herself becoming part of organizations to occupy her time once she completes her sentence. She stated that “cuz I work on chemistry this year, I can stretch to see

how chemistry relates to nutrition with macromolecules. I get why people can't just eat pizza and burgers and expect to be healthy." Student B did not have any more observed verbal altercations with peers during the two week study period.

Student C and student D collaborated on a project that was student C's idea. They collected data from other classmates on what their ideas of healthy eating were, what types of foods they ate on a regular basis, and what they would eat if money was not an issue. Student C stated in his survey that "I'm just tryna hold my peers accountable too. Bring out their best." Student C and Student D created a presentation on student misconceptions and on ways students can improve their eating habits in the most cost-effective ways. Student D wrote on his survey that he learned how to work on a project until it is done because it was nice to feel good about himself for finally finishing something. He said, "I'm more confident about finishing my treatment and seeing my grandma and sister." He wanted to be able to do things like make shopping lists that include healthy meals for his family.

Student E volunteered to learn about the cell cycle in order to create a presentation to assist in teaching the rest of the class who were several grades below him. He stated in his survey that he really was starting to enjoy learning about cells, but still wanted to mess around with his peers because he gets bored. Student F took it upon herself to create posters for the hallway during the nutrition unit. She also realized she had an artistic side and wanted to start with sketching and then learn how to paint with oil pastels and watercolors. Student G took the lead on researching the difference between balanced and unbalanced gut microbiomes. He asked to learn how to read scientific papers and how to find them on the internet. He reported that his new abilities helped him "feel smarter and be able to talk to people like ladies and adults." Student H

took part by asking to work with him on teaching the findings to the rest of the class. Student H reported that he began to like gardening and working with his peers.

Table 5 represents real world skills that the students have identified learning and utilizing from questions 4 and 5 of the student survey in Appendix B. This table offers a quick list of skills that students believe they learned and/or practiced during the two weeks of the study when the social justice curriculum was being used.

Table 5

Skills Identified by Students

	Grade	Program	Skills
Student A	8	Secure Detention	talking to peeps, werken w new freinz, researck skillz
Student B	11	Secure Detention	group roles, helping people work together, finding community services for support, self confidence
Student C	6	Secure Treatment	work w numbers an meetin an workin w peers an readin nutrition labels help others an plannin green for grocerys
Student D	10	Secure Treatment	confidence, finishing a project, work with others, write like a professional person, budget, how plants grow and other biology stuff, talk better with my words
Student E	10	Non Secure Detention	caring about my community, help others become knowing of racism, interest in biology things like cells and how people work in their bodys
Student F	7	Non Secure Detention	present info to others, create good looking presentations like on the outs, look up information, being group leader, learned I like art
Student G	9	Ind. Living	reading scientific assignments,bigger vocabulary, increased confidence in talking with people
Student H	10	Ind. Living	i appreciate gardening, and, can share personal stories with others to no em better, problem fixing ideas

As a whole group, the students decided that the first unit of study would be a unit on nutrition. While the researcher taught the content behind the unit on nutrition and ensured that it aligned with the middle school and high school standards, the students were responsible for creating the projects they wanted to work on. The researcher's role was to act as their advisor in planning and carrying out the projects that were decided upon by the students. The students decided that they would plan a presentation for the detention center facility that offered healthier choices for their commissary food that was an option available for purchase after the school day. The students presented a list of healthier commissary food options to the staff along with an explanation of why healthier snacks would lead to better focus throughout the school day and better sleep in the evening. After presenting their findings to the detention center staff, the students were allowed to add sliced apples, veggies and hummus, beef jerky, and assorted packaged nuts and trail mixes, as well as granola bars and various fruit and vegetable juices to their snack choices that mainly consisted of chips, candy, cookies, and sodas. The staff even allowed several of the students to prepare a budget and shopping list to purchase the commissary items. Two of the students who maintained their behavior levels throughout those two weeks were able to go shopping with the staff members for one of their earned outings.

Discussion

With there being so little research that documents the contrivance of social justice methods in the teaching and learning of science, the researcher was unsure of what to expect. However, based on findings in the reviewed literature, the researcher had hypothesized that the students' engagement levels in science class would increase. Though this group of students was increasingly engaged in this method of teaching and learning, students were still involved in off-task behaviors. However, those behaviors did decrease throughout the study. The behaviors

also became less intense. The verbal and physical altercations that were present the week before the curriculum change disappeared in the two week study. The researcher believes this was due to the students working together as a team to accomplish a shared goal. Moreover, this goal was determined to be something that the students played a major role in defining. It was something that would benefit them, their peers, and also possibly their family outside of the detention facility.

Impact on Students

Within the context of social justice in the science classroom, many students reported an increase in their confidence levels. This is consistent with the Freirean interpretation of social justice, since students became more aware of connections between the science they have learned in class and their own social and cultural operations (Upadhyay, 2010). Talk in the science classroom also changed from gang stories and off-task chatter to more productive and focused dialogue centered around student learning and project oriented conversations. This talk that had students engaged in the construction of scientific knowledge is essential in a reciprocal teaching and learning environment (Patterson, 2019).

Impact on Teachers

As stated previously, implementing a social justice curriculum in the science classroom is not a magical solution to student engagement. The researcher found that the most significant aspect of social justice teaching is having built a solid relationship of trust and respect with the students. The researcher understands that if students wouldn't have been open to conversations about social justice issues that they felt deeply about, the tasks that they performed would have seemed like meaningless assignments to them.

The researcher also found that implementing a social justice curriculum was difficult in that she had to be willing to not act as the teacher that she was used to being. She noticed that she was more of a coach than an instructor to her students during the period of the study. This was significant in that there is a risk associated with infusing students daily experiences into their science lessons, and that teachers must be reading to fully recognize oppression and teach for the goal of empowering students (Upadhy, 2010).

Conclusion

The data showed that utilizing a social justice curriculum in the science classroom increased the engagement of the researcher's students for the two week period of the study. This is shown by the increase in observed on-task student behaviors and the decrease in observed off-task behaviors. It is also shown by the types of on-task behaviors that the students in the study took part in. The students, themselves, also reported an increased level of engagement in their science class. Students have volunteered to take on roles that put them in the lead or support positions of student-driven projects that allowed them to do something positive in their current community at the juvenile detention center. Students also reported that they were learning content and skills that they would take home with them and apply to their daily lives. The findings were congruent with studies from the reviewed literature.

Based on the outlined findings and their congruence with outcomes outlined in similar studies from the literature review, utilizing a social justice approach to teaching science increases the participation in students in a juvenile detention setting. Utilizing social justice driven methods, students focus more on bettering their own lives backed by scientific concepts.

Chapter 5

Implications for Practice

When teachers in juvenile detention facilities adopt a social justice lens for their science classroom, it requires them to acknowledge a historically oppressive culture. It also allows them to learn about their students' diverse experiences and utilize those experiences in building content knowledge. Students in a juvenile setting often have more immediate concerns than their education and engaging them with their schooling can be difficult for teachers.

Implications for Social Change

Social justice teaching in the discipline necessitates teachers being able to see each of their students as being capable of learning. This means that we are not teaching a subset of the population to be scientists, but teaching all students to use inquiry and understand science through their own personal and social lenses (Finkel, 2018). According to Freire, when students have the ability to learn, reflect, and act, they acquire the ability to transform their world (Edwards, 2011). They gain this ability through the acquisition of skills like communication, argumentation, and inquiry and since science is a social enterprise, it requires the practice of a community. When students are valued as part of their communities, it shows in their engagement and allows them to practice social skills to be successful change-makers in their communities outside of the classroom.

Action Plan

Moving forward, the researcher will share her findings with her co-workers. Her goal is to find coworkers who are also interested in social justice topics in order to create cross-curricular activities and projects for students that span several subjects in order to better

prepare the unique population of students for success in their homes and communities once they leave the facility.

Conclusions

In summary, the utilization of a social justice curriculum for students in a juvenile detention center increased the engagement and interest of students by 20%, according to the students who were surveyed. Increasing student engagement in science through a social justice lens offered them the opportunity to utilize their experiences to understand the provided content and find ways to be productive members of whichever social communities they may find themselves in.

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Appendices

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Appendix A

12 October 2020

Dear Parent or Guardian

Hello. You are being contacted about an opportunity for your child to participate in a research study aimed at gathering data about his/her engagement level in science class.

I am completing this study as a Master of Education Student at Minnesota State University Moorhead under the supervision of _____. It is a study that involves research by means of information provided in the form of observations by myself, your child's teacher, about how your student participates and is engaged in science class. This study will also involve information provided by your student in survey form about how he or she feels about the content and interest level of this class. I will be conducting this study over the duration of two weeks, the length of one unit.

The purpose of this study is to provide me with data about how well I am doing at engaging your child in class by utilizing a social justice approach. This approach will benefit your child by allowing them to work on solving a real-world problem with their scientific knowledge and reasoning skills. It will strengthen their critical thinking ability, enhance their communication skills, and allow them to work creatively and professionally with their peers while learning scientific concepts. There are no foreseeable risks involved with this study as it will run adjacent to their classroom routine.

Your child was selected to participate as part of my regular science class. You or your child may decide not to participate at any time without consequence. All collected data is confidential and

no names or indicators will be used at any time. Please do not hesitate to contact me at (work email and extension) regarding any questions you may have about this process.

Parent/ Guardian Signature Date

Researcher Signature Date

Appendix B

Student Survey

1. How much of the class do you feel you were engaged before we began learning about social justice science? Write down a percentage.

2. How much do you feel you enjoyed the class period today? Write down a percentage.

3. For what percentage of class time do you feel that you were engaged and interested?

4. Did you learn something in class today that you feel would be a good skill for your future? What was it?

5. Were you able to practice a skill today that will benefit you in your future?
What was it?
How did you practice it?

Appendix C

Student Observation Form

	# of Times Off Task	# of Meaningful Engagements	Notes
Student A			
Student B			
Student C			

Appendix D

Letter of IRB Exempt Status

Institutional Review Board



DATE: February 8, 2021

TO: Ximena Suarez-Sousa, Principal Investigator
Kelley Larson, Co-Investigator

FROM: Lisa Karch, Chair
Minnesota State University Moorhead IRB *Lisa J. Karch*

ACTION: DETERMINATION OF EXEMPT STATUS

PROJECT TITLE: [1708991-1] Increasing Engagement in Youth in a Juvenile Detention Setting:
Teaching Science for Social Justice

SUBMISSION TYPE: New Project

DECISION DATE: January 25, 2021

Thank you for submitting the required modification to this project. The Minnesota State University Moorhead IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations under 45 CFR 46.104.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact the [Minnesota State University Moorhead IRB](#). Please include your project title and reference number in all correspondence with this committee.

This letter has been issued in accordance with all applicable regulations, and a copy is retained within Minnesota State University Moorhead's records.