

The Effect of Student-Centered Instruction
on the
Academic Achievement of First Grade Students

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Abstract

The study attempted to determine the impact of student-centered learning on student achievement among first grade students. Three classes of first grade students participated in the study. The study used a quasi-experimental, pretest-posttest control group design. Two classes continued to receive the science instruction as provided by the county, while one class received science instruction tailored to be student-centered. Students in the student-centered class asked questions that drove the instruction, where students in the traditional classroom were taught based on a pre-determined curriculum. Before and after the sound unit in the science curriculum, each student was given a five-question survey to indicate their feelings about science instruction and given an assessment to evaluate mastery of the sound unit content. In this study, the change from pre-to-post unit test scores was statistically significant in favor of the student-centered approach. Further research should continue in this area to determine specific strategies that are most effective in encouraging student autonomy, as well as expanding the sample size to include a wider range of age levels.

CHAPTER I

INTRODUCTION

The public system of education was built on the notion that all children deserve opportunities for learning. “Learning” and “achievement” are multi-faceted terms, but on a global, national, state, and local scale, educational success is largely defined by student achievement on standardized assessments. The origins of curricula were teacher-centered. Historically, teachers were deliverers of instruction, while students listened. There have been countless developments, changes, and novel instructional strategies brought into public education in the United States with the intent to improve the quality of education. One such development is that of student-centered learning.

Within any given school building, there are students who are disengaged from their learning and who are not demonstrating mastery of academic material. Teachers work to differentiate lessons, tailor to various learning styles, use technology to enrich instruction, and determine other ways to ensure each student is able to reach their potential. Some teachers utilize teacher-centered instruction while others implement instructional strategies more aligned with student-centered instruction, and frequently there is a mix of the two.

The researcher is interested in this problem because she believes student achievement is dependent on student engagement. The researcher has been in the field for four years and has observed varying levels of student engagement. The researcher has implemented strategies to increase student engagement. While creating lessons from given curricula, the researcher has noticed how often students are tasked with answering questions, and the limited time that is spent encouraging students to ask them. She

wondered whether students feel connected to what they learn in school, and if they are given adequate opportunities to explore what they are curious about. This led the researcher to reflect upon the degree of student responsibility for their learning. Students are pressured to do their best on standardized test and held responsible for their performance. Shifting this responsibility to students' own learning could benefit student achievement. The researcher was interested in finding out how student achievement is impacted when students are given more responsibility and opportunities to make choices about their learning.

Statement of the Problem

The purpose of this experimental study is to determine the impact of student-centered curriculum on student achievement.

Statement of Research Hypothesis

The hypothesis is there will be *no* statistically significant difference between the academic performance of students who receive student-centered curriculum and those who receive teacher-centered curriculum.

Operational Definitions

For the purposes of this study, the researcher defines the terms *student(s)*, *curriculum type*, and *student achievement*.

Student(s)

The students referenced in this study are six- and seven-year-old first grade students in general education classrooms in a Title One public school in Baltimore, Maryland.

Curriculum Type

The independent variable is the type of curriculum implemented. The control group is instructed with teacher-centered curriculum, while the experimental group is instructed with a student-centered curriculum. “Teacher-centered curriculum” is defined in this study as instructional practices created by and delivered by the teacher, with limited choice given to students. “Student-centered curriculum” is defined as instructional practices created with students’ input and choice as the central focus.

Student Achievement

The dependent variable is student achievement. For the purposes of this study, “student achievement” is defined as the number of correct responses on a summative science assessment after a unit studying sound. The assessment is administered via Google Form.

CHAPTER II

REVIEW OF THE LITERATURE

This review of the literature examines the effects of student-centered curricula and instructional practices on student achievement. The first sections illuminate terms used in the literature to describe student-driven and teacher-driven pedagogy, as well as attitudes towards the instructional practices. The next section examines the reasoning behind, and significance of, student choice in the classroom. The two subsequent sections analyze studies which find benefits and limitations of student choice. The final section describes conclusions and implications for further research.

Introduction to Student Choice and Related Pedagogy

The term “student choice” is often associated with a plethora of other educational jargon. This section aims to introduce and clarify terms that are used in this literature review. Morrison (2008) uses the terms democratic and freedom-based education, in which “...students are free to decide what they study, and how, and when they study it” (p. 52). Democratic or freedom-based education is also synonymous with learner-centered, student-centered, or student-directed education (Çam, S. S., & Ünal Oruç, E., 2014; Bergstrom, P., 2019; Burbank, M. D., et al, 2020). Morrison (2008) clarifies that democratic education does not equate to giving students freedom to do whatever they want—teachers must teach students what their freedoms mean, and what responsibility they have. Within the umbrella of these pedagogies, there is student voice, choice, and autonomy, all of which place students’ opinions and interests at the educational forefront. Learner autonomy involves students setting objectives and monitoring their own learning

(Bergqvist, 2012; Orakci & Gelisli, 2019). Bergqvist (2012) explains how the concept is characterized in Sweden and other Nordic countries. “In Sweden, for example, self-regulated ways of organising teaching and learning are referred to as ‘own work’, ‘own learning’, ‘independent work’, ‘individual time for study’, ‘own planning’, or ‘work with own goals’” (Bergqvist, K., 2012, p. 284). The Montessori method is similar to Sweden’s, accentuating a focus on students’ “learning opportunities that are self-directed, exploratory, and based upon individual learners” (Burbank et al, 2020, p. 2). Throughout this paper, a range of the terms outlined above are used when referring to students making decisions about their learning.

Teacher Versus Learner Responsibility

It is important to distinguish between teacher responsibility and learner responsibility and understand the attitudes towards each. In Bergqvist’s (2012) study of a first-grade classroom, the teacher introduced “own work” by explaining how students were going to plan out their tasks, involving “must-do” tasks from the teacher. It was the students’ responsibility to choose from a selection of teacher-decided tasks, plan out their work time, and determine what they were going to do when they were done, for their “free choice” time. Garn and Jolly (2014) found that students appreciated when their teachers gave them choices and they were more likely to demonstrate responsibility for their learning. Çam and Ünal Oruç (2014) conducted interviews with four primary teachers regarding teacher and learner responsibility. There are three themes that emerged from their responses, including “only the teacher is responsible”, “the teacher is more responsible”, or “the student is more responsible”. Teachers who believe they should be more responsible for the learning view themselves as knowledgeable guides who help

students navigate difficult learning processes—the students cannot form an understanding on their own (Çam, S. S., & Ünal Oruç, E., 2014). On the contrary, there are also teachers who believe students should be more responsible and put at the forefront of their education. These teachers assert that “learning is a process happening inside of an individual...the learner’s responsibility in it is more dominant” (Çam, S. S., & Ünal Oruç, E., 2014). Bergstrom (2019) concludes that a distribution of power and control between teacher and student is indicative of student-centered instruction, and a teacher’s maintenance of power and control is indicative of teacher-centered instruction. Bergqvist (2012) and Orakci & Gelisli (2019) advise that student choice puts a significant amount of responsibility on the student, and the teacher must make assumptions that the students will carry out their tasks and monitor their own work independently. Morrison (2008) describes that many teachers are fearful of giving students choice, as they believe it will lead to chaos and a lack of learning. Morrison (2008) also depicts that the reasoning behind this attitude may be a combination of teachers’ lack of trust in their students as well as veering away from the “conventional” teaching that society is accustomed to.

Reasoning Behind Student Choice

School-related Factors

Students’ success in school is impacted by school-related factors, which impacts their engagement, attitude towards school, motivation, and ultimately their learning outcomes. High school students in Segedin’s (2012) study note that they do not usually feel what they learn is interesting or relevant to them, and ninety-two percent of the respondents emphasize that teacher expectations and freedom given to students affect the

effort students put into their education. School systems' courses are organized into "streams" or "tracks" and at-risk students end up being pushed into the lower stream, leading to students' low motivation and self-esteem (Segedin, 2012). Efforts must be made to combat this system and empower students. Bergqvist (2012) addresses the heterogeneity of students' abilities and how difficult it is for teachers to reach all students, as they each work at a different pace. He says a logical solution to that problem is to implement practices that are more individualized (Bergqvist, 2012).

Equity

New models of teaching and learning are needed to improve student outcomes, particularly for economically disadvantaged students and students of color. In the field of education, there is an ingrained system that has perpetuated inequities. Ng (2018) explains economically disadvantaged students perform lower than "their advantaged counterparts" on standardized tests, they are often less engaged in school, and "their perspectives and views about reading are seldom considered when developing pedagogical practices" (p. 700). Burbank et al (2020) shared similar findings, stating that Black students in Montessori classrooms scored higher on state assessments than similar peers in other programs. Morrison (2008) proclaims, "Student voice and choice in the classroom lies so far outside the educational norm in our society..." (p. 54). Morrison (2008) also illuminates that "our society's schools often fall far short of fostering the development of people who value diversity, who are both autonomous yet cognizant of others' needs and rights and who are open-minded yet equipped with critical-thinking skills to analyze contradictory ideas" (p. 52). The skills students learn in school will

transfer to their practices in society, so it is important to consider the hidden curriculum in schools.

Society and Self-Development

Beymer & Thomson (2015) and Patall et al (2008) describe self-determination theory, which states that competence, relatedness, and autonomy are essential for positive self-development. Fostering these three needs is presumed to lead to intrinsic motivation. Patall et al (2008) also contributes observations about societal norms revolving around choice. Some examples she shares include the concepts of “liberty” and “freedom” that the country was founded on, the free market economy, and other choices that people make through voting or other democratic practices (Patall et al, 2008). Morrison (2008) explains the relation between the society and schools, in that “certain values and beliefs are dominant in our society and inculcated in school” (p. 50). Most behaviors that are reinforced in society will be reflected in schools, and vice versa, whether positive or negative. If one wants to change the societal norms, it can begin in the schools.

Benefits of Student Choice

Student Motivation

Across the literature, researchers have found positive correlations among student choice and student motivation. The meta-analysis performed by Patall et al (2008) “suggests that choice had a greater effect on intrinsic motivation for children than for adults” (p. 296). This finding affirms that children benefit from having choice within their educational experience. Similarly, results from Garn and Jolly’s (2014) study

indicate two factors that contribute to intrinsic motivation in students, which are: teachers and parents taking time to understand the child's learning goals and interests and learning environments that provide choices. Dunphy (2017) finds that choice has a positive effect on students' motivation as well, as indicated from her study with second grade students. Ng (2018) writes about how a primary teachers' instructional changes related to student voice impacted her students' motivation and engagement. Ng (2018) explains that the teacher's new practices led to student behaviors such as collaboration, persistence, and seeking out new reading material. Morrison (2008) suggests that a democratic education places trust in the students and that more often than not, students rise to the challenge, which results in a high level of intrinsic motivation.

Student Achievement

Student achievement can improve when students are given choice. Orakci & Gelisli's (2019) study results conclude "the application of activities centered on learner autonomy in the experimental group increased the achievement significantly in the experimental group" (p. 286). Beymer and Thomson (2015) recommend that teachers provide choices that align with the ability levels of their students. By individualizing the choices, students are challenging themselves with any choice they make, rather than being able to choose something that is too easy for them.

Societal Productivity

Beymer and Thomson (2015) argues "it may be unreasonable to ask students to blindly follow directions throughout their school years and then expect them to become part of a functioning society" (p. 110). Morrison (2008) determines that those who are

given freedom and choice in their schooling “ultimately become better democratic citizens because they have learned how to negotiate with others” (p. 54). This leads to a more productive society, consisting of people who are open to change and listen to others (Morrison, 2008). The role of a public-school education is to prepare students for the “real world” and prepare students for their futures, no matter what that entails. By giving students the freedom and guidance to make decisions and cooperate with others, students will be prepared to contribute positively to society.

Possible Barriers for Student Choice

The complexity and rigidity of school systems often leads to conflict, differences in opinions, and difficulty in altering norms. Çam and Ünal Oruç (2014) describe the variation in teacher opinions regarding who is responsible for teaching and learning, even within just one school. Bergstrom (2019) observes conflicting perceptions of power and control in classrooms as well. Morrison (2008) points out that teachers can be “stuck” in conventional pedagogy or fearful of giving students too much control, and they refuse to change their practices to include student choice. Morrison (2008) also adds that there can be student challenges, as they are accustomed to being passive in their educational journey—being asked to reflect upon what they want to learn may be challenging for them at first. Institutional structures such as “large class sizes and mandated, pre-arranged content render attempts to institute democratic practices uncertain” (p. 58). Finally, too much choice can be detrimental to students and produce negative results (Beymer, P. N., & Thomson, M. M., 2015). Teachers must be methodical about presenting options to students and ensure that they are not overwhelmed.

Conclusions and Implications for Future Research

The literature reviewed in this paper came from a wide variety of studies. These included many primary-level classrooms and teachers, which are relevant to future research examining the effects of student choice on student achievement. However, there were several articles that had small sample sizes and articles that were focused on students in older grade levels. Although these articles had information relevant to future research, the difference in their population causes limitations for implications related to first grade classrooms. Many studies focused on the impact of student choice on motivation or students' engagement in schools. However, few studies examined the impact on achievement. The literature indicates there is a strong need for, and benefits to, giving students choice. There is a need for more research on this topic with the population of primary grade level students, as well as more research on a potential correlation between student choice and student achievement.

CHAPTER III

METHODS

Design

The design used was a quasi-experimental study. It is quasi-experimental because the participants were not randomly assigned to groups. The sampling strategy used in the study was a pretest-posttest control group design. There were 52 first grade students total in the study. 16 students were in the treatment group and 36 were in the control group.

Participants

The participants were selected from the first grade in a targeted Title One school in Baltimore, Maryland. The participants were six or seven years old. In both groups, there were students of varying races and socioeconomic statuses. There were students who have IEPs and students who are learning English as a second or other language. There were 17 males and 19 females in the control group. There were 7 males and 9 females in the treatment group. The treatment group is a class of first grade students, and the control group is comprised of two classes of first grade students.

Instrument

The instruments were a teacher-developed set of self-report opinion questions about control of lessons and a teacher-developed set of factual questions about the science unit that was learned. The internal consistency reliability coefficient was calculated from the pretest data. Test validity was focused on the relevance of the content covered by the factual questions. Two teachers of first grade, other than the researcher, rated the test items on how well they measured the skills that were to be tested (e.g., high, moderate, low degree to which the tested skill was measured by the item). Teacher A

stated, “I have taught first grade for 7 years and have taught the same science curriculum each year. In my expert opinion, the items on the assessment accurately reflect the content students are expected to learn.” Teacher B stated, “This is my 11th year teaching 1st grade. Our class completed a science test to sample the content of what the students are supposed to know related to the sound unit. Each of the questions on the science test were an accurate sample of the content that the students are expected to know by the end of the chapter.” Statistical validities (concurrent, predictive, and construct) were not feasible for the factual questions. The researcher provided justification for the opinion questions.

Procedure

The participants were selected based on convenience. The treatment group is made up of the researcher’s students, and the control group is comprised of the other two first grade classes in the school. Participants in both groups were told they would be answering questions about how they felt about school, and then some questions about a science topic. The participants were instructed to open the Google Form survey and assessment during the Google Meet session. After participants opened the form, the researcher read each question one by one, along with the response choices, giving students time to respond to that question before reading the next one to them. During the science unit focusing on sound, the control groups followed the given curriculum. The treatment group’s curriculum was manipulated. The researcher altered and added to the teacher-centered curriculum to infuse more student responsibility and choice to the science unit. The post-test was delivered in the same manner as the pre-test.

CHAPTER IV

RESULTS

The study attempted to determine the impact of student-centered learning on student achievement. Three classes of first grade students participated in the study. Two classes continued to receive science instruction as provided by the county, while one class received science instruction tailored to be student-centered. Before and after treatment, students were given a five-question survey to indicate their feelings about science instruction. Before and after treatment, students were also given a student assessment on the current science unit of study: sound. Data below depict results of the surveys and tests, as well as analysis of the pre-to-post assessment changes.

Table 1. t-test of pre survey responses

Method

μ_1 : population mean of presu when group = control
 μ_2 : population mean of presu when group = treatment
Difference: $\mu_1 - \mu_2$
Equal variances are assumed for this analysis.

Descriptive Statistics: pre survey

group	N	Mean	StDev	SE Mean
control	36	10.97	1.95	0.32
treatment	16	11.88	1.54	0.39

Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$
Alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$

t-Value DF P-Value

-1.64 50 0.108

The results of the t-test for the pre survey means indicate that the control and treatment samples did not differ significantly ($p=.108 > .05$). This is a requisite to measure change.

Table 2. t-test of pre-to-post change in survey responses

Method

μ_1 : population mean of suchange when group = control
 μ_2 : population mean of suchange when group = treatment

Difference: $\mu_1 - \mu_2$
 Equal variances are assumed for this analysis.

Descriptive Statistics: survey change from pre-to-post

group	N	Mean	StDev	SE Mean
control	33	0.58	2.33	0.41
treatment	14	-1.07	1.94	0.52

Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$
 Alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$

t-Value DF P-Value

2.32 45 0.025

The results of the t-test for the pre-to-post mean survey changes indicate that the control and treatment samples differed significantly ($p=.025 < .05$). The control sample had higher post than pre survey means, while the treatment had lower post than pre survey means.

Table 3. t-test of pre sound unit test scores

Method

μ_1 : population mean of presd when group = control
 μ_2 : population mean of presd when group = treatment
 Difference: $\mu_1 - \mu_2$
 Equal variances are assumed for this analysis.

Descriptive Statistics: pre sound unit test

group	N	Mean	StDev	SE Mean
control	36	3.94	1.55	0.26
treatment	16	3.00	1.93	0.48

Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$
 Alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$

T-Value DF P-Value

1.88 50 0.066

The results of the t-test for the pre sound unit test means indicate that the control and treatment samples did not differ significantly ($p=.066 > .05$). This is a requisite to measure pre-post change.

Table 4. t-test of pre-to-post change in sound unit test scores

Method

μ_1 : population mean of sdchange when group = control
 μ_2 : population mean of sdchange when group = treatment

Difference: $\mu_1 - \mu_2$
 Equal variances are assumed for this analysis.

Descriptive Statistics: sound unit test change from pre-to-post

group	N	Mean	StDev	SE Mean
control	36	-0.67	2.10	0.35
treatment	16	0.75	1.65	0.41

Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$

Alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$

T-Value DF P-Value

-2.39 50 0.021

The results of the t-test for the pre-to-post mean sound unit test changes indicate that the control and treatment samples differed significantly ($p = .025 < .05$). The control sample had lower unit test post means than pre means, while the treatment sample had higher post unit test means than pre means.

Figure 1. Interval Plots of Pre-to-post Survey Changes and Pre-to-Post Sound Unit Test Changes

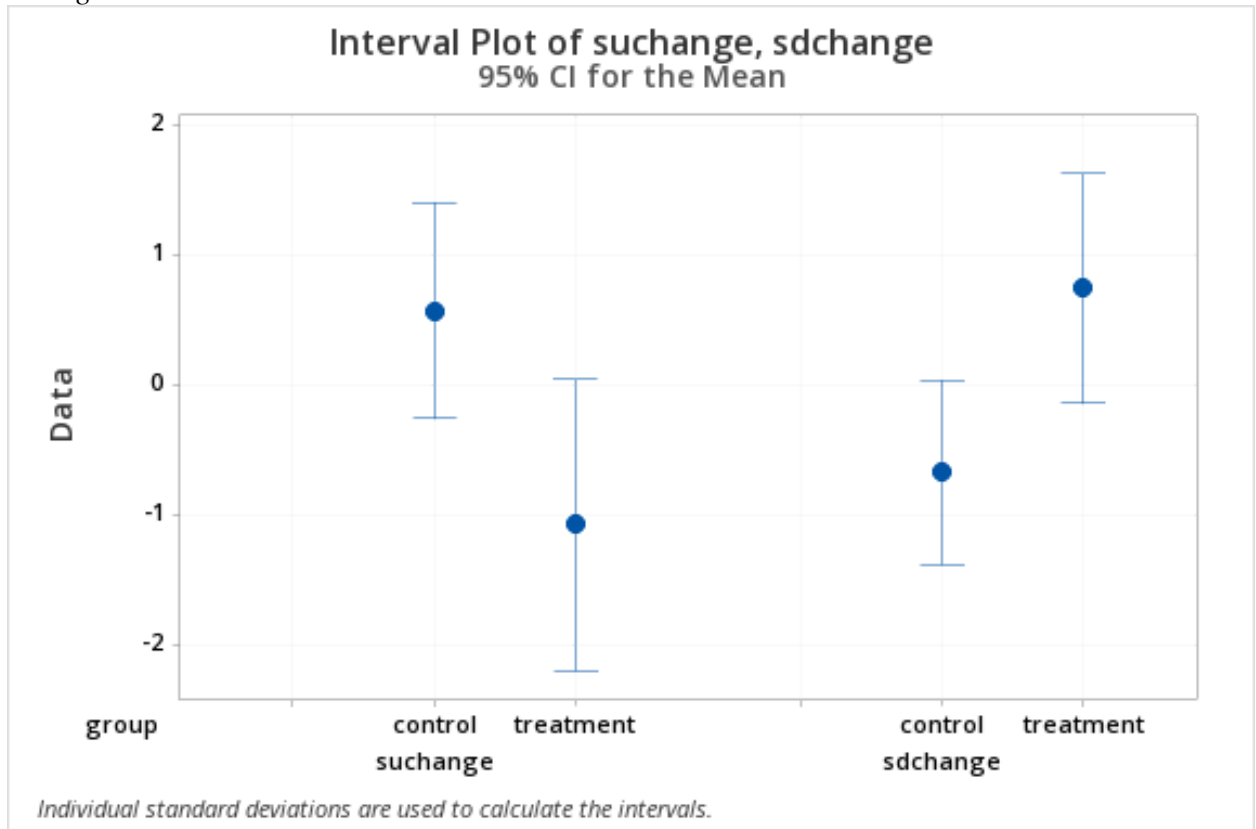


Figure 1 indicates that the control sample had positive pre-to-post mean changes on the survey. The treatment sample, by contrast, experienced negative mean changes from the pre-to-post

survey. The mean differences were statistically significant ($\alpha=.05$). On the pre-to-post sound unit test, the control sample had negative pre-to-post mean changes, while the treatment sample had positive mean changes. The mean differences were statistically significant ($\alpha=.05$).

The findings enable the researcher to reject the null hypothesis, as the results indicated the student-centered curriculum positively impacted the treatment group's academic achievement on the science post-test. The control and treatment samples did not differ significantly on the pre survey and the pre sound unit test. The survey pre-to-post mean changes, however, were statistically significant with the controls gaining and the treatment declining. By contrast, the unit test pre-to-post mean changes were also statistically significant, but the treatment sample's scores improved while the control sample's scores declined. Interestingly, these results indicate students in the treatment group were less interested in science content and felt they had less choice in science content after the student-centered instruction was implemented. However, despite the treatment group's indication that they had a more negative outlook on their science curriculum when it was student-centered, the sound post-test results indicated better student understanding of the content when student-centered curriculum was implemented.

CHAPTER V

DISCUSSION

The study was successful in determining the positive impact of student-centered learning on student achievement within the groups of first grade students chosen for the study. Analysis of the data supports rejecting the null hypothesis. Students who participated in student-centered instruction had more positive changes to their post-test scores than students participating in teacher-centered instruction. There were mixed results among other components of the data, including the student self-report survey in which students indicated how they felt towards science class and how much autonomy they had.

Implications of the Results

The pre- to post- change in sound unit test scores was significantly significant in favor of the treatment group. With these results, the researcher concludes that the null hypothesis should be rejected, as students' academic achievement benefitted from student-centered instruction. The pre- to post- change in survey responses was statistically significant in favor of the control group. Although the treatment did not necessarily positively impact students' responses regarding their feelings towards science class and student choice, the difference in post-test scores indicate the student-centered instruction did have a statistically significant positive impact on students' mastery of academic content. The researcher interprets that the treatment itself was effective in increasing student mastery of the content. However, the change in instructional methods did not seem to be noticeable enough for students to positively change their responses on

the post-survey. The results provide encouragement for teachers who want to provide more opportunities for students' academic growth and autonomy.

Threats to Validity

The researcher notes multiple threats to external and internal validity that could have impacted the results. One external threat to validity was the group was selected by convenience sample. Students all attend the same school and are instructed using the same overall county-given curriculum. The results of the study may not be able to be generalized across various school districts, grade levels, or demographics.

Some internal threats to validity included the age of the participants, participants' reading and writing abilities, the types of response options, participants' perception of the rating scale used, and the degree to which participants had assistance from parents. The participants were six and seven years old. At this age, there is a wide range of literacy abilities which can impact students' ability to respond to the questions on the survey and test. The survey was comprised of all multiple-choice responses and the statements were fairly broad, such as "I choose what I learn in science class". The rating scale during the survey was "yes", "sometimes", or "no" for each question. Seeing as the researcher did not clearly explain each response option to the students, they may interpret those options differently, leading to a variety of responses. Moving forward, a researcher may want to use a scale that is more direct and quantitative, such as, "within any given week, I am able to make __ (number) __ of choices in science class." The researcher could also use an interview format to gather data on student opinion regarding control and choice to get more information than the survey responses provided. The pre- and post- surveys and science tests were given in both virtual and in-person formats. With these formats, some

students had parental help when completing the survey and unit test, while other students did not have any help. Some students frequently turned in work incomplete or guessed on each question. This habit could influence how students perform on the unit tests, as well as how accurately they fill out the survey. If a student just clicks on random circles to select their responses, their results are invalid.

Connections to Previous Studies/Existing Literature

Previous studies referenced in Chapter II outline the definitions of student-centered instruction, reasoning behind it, and some implications. There were connections between previous literature and this study, including Bergstrom's (2019) explanation that a distribution of power and control between teacher and student is indicative of student-centered instruction, while a teacher's maintenance of power and control is indicative of teacher-centered instruction. Bergstrom's description influenced the researcher's methods, providing the treatment group with multiple opportunities for increased student autonomy and ensuring that students had some control of what they learned during the sound unit in their science class. Results from Garn and Jolly's (2014) study indicate that two factors contribute to intrinsic motivation in students: teachers and parents taking time to understand the child's learning goals and interests and learning environments that provide choices. The researcher incorporated both of those factors in the student-centered instructional methods for the treatment group. The researcher analyzed the effect of student-centered learning on academic achievement, whereas many previous studies focused mostly on student motivation.

Implications for Future Research

There are many opportunities for future research related to this study. The study was conducted during the COVID-19 pandemic, and the treatment and control groups were participating in hybrid learning, during which the teacher instructs both online learners and in-person learners simultaneously. There are many more opportunities to support student autonomy and student-centered learning during a typical school year, so future research conducted in a traditional setting would provide more insight regarding the efficacy of student-centered instruction. The researcher also suggests conducting the pre- and post- surveys in an interview format and allow for open-ended questions rather than all “yes”, “sometimes” and “no” responses. Responses may be more valid if conducted in an interview format. The researcher also could have outlined exactly what instructional methods she used to adapt the curriculum from teacher-centered to student-centered learning. By outlining the methods, she could ask the students particularly about each component to pinpoint what strategies positively impacted their outlook on the science unit, as well as what strategies they felt helped them learn best. Since there are a limited number of studies conducted at the primary level to determine effects of student-centered learning on academic achievement, further research is needed across various demographics of elementary school students.

Conclusions/Summary

This study was intriguing in that the researcher was able to determine student-centered instruction does positively impact student achievement, but unable to directly correlate that with the students’ self-reports of their feelings towards the instruction. Conducting the study in the hybrid learning format was unique and the researcher

implemented fewer strategies to increase student autonomy and choice than she would have in the typical school environment. One of the main instructional strategies implemented in the student-centered classroom included having students ask questions about what they wanted to learn. The content was driven by the students' questions while ensuring all standards of the original curriculum were met. The academic achievement results indicate the student-centered instruction did have a statistically significant positive impact on students' mastery of the science content in this study. Students showed more growth when their instruction was more dedicated to their interests and choices.

Appendix A

Survey Questions:

1. Do you enjoy science?
2. Do you choose what you learn about?
3. Do you choose how you show your teacher what you've learned?
4. Do you like asking questions in science class?
5. Do you have time to be creative in science class?

Assessment Questions:

1. Sound is important because ____.
2. How is sound created?
3. How is noise different than sound?
4. If a sound is high-pitched, the vibrations move ____.
5. Sounds travel ____.

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