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The Impact of Flexible Seating on Academic Performance within an Elementary Classroom

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The Impact of Flexible Seating on Academic Performance within an Elementary Classroom

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Abstract

This study examined how the implementation of flexible seating in an elementary classroom impacted academic achievement. The focus for this study was to determine if allowing students the opportunity to choose the type of seating they use is more beneficial than having every student sit in traditional seating arrangements of desks and chairs. Data was collected through pre- and post-tests via the STAR Reading and Math assessments, and analyzed in a Google Sheet. This nine-week study took place within two 3rd grade classrooms, with a total of 38 participants, in a small school in west-central Minnesota. The results of this study indicated that flexible seating did have a positive impact on academic achievement as the students that used flexible seating, when looking at the averages and medians, showed more growth than their traditional seating counterparts.

TABLE OF CONTENTS

Chapter One - Introduction

Introduction

Traditional seating, which includes desks and chairs ordered neatly in rows, has been a part of education going back to as far as the 18th century when students were taught in one-room schoolhouses. Education has changed since the 1700s though, and so has the type of seating offered to students. Traditional seating served the purpose of making the instructor the focus, and in the 18th and 19th centuries, it prepared students for working in factories (Stapp, 2019). Stapp (2019) also noted that obedience was seen as the end product, not comprehension nor mastery. Continuing to move into the 21st century, many teachers and schools are adopting what has been called flexible seating, easily configurable seating arrangements that provide alternatives to desks and chairs that also allow students to move within their seat without disruption (Kennedy, 2016). Flexible seating can take many forms, with some of the most common types being stability balls, wobble stools, standing desks, and seating cushions (See Appendix A). While relatively new to education, the amount of research on the impact flexibility seating has on academic performance is limited. The goal of this study was to add to the area of research and determine what impact flexible seating had on the academic achievement of elementary students.

Brief Literature Review

Research on incorporating flexible seating into elementary classrooms has been ongoing. Furthermore, credible research on academic achievement is scarce. What the literature does show, however, is that there are many benefits to implementing flexible seating into the classroom. One reason teachers are adopting flexible seating is that it can aid in students' health. Students that are in traditional seating with desks and chairs spend upwards of 90% of their school day sitting down (Rollo et al., 2019). When students spend the day sitting in a chair, they

can develop back and/or neck pain (Shahvarpour et al., 2016). Harvey and Kenyon (2013), stated that "static posture may impede learning, diminish attention span and concentration, and result in fatigue, drowsiness, or even pain or discomfort" (p. 2). Another reason teachers are adopting flexible seating is because it provides a learning environment that reflects the students' learning styles. Some students prefer to sit in a chair throughout the day, but most others need an outlet that allows them to move. Cole et al. (2021) conducted a study in which 65 students had their seating preferences analyzed. They found that roughly 40% of students chose flexible seating options on a daily basis, and the most popular seating choices were the floor, stability balls, couch, and tire (Cole et al., 2021).

Flexible seating has also been shown to positively affect students' engagement in class. When students have control over choosing where to sit or what type of seating model to use, they are able to internalize their learning (Alzahrani, 2021; Seaver, 2019). Schilling and Schwartz (2004) found that the engagement for students with Autism Spectrum Disorder (ASD) "increased substantially" when using a stability ball in class (p. 429). They also noted that when the flexible seating option was removed, the students showed an almost immediate reduction in engagement (Schilling & Schwartz, 2004). When students are allowed to move or fidget on their flexible seating option, the number of times they leave their spot to release their energy decreases, which in turn makes their overall productivity higher (Kennedy, 2016; Olson et al., 2019; Schoolcraft, 2018; Utecht & Keller, 2018).

Flexible seating allows students to collaborate and build relationships. Instead of solely relying on the teacher, flexible seating used in groups encourages students to learn with each other. Jones (2020) pointed out that a classroom with varied seating options "nurtures collaborative relationships, models a respectful attitude regarding alternative points of view,

empowers and emboldens students to value their thoughts and opinions, and promotes confidence in personal expression" (p. 58). Furthermore, flexible seating encourages students to formulate their own ideas and solutions in a low-risk environment in which they can cooperate with their neighbors because they are not bound to the chair they have been assigned to.

Statement of the Problem

Prior to this study, the researcher observed that his students gravitated towards the flexible seating options that were available in the classroom. He noticed that the students who used flexible seating rocked back and forth or swayed side to side, yet they still stayed engaged with their learning. This background in flexible seating made the researcher wonder how flexible seating impacted academic achievement. To determine what impact, if any, flexible seating has on academic achievement, the researcher used two third grade classes to conduct this study. The researcher's classroom provided flexible seating options for students to use all day, everyday, while the researcher's colleague used traditional seating in her classroom. The researcher collected data via STAR assessments in reading and math for both classes to evaluate the overall progress students made.

Purpose of the Study

The purpose of this study was to see what impact, if any, flexible seating had on academic achievement for elementary students. The researcher of this study has used flexible seating, such as wobble stools, wobble cushions, and floor seating in his 3rd and 4th grade classrooms since he began teaching, but has wondered what benefits it offers his students. At the time of the study, the researcher was a third grade teacher who knew the importance that freedom of choice had on their learning.

Research Question

The research was driven by the author's interest in various types of seating that has become available to students in recent years. Because of this, the following question guided the researcher's work: "What impact does flexible seating have on academic achievement for elementary students?"

Definition of Variables

Dependent Variables. The dependent variables in this study included the results of the pre-test and post-test that each participant took, the academic progress the participants made during the time of the study, and student's behaviors.

Independent Variables. The independent variables in this study were the two types of seating offered to students; traditional seating (desks/tables and chairs), and flexible seating, (wobble stools, wobble cushions, floor seating, etc.).

Significance of the Study

Although research shows that flexible seating increases engagement and positively impacts collaboration and student health (Alzahrani, 2021; Gremmen et al., 2016; Harvey & Kenyon, 2013; Jones, 2020; Kennedy, 2016; Olson et al., 2019; Schilling & Schwartz, 2004; Schoolcraft, 2018; Seaver, 2019; Seifert & Metz, 2017; Shahvarpour et al., 2016; Sorrell, 2019; Utecht & Keller, 2018), there is limited research that shows flexible seating impacts academic achievement. Believing there is a positive correlation between the two, the researcher enlisted the aid of a colleague to use her classroom as a control group that used traditional seating during the duration of the study, while the researcher used flexible seating for the duration of the study.

While meeting students' learning needs through differentiated instruction, teachers can provide their class with the choice of various seating options to meet their learning environment

needs, too. When provided with this freedom of choice and accountability, students are active in their own learning, which sets them up for success. This success carries into their work, showing a positive impact on academic performance.

Research Ethics

Permission and IRB Approval

In order to conduct this study, the researcher became certified through the Collaborative Institutional Training Initiative. The researcher also sought out MSUM's Institutional Review Board (IRB) approval to ensure the ethical conduct of research involving human subjects (Mills & Gay, 2019). Likewise, authorization to conduct this study was received from the school district where the research project took place (See Appendices B, C, and D).

Informed Consent

Protection of human subjects participating in this research was assured. Participant minors were informed of the purpose of the study via the Method of Assent (See Appendices E and F) that the researcher read to participants before the beginning of the study. Participants were aware that this study was conducted as part of the researcher's Master Degree Program and that it benefited his teaching practice. Informed consent means that the parents 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's participation in the study (Rothstein & Johnson, 2014). Confidentiality was 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 was outlined both verbally and in writing.

Limitations

A potential limitation of this research was the sample size. This study was conducted in two 3rd grade classes of approximately 20 students each in a rural school district. One of these classes was the control group, and only used traditional seating throughout the study. This limits the scope of the study, and the findings may not be applicable to all elementary classrooms. There could have been biases such as varying teacher opinions, teaching styles, and different participants for the study. The researcher believes another limitation is instrument decay, in which a seating option could have become unusable during the time of the study.

Conclusion

Flexible seating offers a positive alternative to traditional seating in an elementary classroom. While some students prefer a desk/table and a chair, a majority of students prefer a seating option that suits their individual learning style. The use of flexible seating addresses this issue. The goal of this study was to determine the impacts flexible seating has on academic achievement for elementary students. In the next chapter, the previous literature that has been found relating to flexible seating, specifically the benefits it offers with engagement, collaboration, and academic achievement, will be discussed and synthesized.

Chapter Two - Literature Review

Introduction

As the purpose of education has changed over the past several hundred years, so has the type of seating used in classrooms. Traditional seating, consisting of desks and chairs in rows, served the purpose of making the instructor the focus, and in the 18th and 19th centuries, it prepared students for working in factories (Stapp, 2019). Continuing to move into the 21st century, many teachers and schools are adopting what has been called flexible seating. Flexible seating can take many forms, with some of the most common types being stability balls, wobble stools, standing desks, and seating cushions. In the research of previous literature on the topic of flexible seating, it has been shown to have merit. The researcher of this paper utilized Minnesota State University Moorhead's online library, primarily the ERIC database, to search for peer reviewed articles and journals that were authored between 2015 and 2022. There were several keywords and/or phrases that were used to find information on the topic, including: flexible seating, dynamic seating, traditional seating, stability balls, wobble stools, physical activity in schools, and seating choice. After reading through the existing literature, the researcher noticed that there were several themes that stood out for flexible seating, which includes the academic benefits and behavior benefits that it offers.

Body of the Review

Context

Within the traditional seating model, students spend nearly all of their school day seated in a chair, which allows for little to no movement. This sedentary behavior does more harm than good for students (Flippin et al., 2020; Stapp, 2019). Rollo et al. pointed out that children in traditional seating classrooms spend over 90% of the school day seated (2019). Traditional

seating limits the opportunity for students to move and get the necessary physical activity they need to stay healthy. Another concern with traditional seating is poor posture. When students spend the day sitting in a chair, they can form back and/or neck pain (Shahvarpour et al., 2016). Harvey and Kenyon (2013), stated that "static posture may impede learning, diminish attention span and concentration, and result in fatigue, drowsiness, or even pain or discomfort" (p. 2).

Teachers are required to differentiate their instruction and provide a learning environment that reflects their students' learning styles. While some students are content sitting in a chair for hours on end, most need more variety that allows them to move. In a study conducted by Cole et al. in which they observed and analyzed the seating preferences of 65 students, nearly 20% of the participating students never chose to sit in traditional desk/chair arrangement (2021). There were two other compelling findings from this study: about 40% of participants sat in traditional seating one or less times throughout the period of data collection, and the most popular seating choices were the floor, stability balls, couch, and tire (Cole et al., 2021). When students are provided with the choice to sit in a spot that works best for their learning style, most will gravitate towards a flexible seating option.

Flexible Seating and Engagement

Although flexible seating is not for everyone, there are many advantages to including this option in classrooms. Providing students choice in their learning environment, particularly in the type of seating they use, will positively impact their engagement. Allowing students to have control over this small area makes time for learning more meaningful and helps to internalize their learning (Alzahrani, 2021; Seaver, 2019). Sorrell (2019) conducted a study through the use of interviews, surveys, and observations to analyze student perceptions of flexible seating within her classroom. Interestingly, there were no negative perceptions of flexible seating among the

students that were studied. One student enthused that “because of the choice and movement that flexible seating allows, they could learn better” (Sorrell, 2019, p. 130).

One of the most profound findings is the benefits flexible seating has for students with developmental disabilities, specifically Autism Spectrum Disorder (ASD). Schilling and Schwartz conducted a small study in 2004 with four students with ASD and the use of a stability ball. Their data shows that engagement for each participant “increased substantially,” even though they gently rocked back and forth. Whatsmore, upon removal of the stability ball, “all participants demonstrated an immediate decline in engagement and returned to their respective baseline levels” (Schilling & Schwartz, 2004, p.429). Despite the small sample size of their study, the benefits were clearly shown for individuals with exceptionalities. This can lead one to believe that their general education classroom counterparts would likely have similar results in increased engagement.

A study conducted by Seifert and Metz in 2017 that involved 52 students spread out among four preschool-aged classrooms was measured with two approaches; two rooms as the control group with traditional seating vs. two rooms that used wobble cushions. Seifert and Metz (2017) explained that their study examined all four classrooms during circle time, while measuring the engagement of the students. The study discovered that the students on the wobble cushions were more likely to participate in the activity and less likely to get off-task with their classmates or have side conversations. “These findings suggest that during the weeks when children sat on wiggle cushions, their attention to activities and effort in participation was higher than the weeks during which [they did not]” (Seifert & Metz, 2017, p. 416).

Academic productivity and on-task behavior also improve with the implementation of flexible seating. When students are provided a seating option that allows them to move or fidget,

this cuts down on the number of times they want to leave their spot to release their energy. This, in turn, increases the overall productivity of the students (Kennedy, 2016; Olson et al., 2019; Schoolcraft, 2018; Utecht & Keller, 2018). Students that remain in their spots are more likely to complete assigned work and less likely to exhibit off-task behavior.

Flexible Seating and Collaboration

Another benefit with flexible seating is that it promotes collaboration and builds relationships among students. Having flexible seating, such as groups of stools and/or floor seating, invites students to learn together instead of solely relying on the teacher. Jones (2020) pointed out that a classroom with varied seating options "nurtures collaborative relationships, models a respectful attitude regarding alternative points of view, empowers and emboldens students to value their thoughts and opinions, and promotes confidence in personal expression" (58). Seating that is set up in small groups elicits student interactions due to the proximity they have with one another (Gremmen et al., 2016). Furthermore, flexible seating encourages students to formulate their own ideas and solutions in a low-risk environment in which they can cooperate with their neighbors because they are not bound to the chair they have been assigned to. Wannarka and Paul (2008) disagreed, however, as they posited that a classroom should only be set up for groups if the task at hand is group work. They theorized that students working in rows produce more work and are less likely to disrupt their peers (Wannarka & Paul, 2008).

Flexible Seating and Academic Achievement

Incorporating flexible seating into classrooms leads to greater academic achievement compared to classrooms that utilize traditional seating. Given the behavior benefits that have already been pointed out, such as increased engagement and higher productivity, it makes sense that academics are also affected. When teachers do not have to spend nearly as much time

redirecting student behavior, more learning can take place, which positively impacts academic scores.

A study in 2016 that involved three sixth-grade classes was measured with three approaches; one room as a control with traditional seating, one room that took regular brain breaks, and one room that had each participant use a stability ball. Mead et al. (2016) explained that their study examined all three classrooms while receiving math instruction from the same curriculum, then they measured academic progress on standardized tests. The study discovered that the students on the stability balls had the greatest overall academic gains, unlike their traditional seating counterparts who showed the least overall growth. They go on to say:

> This intervention suggests that stability ball use may be a simple, effective means of improving student learning in the core academic area of mathematics. This study presents school administrators and teachers, who are under pressure to raise test scores, an alternative option to expensive and timely remediation measures that are currently being employed throughout the United States. (Mead et al., 2016, p. 446)

A counterargument from van der Wurff et al. stated that their study of 271 high school students showed quite the opposite. They concluded that sensory processing tools, including wobble cushions, lead to negative effects in mathematics as measured by a test that was administered by the researchers (2021). Another study from Bergtold et al. agreed with van der Wurff et al.. Bergtold et al. surmised that seating arrangement and seating type had little to no effect on academic achievement as measured by exam scores of 347 college students (2019). Since these results were gathered from older students, the research does not necessarily contradict flexible seating in elementary schools. Regardless, there is more literature that is in support of flexible seating as it has been shown to have academic benefits for children.

Theoretical Framework

The theory that is centered around flexible seating is William Glasser's Choice Theory. Choice Theory stated that every person is driven by four psychological needs: the need to belong, the need for power, the need for freedom, and the need for fun (Glasser, 1997). These four pillars are integral to flexible seating as providing students with choices allows students to pick an option that is both relevant and important to them (Woolfolk, 2019). When students are given the opportunity to pick their flexible seating, they are given both the power and freedom to choose, satisfying those two needs. Needing to belong would be met by the student getting to sit in the spot of their choosing, as they feel they belong there. The need for fun, while less of a priority when it comes to choosing where to sit, is still fulfilled if they get to sit next to a friend and collaborate with them. How choice theory affects academic success was tested by the researcher.

Research Question

The research was driven by the author's interest in various types of seating that has become available to students in recent years. Because of this, the following question guided the researcher's work: "What impact does flexible seating have on academic achievement for elementary students?"

Conclusion

This chapter reviewed the literature that supports the advantages of incorporating flexible seating in the classroom. The literature highlighted the importance of student choice, which is also supported by the work of theorist William Glasser. The articles and journal entries from this literature review also helped the author to understand the advantages flexible seating has on behavioral benefits and academic success. Even though some students would continue to choose

traditional seating, other students thrive when given seating options that best suit them and their learning style. The author's goal through their action research was to determine the impact flexible seating has on academic achievement for elementary students. The next chapter will go into greater detail about the methods for which this action research was conducted.

Chapter Three - Methods

Introduction

Classroom seating options have changed over the past several hundred years. In the 18th and 19th centuries, classrooms used traditional seating which consisted of desks and chairs organized in rows. Classrooms were set up this way to make the teacher the focus and eventually prepare children to work in factories (Stapp, 2019). Stapp (2019) also noted that obedience was seen as the end product, not comprehension nor mastery. Moving into the 21st century, many teachers and schools have adopted flexible seating, easily configurable seating arrangements that also allow students to move within their seat without disruption (Kennedy, 2016). Flexible seating can take many forms, with some of the most common types being stability balls, wobble stools, standing desks, and seating cushions.

The goal of this study was to determine what impact flexible seating had on the academic achievement of elementary students. This study was conducted through the use of a quantitative two-group quasi-experimental research design. A quasi-experimental design was chosen by the researcher because randomization of participants was not feasible (Mitchell, 2015). Students were assigned classroom teachers prior to the study, which impacted the researcher's sampling. A two-group quasi-experiment, compared to a one-group quasi-experiment, has fewer threats to validity and allows the researcher to involve a group that does not receive the treatment of interest (Mitchell, 2015).

Research Question

The research was driven by the author's interest in various types of seating that has become available to students in recent years. Because of this, the following question guided the

researcher's work: "What impact does flexible seating have on academic achievement for elementary students?"

Research Design

This study was conducted using a quantitative approach with an experimental design. "Experimental quantitative research requires students to be randomly assigned to a control group or an experimental group and involves manipulation of the independent variables in order to control group assignments" (Mills, 2018, p. 133). The researcher implemented flexible seating within his classroom in order to see the effect this had on their academic achievement compared to the classroom acting as the control group that used traditional seating. When using the experimental research design, researchers are looking for a cause-and-effect relationship (Mitchell, 2015). With this study, the researcher looked for the effects flexible seating had on academic achievement. The STAR Reading and Math assessments were given to the participants to see their starting academic ability before the study began.

Setting

This study was conducted in two third-grade classrooms at an elementary school that houses grades preschool through fourth grade. Despite being an hour or more from the closest "big city," nearly 7,000 people call this rural community their home ("Community Opportunity," n.d.). Located in the west-central part of Minnesota in the heart of lakes country, the community this school belongs to is home to multiple large businesses and manufacturing facilities. Drawing in thousands of people for both work and play, this little town has a strong sense of community.

According to the 2022 Minnesota Department of Education's "Report Card," the district in which this elementary school is located has around 1,600 students enrolled, with nearly 550 of these students being at the elementary school. The enrollment by race/ethnicity of the elementary

school is as follows: 77% White, 14% Hispanic or Latinx, 2% Black, 2% Asian American and Pacific Islander, and another 5% identified as two or more races ("Minnesota Report," 2022). Rounding out the remaining enrollment criteria of the elementary school, 8% of students were English Learners, 30% qualified for free or reduced price-meals, and 20% received special education services ("Minnesota Report," 2022).

Participants

There were two third-grade classrooms that participated in this study. The first classroom, taught by the researcher of this study, was made up of 20 eight-to-nine year olds. 11 of the students were male and 9 were female. The race/ethnicity of the students that were in the class is as follows: 90% White and 10% Hispanic or Latinx. 10% of the students were English Learners, 35% qualified for free or reduced-price meals, and 15% received special education services. All 20 students lived in a two-parent household, either with parents or step-parents.

The second classroom, taught by the researcher's colleague, was composed of 18 eight-to-nine year olds. 11 of the students were male and 7 were female. The race/ethnicity of the students that were in the class is as follows: 94% White and 6% Black. None of the students were English Learners, 29% qualified for free or reduced-price meals, and 11% received special education services. 89% of students lived in a two-parent household, while 11% lived in a single-parent household.

Sampling

The students that were selected for this study were chosen for their availability to the researcher in the 2022-2023 academic school year, which would be considered convenience sampling. Convenience sampling "draws from a source that is conveniently accessible to the researcher or those managing the assessment" (Sexton, 2022). Participants for the experimental

group were chosen as they were already in the researcher's class. Participants in the control group were selected as their classroom utilizes traditional seating. All students within both classrooms were given the opportunity to participate in this study. This convenience sampling allowed the researcher to implement a variable within his classroom of 20 students, in this case flexible seating. Meanwhile, the control took place in a classroom of 18 students that used traditional seating consisting of desks and chairs. It is important to note that regardless of the study, the students in the researcher's classroom still would have had flexible seating available to them and the students in the researcher's colleague's classroom still would have used traditional seating.

Instrumentation

The instruments used to collect data for this study were the STAR math and reading assessments (See Appendix G). The STAR math and reading assessments, developed by Renaissance Learning, are computer-adaptive assessments that provide teachers with immediate feedback to a student's reading and math development ("STAR Reading," 2015; "STAR Math," 2015). Used as a way to progress-monitor students, the STAR reading and math tests are not considered "high stakes" tests. Both tests administer 34 multiple-choice questions, and students are given as much time as needed to complete the test. The typical testing session, however, is between 25-45 minutes. Since both tests are computer-adaptive, repetition of questions is highly unlikely, as the software will not present the same item more than once in any 75-day period ("STAR Reading," 2015; "STAR Math," 2015). The STAR reading assessment has a reliability coefficient of 0.93 and validity coefficient 0.74 ("STAR Reading," 2015). The STAR math assessment has a reliability coefficient of 0.92 validity coefficient 0.71 ("STAR Math," 2015). The coefficients showed that the reliability and validity of both tests were strong and useful for

collecting data. The data collected from the STAR reading and math assessments was then compiled in a Google Sheet (See Appendices H and I). The Google Sheet contained information for Grade Equivalent (GE) scores. Grade Equivalent scores are a norm-referenced score that compares test results to other students who completed the same test and is a placement of students for whom a particular score is typical ("STAR Reading," 2015). Grade Equivalent scores are reported as a decimal, with the number in the ones place representing the grade level and the tenths place representing the month of school. For example, if a student scored a GE of 3.2, this would indicate they tested at a level comparable to a third grade student in the second month of school. The GE of students are expected to grow by 0.1 for each month of instruction. This method was chosen by the researcher because it was most often used in his school and provided a true insight into what the student knew.

Data Collection

Quantitative data was collected during this study. The STAR reading and math assessments were given to students in both the control and experimental groups the first week of the study to determine their starting academic ability. Students were then instructed as normal throughout the study, with no other changes to instruction or classroom design except one classroom used flexible seating (the experimental group) and one classroom used traditional seating of desks and chairs (the control group). The STAR reading and math assessments were given to students in both the control and experimental groups during the last week of the study to determine the level of academic achievement during the course of the action research.

Data Analysis

Quantitative data was collected twice during the study. The STAR reading and math assessments were used as a pre-test and post-test to this study to determine what impact, if any,

flexible seating had on academic achievement. The data from the STAR assessments were tracked in a Google Sheet (See Appendices H and I), which indicated the student's grade equivalents, class averages, median scores, and percent of change of individuals and the class. Once all of the data was entered into the spreadsheet, the researcher analyzed class averages to determine which type of seating was correlated with greater academic achievement during the time of the study. The greater the average, the more achievement the class made as a whole.

Research Question and System Alignment

Table 3.1 provides a description of the alignment between the study's research question and the methods used in this study to ensure that all variables of study have been accounted for adequately.

Table 3.1.

Research Question Alignment

Research Question	Variables	Design	Instrument	Validity & Reliability	Technique	Source
What impact does flexible seating have on academic achievement for elementary students?	DV: The testing results and academic progress. IV: The type of seating used (traditional vs flexible seating).	Quantitative two-group quasi experimental research	STAR Reading and STAR Math assessments (computer-adaptive assessments)	All students were taught from the same curriculum. All participants completed a pre-test and post-test; STAR reading and STAR math	STAR reading and math assessments were used as a pre-test and post-test for this study.	Two third-grade classes. Sample Size: 38 students, with 18 in the control group and 20 in the experimental group

Note. The STAR reading and math assessments are traditionally taken by students three times per year (fall, winter, and spring), but may be used additionally throughout the year as a form of progress monitoring.

Procedures

This action research took place over a nine-week period, with the first and last weeks used to gather pre- and post-test data. To begin, the researcher had students in both the experimental and control classrooms complete the STAR reading and STAR math assessments. This information provided the researcher with the starting academic ability for each participant of the study. The researcher then accessed the testing results on Renaissance Learning, which is the online teacher hub for STAR assessments. The researcher took this information and entered it into the previously created Google Sheet. The Google Sheet automatically calculated the class averages and medians for the pre-tests. Throughout the remainder of the study, the researcher who taught the experimental classroom and his colleague who taught the control classroom provided literacy and math instruction from the same district-provided curricula. The researcher and his colleague used their common planning time to ensure that they were teaching the same lessons at roughly the same pace so both groups had the same exposure to the content. During the last week of the study, the students in the experimental and control classrooms took the STAR reading and STAR math assessments again. This information provided the researchers with the academic progress that was gained throughout the course of this study. The researcher took this information and entered it into the Google Sheet. The Google Sheet calculated multiple points of data. First, the class Grade Equivalent averages and medians for the post-tests were tabulated. Next, the averages and medians of Grade Equivalent changes were found. Lastly, the percent of change made during the study for individual students and the overall class were determined. Once the table was complete, the researcher analyzed the academic achievement of the experimental group compared to the control group.

Ethical Considerations

The participants of this study were children, which is considered a vulnerable population. To ensure ethical considerations were met, the researcher became certified through the Collaborative Institutional Training Initiative. The researcher also sought out MSUM's Institutional Review Board (IRB) approval to ensure the ethical conduct of research involving human subjects (Mills & Gay, 2019). Likewise, authorization to conduct this study was received from the school district where the research project took place. Participants and their families were given detailed information about the study, as well as made aware of any risks that might have been associated with the study. Confidentiality was ensured for the participants by eliminating names, and incorporating the use of pseudonyms (e.g., Student 1 or Student A). Participants and their families were informed that they could withdraw from the study at any time without penalty or questions asked. The emotional well-being of the students were also taken into consideration. Participants were not made aware of the scores of their pre-test or post-test as to eliminate the possibility of students comparing themselves, positively or negatively, to one another.

Conclusion

There are various types of seating available to students today. Some classrooms continue to use traditional seating of desks in rows, while others have adopted flexible seating in an attempt to accommodate students' needs. This chapter explained the methods of determining the impact flexible seating has on academic achievement compared to traditional seating. The next chapter will examine the results of the action research.

Chapter Four - Results

Data Collection

The purpose of this study was to see what impact, if any, flexible seating had on academic achievement for elementary students. Quantitative data was collected during the study. Data was collected by both the researcher and the researcher's colleague. 38 third grade students participated in this study. 20 students, making up the experimental group, were in the researcher's classroom and used flexible seating consisting of wobble stools, wobble cushions, stability balls, couches, and chairs. The control group was composed of 18 students in a classroom that utilized traditional seating of desks/tables and chairs. The STAR reading and math assessments were given to students in both the control and experimental groups during the first week of the study to determine their starting academic ability. Students were then instructed as normal throughout the nine week study, with no other changes to instruction or classroom design except one classroom used flexible seating (the experimental group) and one classroom used traditional seating of desks and chairs (the control group). The STAR reading and math assessments were given to students in both the control and experimental groups during the last week of the study to determine the level of academic achievement during the course of the action research. Since the Grade Equivalent (GE) of students are expected to grow by a minimum of 0.1 with each month of instruction, the students participating in this study should have grown by a minimum of 0.2 as measured by the STAR tests. The information gathered through the pre- and post-tests were displayed and evaluated in a table created in Google Sheets.

Results

Table 4.1 shows the STAR Reading pre- and post-test data collected from the experimental class that used flexible seating during the course of the study. One student from this

class did not show growth as measured by the STAR test as their Grade Equivalent (GE) did not change. Four students showed minimal growth, with their GE growing by 0.1 or 0.2. The remaining 15 students grew more than what was expected during the nine-week study. Notably, students 2, 3, 7, 8, and 13 grew by 1.0 or more, showing over a year's worth of growth during the time of the study.

Table 4.1

STAR Reading Results for Flexible Seating Classroom

Student	Pre-Test GE	Post-Test GE	GE Change (+/-)	Percent Change of GE
1	3.90	4.10	0.20	5.13%
2	3.70	4.80	1.10	29.73%
3	4.50	5.20	0.70	15.56%
4	0.80	1.80	1.00	125.00%
5	2.50	2.50	0.00	0.00%
6	1.00	1.10	0.10	10.00%
7	3.20	4.20	1.00	31.25%
8	6.30	7.60	1.30	20.63%
9	2.50	3.20	0.70	28.00%
10	2.40	3.20	0.80	33.33%
11	3.00	3.60	0.60	20.00%
12	1.00	1.20	0.20	20.00%
13	3.50	4.50	1.00	28.57%
14	3.50	3.80	0.30	8.57%
15	3.50	4.00	0.50	14.29%
16	1.00	1.10	0.10	10.00%
17	3.10	3.50	0.40	12.90%
18	3.60	3.90	0.30	8.33%
19	5.20	5.90	0.70	13.46%
20	2.40	2.80	0.40	16.67%

Table 4.2 shows the STAR Reading pre- and post-test data collected from the control class that used traditional seating during the course of the study. Six students from this class did

not show growth as measured by the STAR test as their Grade Equivalent (GE) either did not change or regressed. Three students showed minimal growth, with their GE growing by 0.1 or 0.2. The remaining nine students grew more than what was expected during the nine-week study. Notably, students B, D, and Q grew by 1.0 or more, showing over a year's worth of growth during the time of the study.

Table 4.2

STAR Reading Results for Traditional Seating Classroom

Student	Pre-Test GE	Post-Test GE	GE Change (+/-)	Percent Change of GE
A	4.10	3.90	-0.20	-4.88%
B	5.00	6.20	1.20	24.00%
C	1.60	1.40	-0.20	-12.50%
D	1.20	2.70	1.50	125.00%
E	4.90	5.40	0.50	10.20%
F	2.80	3.50	0.70	25.00%
G	2.20	2.40	0.20	9.09%
H	3.40	4.00	0.60	17.65%
I	2.30	2.30	0.00	0.00%
J	3.20	3.30	0.10	3.12%
K	4.10	3.80	-0.30	-7.32%
L	2.10	2.60	0.50	23.81%
M	2.00	2.00	0.00	0.00%
N	3.40	3.60	0.20	5.88%
O	1.80	2.60	0.80	44.44%
P	2.60	3.00	0.40	15.38%
Q	2.80	4.50	1.70	60.71%
R	2.70	2.50	-0.20	-7.41%

Table 4.3 shows the average Grade Equivalent (GE) pre- and post-test scores as collected by the STAR Reading assessment, as well as the average GE percent change. The flexible seating class had more academic growth than their traditional seating counterparts as their GE change and percent change were higher.

Table 4.3

Comparing STAR Reading Averages

Class	Average Pre-Test GE	Average Post-Test GE	Average GE Change (+/-)	Average GE Percent Change
Flexible Seating Class	3.03	3.60	0.57	22.57%
Traditional Seating Class	2.90	3.32	0.42	18.46%

Table 4.4 shows the median Grade Equivalent (GE) pre- and post-test scores as collected by the STAR Reading assessment, as well as the median GE percent change. Similar to the average scores reported in Table 4.3, the flexible seating classroom had higher median scores, too.

Table 4.4

Comparing STAR Reading Medians

Class	Median Pre-Test GE	Median Post-Test GE	Median GE Change (+/-)	Median GE Percent Change
Flexible Seating Class	3.15	3.70	0.55	16.11%
Traditional Seating Class	2.75	3.15	0.30	9.65%

Table 4.5 shows the STAR Math pre- and post-test data collected from the experimental class that used flexible seating during the course of the study. Three students from this class did not show growth as measured by the STAR test as their Grade Equivalent (GE) did not change. Three students showed minimal growth, with their GE growing by 0.1 or 0.2. The remaining 14 students grew more than what was expected during the nine-week study. Notably, students 1, 5, and 16 grew by 1.0 or more, showing over a year's worth of growth during the time of the study.

Table 4.5

STAR Math Results for Flexible Seating Classroom

Student	Pre-Test GE	Post-Test GE	GE Change (+/-)	Percent Change of GE
1	3.70	4.80	1.10	29.73%
2	5.10	5.70	0.60	11.76%
3	4.70	4.70	0.00	0.00%
4	3.60	3.60	0.00	0.00%
5	3.50	4.60	1.10	31.43%
6	2.80	3.00	0.20	7.14%
7	3.70	4.10	0.40	10.81%
8	5.10	6.00	0.90	17.65%
9	3.00	3.80	0.80	26.67%
10	1.60	2.50	0.90	56.25%
11	2.30	3.20	0.90	39.13%
12	2.00	2.70	0.70	35.00%
13	4.10	4.20	0.10	2.44%
14	4.30	4.50	0.20	4.65%
15	3.80	3.80	0.00	0.00%
16	2.10	4.60	2.50	119.05%
17	3.30	3.90	0.60	18.18%
18	4.30	5.20	0.90	20.93%
19	4.00	4.60	0.60	15.00%
20	2.60	3.30	0.70	26.92%

Table 4.6 shows the STAR Math pre- and post-test data collected from the control class that used traditional seating during the course of the study. Seven students from this class did not show growth as measured by the STAR test as their Grade Equivalent (GE) either did not change or regressed. Three students showed minimal growth, with their GE growing by 0.1 or 0.2. The remaining eight students grew more than what was expected during the nine-week study. Notably, students H and Q grew by 1.0 or more, showing over a year's worth of growth during the time of the study.

Table 4.6

STAR Math Results for Traditional Seating Classroom

Student	Pre-Test GE	Post-Test GE	GE Change (+/-)	Percent Change of GE
A	3.40	3.50	0.10	2.94%
B	5.00	5.10	0.10	2.00%
C	2.30	1.20	-1.10	-47.83%
D	3.30	3.90	0.60	18.18%
E	4.10	3.80	-0.30	-7.32%
F	4.40	4.00	-0.40	-9.09%
G	2.70	3.50	0.80	29.63%
H	3.50	4.90	1.40	40.00%
I	3.80	4.10	0.30	7.89%
J	2.80	3.00	0.20	7.14%
K	4.10	3.60	-0.50	-12.20%
L	3.20	3.70	0.50	15.63%
M	3.60	3.00	-0.60	-16.67%
N	3.60	3.20	-0.40	-11.11%
O	3.00	3.20	0.20	6.67%
P	3.30	3.30	0.00	0.00%
Q	2.60	3.80	1.20	46.15%
R	3.10	3.70	0.60	19.35%

Table 4.7 shows the average Grade Equivalent (GE) pre- and post-test scores as collected by the STAR Math assessment, as well as the average GE percent change. The flexible seating class had more academic growth than their traditional seating counterparts as their GE change and percent change were higher.

Table 4.7

Comparing STAR Math Averages

Class	Average Pre-Test GE	Average Post-Test GE	Average GE Change (+/-)	Average GE Percent Change
Flexible Seating Class	3.48	4.14	0.66	23.64%
Traditional Seating Class	3.43	3.58	0.15	5.08%

Table 4.8 shows the median Grade Equivalent (GE) pre- and post-test scores as collected by the STAR Math assessment, as well as the median GE percent change. Similar to the average scores reported in Table 4.7, the flexible seating classroom had higher median scores, too.

Table 4.8

Comparing STAR Math Medians

Class	Median Pre-Test GE	Median Post-Test GE	Median GE Change (+/-)	Median GE Percent Change
Flexible Seating Class	3.65	4.15	0.65	17.91%
Traditional Seating Class	3.35	3.65	0.15	4.80%

Data Analysis

As the previous literature on the topic of flexible seating and academic performance were limited at the time this study began, the researcher had no expectations for the results. The data from this quantitative study were carefully analyzed, which led the researcher to determine that flexible seating does positively impact elementary students' academic achievement. Tables 4.3 and 4.4 compared the STAR Reading results of both the experimental and control classes. The average and median scores both show that the flexible seating (experimental) class scored higher than the traditional seating (control) class. The difference between the two are within 0.2 Grade

Equivalents, though, so the academic gains while present, are minimal. These results alone do not make the case that flexible seating is a shift worth making in the classroom.

Tables 4.7 and 4.8 compared the STAR Math results of both the experimental and control classes. The average and median scores both show that the flexible seating class scored significantly higher than the traditional seating class. The students that used flexible seating scored an average and median of 0.5 Grade Equivalent higher. The percent change for flexible seating was around four times higher as well. While the results for reading were not enough reason to convince an unsure educator to switch to flexible seating, the math scores show quite the opposite.

The results of this study coincide with a 2016 study that involved three sixth-grade classes. Mead et al. (2016) measured three approaches; one room as a control with traditional seating, one room that took regular brain breaks, and one room that had each participant use a stability ball. Mead et al. (2016) explained that their study examined all three classrooms while receiving math instruction from the same curriculum, then they measured academic progress on standardized tests. The study discovered that the students on the stability balls had the greatest overall academic gains, unlike their traditional seating counterparts who showed the least overall growth. They go on to say:

> This intervention suggests that stability ball use may be a simple, effective means of improving student learning in the core academic area of mathematics. This study presents school administrators and teachers, who are under pressure to raise test scores, an alternative option to expensive and timely remediation measures that are currently being employed throughout the United States. (Mead et al., 2016, p. 446)

The researcher did encounter several problems in data collection, however it is the researcher's opinion that they had little to no influence on the results. One problem encountered while collecting data was the absence of students on the days of a pre- or post-test. Since both the researcher and his colleague tested on the same days, the students that were absent had to take their tests upon their return. Another problem arose during the week of the post-test – the STAR Math assessment was unavailable for students and teachers because the school district did not pay to renew their licenses in time. This caused the post-test for STAR Math to be postponed one week from the planned date, however both the experimental and control classes took the post-test on the same date once it was available.

Conclusion

There are various types of seating available to students today. Some classrooms continue to use traditional seating of desks in rows, while others have adopted flexible seating in an attempt to accommodate students' needs. This chapter showed the data and analyzed the results of the study. The data shows that flexible seating is a tool that can be used in classrooms to increase academic achievement, especially in mathematics. The next chapter will outline the researcher's action plan for using this intervention in his daily teaching, as well as how he will share the information gathered from this study with others.

Chapter Five - Implications for Practice

Action Plan

Through this action research, the author has learned how important it is to provide choice to his students. Making choices is part of everyday life, so limiting students to a desk and chair does not match all of the possible learning styles (Harvey & Kenyon, 2013). Allowing students to pick a seating option that best suits their needs allows them to learn their best. Furthermore, seating options that allow students to move or fidget quietly help them focus their attention on the lesson or assigned task while minimizing off-task behavior (van der Wurff et al., 2021). Throughout the study, the researcher observed that once students had a chance to try each type of seating, they gravitated towards one type more than others. He noticed that a handful of students only wanted to sit on wobble stools, while some preferred to always be on the floor with a wobble cushion. Still, there were a couple that consistently chose to sit in a traditional desk and chair. The most popular seating types, though, were the stability balls and couch.

The information the researcher learned through this action research project will impact his teaching moving forward. He will continue to provide various seating options, including both traditional seating and flexible seating options, to his students while allowing them to choose the type that allows them to learn their best. He will also continue to note which types of seating are more popular and which are less desirable. This will allow him to seek out appropriate seating options in the future. As an educator, he now knows the benefits of flexible seating beyond it being a new trend that has infiltrated classrooms. He has learned the importance of listening and understanding student opinions, especially in the realm of choice. What the researcher has learned from this study can now be shared with others that have been wondering if there are any benefits to using flexible seating.

Plan for Sharing

The researcher will first share the results of this action research project with his third grade teaching team. The classroom and intervention teachers in his school would also benefit from the results of this study. The researcher will also share the results of this study with his Principal and Dean of Students so they can share it with others as they see fit. His students will be told the results of the study in a way that makes sense to them. The families of the researcher's students that participated in this study will also have the results shared with them in the form of a letter.

References

Alzahrani, A. (2021). Applying flexible seating in the classroom to enhance learning. *Taboo: The Journal of Culture & Education*, 20(2), 213–217.

Bergtold, J. S., Yeager, E. A., & Griffin, T. W. (2019). Spatial dynamics in the classroom: Does seating choice matter? *PLoS ONE*, 14(12). https://doi-org.trmproxy.mnpals.net/10.1371/journal.pone.0226953

Cole, K., Schroeder, K., Bataineh, M., & Al-Bataineh, A. (2021). Flexible seating impact on classroom environment. *Turkish Online Journal of Educational Technology - TOJET*, 20(2), 62–74.

Community opportunity map. (2022). Casey Family Programs. Retrieved July 9, 2022, from https://caseyfamily.caimaps.info/CAILive/

Flippin, M., Clapham, E. D., & Tutwiler, M. S. (2021). Effects of using a variety of kinesthetic classroom equipment on elementary students' on-task behaviour: a pilot study. *Learning Environments Research*, 24(1), 137–151. https://doi-org.trmproxy.mnpals.net/10.1007/s10984-020-09321-2

Glasser, W. (1997). `Choice theory' and student success. *Education Digest*, 63(3), 16.

Gopalan, M., Rosinger, K., & Bin-Ahn, J. (2020). Use of quasi-experimental research designs in education research: Growth, promise, and challenges. *Review of Research in Education*, 44, 218–243.

Gremmen, M. C., van den Berg, Y. H. M., Segers, E., & Cillessen, A. H. N. (2016). Considerations for classroom seating arrangements and the role of teacher characteristics and beliefs. *Social Psychology of Education: An International Journal*, 19(4), 749–774.

Harvey, E. J., & Kenyon, M. C. (2013). Classroom seating considerations for 21st century

students and faculty. *Journal of Learning Spaces*, 2(1).

Jones, J. (2020). Innovations in learning: Design enhances engagement. *Childhood Education*, 96(1), 58–61.

Kennedy, M. (2016). Creating some wiggle room. *American School & University*, 88(10), 20–21.

Martin, R., & Murtagh, E. M. (2015). Preliminary findings of active classrooms: An intervention to increase physical activity levels of primary school children during class time. *Teaching & Teacher Education*, 52, 113–127. https://doi-org.trmproxy.mnpals.net/10.1016/j.tate.2015.09.007

Mead, T., Scibora, L., Gardner, J., & Dunn, S. (2016). The impact of stability balls, activity breaks, and a sedentary classroom on standardized math scores. *Physical Educator*, 73(3), 433–449. https://doi-org.trmproxy.mnpals.net/10.18666/TPE-2016-V73-I3-5303

Mills, G. (2018). *Action research: A guide for the teacher researcher*. Pearson Education, Inc.

Mills, G. E., & Gay, L. R. (2019). Educational research: competencies for analysis and applications. Pearson.

Minnesota report card. (2022). Minnesota Department of Education. Retrieved July 9, 2022, from https://rc.education.mn.gov/#mySchool/orgId--10549000000__groupType--district__p--3

Mitchell, O. (2015). Experimental research design. In W. G. Jennings (Ed.), *Encyclopedia of Crime and Punishment*. Wiley. https://doi.org/10.1002/9781118519639.wbecpx113

Olson, N. A., Panahon, C. J., & Hilt-Panahon, A. (2019). Investigating the effects of stability

balls on classwide student behavior and academic productivity. *Journal of Applied School Psychology*, 35(3), 201–214. https://doi-org.trmproxy.mnpals.net/10.1080/15377903.2018.1549175

Rollo, S., Crutchlow, L., Nagpal, T. S., Sui, W., & Prapavessis, H. (2019). The effects of classroom-based dynamic seating interventions on academic outcomes in youth: A systematic review. *Learning Environments Research*, 22(2), 153–171. https://doi-org.trmproxy.mnpals.net/10.1007/s10984-018-9271-3

Rothstein, L., & Johnson, S. F. (2014). *Special education law*. SAGE.

Schilling, D. L., & Schwartz, I. S. (2004). Alternative seating for young children with autism spectrum disorder: Effects on classroom behavior. *Journal of Autism & Developmental Disorders*, 34(4), 423–432.

Schoolcraft, N. (2018). Student and teacher perceptions of stability balls as alternative seating in a first grade classroom. *Journal of Teacher Action Research*, 4(3), 90–111.

Seaver, M. (2019). Student choice equals student engagement. *Virginia English Journal*, 69(1), 110–112.

Seifert, A., & Metz, A. (2017). The effects of inflated seating cushions on engagement in preschool circle time. *Early Childhood Education Journal*, 45(3), 411–418. https://doi-org.trmproxy.mnpals.net/10.1007/s10643-016-0797-7

Sexton, M. (2022). Convenience sampling and student workers: Ethical and methodological considerations for academic libraries. *Journal of Academic Librarianship*, 48(4), N.PAG. https://doi-org.trmproxy.mnpals.net/10.1016/j.acalib.2022.102539

Shahvarpour, A., Shirazi-Adl, A., & Larivière, C. (2016). Active–passive biodynamics of the

human trunk when seated on a wobble chair. *Journal of Biomechanics*, 49(6), 939–945. https://doi-org.trmproxy.mnpals.net/10.1016/j.jbiomech.2016.01.042

Sorrell, M. E. (2019). Perceptions of flexible seating. *Journal of Teacher Action Research*, 5(2), 120–136.

Stapp, A. C. (2019). Reconceptualizing the learning space through flexible seating: A qualitative analysis of select third-grade students' and teacher perceptions. *Research in the Schools*, 26(2), 32–44.

STAR Math Technical Manual. (2015). Renaissance Learning. Retrieved July 10, 2022 from https://www.wtps.org/site/handlers/filedownload.ashx?moduleinstanceid=37941&dataid=46216&FileName=STAR%20Math%20Manual.pdf

STAR Reading Technical Manual. (2015). Renaissance Learning. Retrieved July 10, 2022 from http://hollandrti.weebly.com/uploads/1/6/8/1/16819326/star_reading_technicalmanual.pdf

Utecht, J., & Keller, D. (2019). Becoming relevant again: Applying connectivism learning theory to today's classrooms. *Critical Questions in Education*, 10(2), 107–119.

van der Wurff, I., Meijs, C., Hurks, P., Resch, C., & de Groot, R. (2021). The influence of sensory processing tools on attention and arithmetic performance in Dutch primary school children. *Journal of Experimental Child Psychology*, 209. https://doi-org.trmproxy.mnpals.net/10.1016/j.jecp.2021.105143

Wannarka, R., & Ruhl, K. (2008). Seating arrangements that promote positive academic and behavioural outcomes: a review of empirical research. *Support for Learning*, 23(2), 89–93. https://doi-org.trmproxy.mnpals.net/10.1111/j.1467-9604.2008.00375.x

Woolfolk, A. (2019). Educational psychology (14th ed.). Pearson Education.

Appendix A

Photographic examples of flexible seating options.

Wobble Cushion	Wobble Chair
 https://img.lakeshorelearning.com/is/image/OCProduction/lc449bu_g?$Large$	 https://funandfunction.com/media/catalog/product/cache/f7fad25601a33f58fe4effca3f40cf34/C/F/CF5991P_001.jpg
Stability Ball	**Standing Desk**
 https://www.gophersport.com/cmsstatic/g-54985-BALLanceActivateStabilityBallChairs-01.jpg?medium	 https://m.media-amazon.com/images/S/aplus-media/vc/17f9ddc1-fa61-4e82-8796-682a4e6133c0.__CR0,0,300,300_PT0_SX300_V1___.jpg

Appendix B

The researcher's certification through the Collaborative Institutional Training Initiative.

CITI PROGRAM

Completion Date 19-Jun-2022
Expiration Date 18-Jun-2025
Record ID 49673602

This is to certify that:

Austin Hendershot

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

Social & Behavioral Research - Basic/Refresher
(Curriculum Group)
Social & Behavioral Research
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

Minnesota State University Moorhead

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w6c40ee76-2abd-4f63-8242-4554e149db82-49673602

Appendix C

Permission to conduct the study from MSUM's Institutional Review Board.

Institutional Review Board

MINNESOTA STATE UNIVERSITY MOORHEAD

DATE:	September 12, 2022
TO:	Kathy Enger, Principal Investigator Austin Hendershot, Co-investigator
FROM:	Dr. Robert Nava, Chair Minnesota State University Moorhead IRB
ACTION:	**APPROVED**
PROJECT TITLE:	[1958217-1] The Impact of Flexible Seating on Academic Performance within an Elementary Classroom
SUBMISSION TYPE:	New Project
APPROVAL DATE:	September 12, 2022
EXPIRATION DATE:	
REVIEW TYPE:	Exempt Review

Thank you for your submission of New Project materials for this project. The Minnesota State University Moorhead IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Exempt Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to the Minnesota State University Moorhead IRB. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to the Minnesota State University Moorhead IRB.

This project has been determined to be a project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of .

Please note that all research records must be retained for a minimum of three years after the completion of the project.

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.

Appendix D

Signed letter of consent from the researcher's building principal.

HEART OF THE LAKES
ELEMENTARY SCHOOL

Heart of the Lakes Elementary School
810 2nd Ave SW
Perham, MN 56573
Michael Kunza, Principal

August 23, 2022

Michael Kunza
Heart of the Lakes Elementary
810 2nd Ave SW
Perham, MN 56527

Dear Principal Kunza:

As a graduate student in the Curriculum and Instruction Department at Minnesota State University Moorhead, I am conducting research as part of the requirements for a master's degree. The title of my research is "The Impact of Flexible Seating on Academic Performance within an Elementary Classroom" and the purpose of my research is to determine what impact, if any, flexible seating has on a student's academic achievement compared to traditional seating.

I am writing to request your permission to conduct my research at Heart of the Lakes Elementary in my third grade classroom and Tricia Barthel's third grade classroom.

Participants within my class will be given the choice of seating to use in class, while participants within Tricia Barthel's class will use traditional seating. All participants will complete the STAR Reading and STAR Math tests as a pre- and post-test. Participants and their families will be presented with informed consent information prior to participating. Taking part in this study is completely voluntary, and participants are welcome to discontinue participation at any time. Confidentiality will be protected through the use of pseudonyms without the utilization of any identifying information.

Thank you for considering my request. If you choose to grant permission, please sign the bottom portion of this letter.

Sincerely,

Austin Hendershot
Third Grade Teacher
Heart of the Lakes Elementary

I grant permission for this research project to take place:

Michael Kunza

Michael Kunza, Principal

Appendix E

Informed consent letter for student's in the researcher's classroom.

HEART OF THE LAKES
ELEMENTARY SCHOOL

Heart of the Lakes Elementary School
810 2nd Ave SW
Perham, MN 56573
Michael Kunza, Principal

August 31, 2022

Dear Parent or Guardian,

Your child has been invited to participate in a study this fall to see if the type of seating options available to students has an impact on academic performance.

Your child was selected because they are in my regular education classroom. If you decide to participate, please know your child will be asked to do the following, and these are typical classroom activities that involve *no risk* to your child.

1. Your child will be allowed to sit on various types of flexible seating, and eventually choose the spot in which they feel the most comfortable and able to learn effectively.
2. Your child will take the STAR Reading and STAR Math tests two times: once as a pre-test and once as a post-test to see what impact, if any, flexible seating has on their academic achievement. These tests will not affect your child's grade.

Although Principal Michael Kunza has granted me permission to conduct this study, since this information is being used to help me complete my master's degree at Minnesota State University Moorhead, I need to have parental consent to use this information in my final paper that I am required to do as part of my degree. If I did not need this type of information to complete my master's degree, I would be conducting this same type of research in my normal everyday teaching and would not need signatures. If you sign this form, you are giving me consent to use the information that I gather. All information that is used will be kept confidential and no names will be used. Please also note that your child can choose not to participate at any time without consequence.

Please feel free to ask any questions you may have regarding this study. You may contact me at school at (218) 346-5437 or by email at ahendershot@perham.k12.mn.us. You may also contact the Principal Investigator, Dr. Kathy Enger, at kathy.enger@mnstate.edu. Any questions about your rights may be directed to Dr. Robert Nava, Chair of the MSUM Institutional Review Board, at 218-477-4308 or by email at robert.nava@mnstate.edu. You will be offered a copy of this form to keep.

"I have been informed of the study details and understand what participation in the study means. I understand that my child's identity will be protected and that they can choose to stop participating in the study at any time. By signing this form, I am agreeing to allow my child to participate in the study. I also attest that I am at least 18 years of age or older."

_____
Name of Child (Print)

_____ _____
Signature of Parent or Guardian Date

_____ _____
Signature of Co-Investigator Date

Appendix F

Informed consent letter for student's in the researcher's colleague's classroom.

Heart of the Lakes Elementary School
810 2nd Ave SW
Perham, MN 56573
Michael Kunza, Principal

August 31, 2022

Dear Parent or Guardian,

Your child has been invited to participate in a study this fall, conducted by Mr. Austin Hendershot, to see if the type of seating options available to students has an impact on academic performance.

Your child was selected because they are in Mrs. Tricia Barthel's regular education classroom. If you decide to participate, please know your child will be asked to do the following, and these are typical classroom activities that involve *no risk* to your child.

1. Your child will take the STAR Reading and STAR Math tests two times: once as a pre-test and once as a post-test. These tests will not affect your child's grade.

Although Principal Michael Kunza has granted Mr. Austin Hendershot permission to conduct this study, since this information is being used to help him complete his master's degree at Minnesota State University Moorhead, he needs to have parental consent to use this information in his final paper that he is required to do as part of his degree. If you sign this form, you are giving Mr. Austin Hendershot consent to use the information that he gathers. All information that is used will be kept confidential and no names will be used. Please also note that your child can choose not to participate at any time without consequence.

Please feel free to ask any questions you may have regarding this study. You may contact Mr. Austin Hendershot at school at (218) 346-5437 or by email at ahendershot@perham.k12.mn.us. You may also contact the Principal Investigator, Dr. Kathy Enger, at kathy.enger@mnstate.edu. Any questions about your rights may be directed to Dr. Robert Nava, Chair of the MSUM Institutional Review Board, at 218-477-4308 or by email at robert.nava@mnstate.edu. You will be offered a copy of this form to keep.

"I have been informed of the study details and understand what participation in the study means. I understand that my child's identity will be protected and that they can choose to stop participating in the study at any time. By signing this form, I am agreeing to allow my child to participate in the study. I also attest that I am at least 18 years of age or older."

_____
Name of Child (Print)

_____ _____
Signature of Parent or Guardian Date

_____ _____
Signature of Co-Investigator Date

Appendix G

An example of a Student Diagnostic Report as shown on the teacher's hub is below.

STAR Math

Student Diagnostic Report
Enterprise Test

Printed [redacted]

School: [redacted] Test Date: [redacted]
Test Time: [redacted]

[redacted]
ID: [redacted] Teacher: [redacted]
Grade: [redacted] Class: [redacted]

District Benchmarks - Grade 4

Urgent Intervention Intervention On Watch At/Above Benchmark

STAR Math Scores	
SS: 602 (Scaled Score) At/Above Benchmark	[redacted] Scaled Score is based on the difficulty of questions and the number of correct responses.
PR: 55 (Percentile Rank)	[redacted] cored greater than 55% of students nationally in the same grade.
GE: 4.0 (Grade Equivalent)	[redacted] test performance is comparable to that of an average fourth grader at the beginning of the school year.
Domain Scores	
Pre-Kindergarten–8 Operations and Algebraic Thinking: 39 Number and Operations in Base Ten: 66 Measurement and Data: 30 Geometry: 54 Number and Operations — Fractions: 23	Domain scores, ranging from 0-100, estimate [redacted] percent of mastery on skills in each domain at a fourth grade level.
Algebra Readiness	
[redacted] is not yet meeting grade level expectations for algebra readiness.	
Math Recommendation	
Accerated Math™ Library: Grade 4	If you are using the Accelerated Math management software system with [redacted] assign the Grade 4 library. This library should provide a good match for her abilities.

Appendix H

STAR Data for Classroom #1 (Experimental Classroom with Flexible Seating).

Classroom #1 (Experimental Classroom with Flexible Seating)								
	STAR Reading				STAR Math			
	Pre-Test Grade Equivalent	Post-Test Grade Equivalent	Grade Equivalent Change (+/-)	Percent Change in Grade Equivalent	Pre-Test Grade Equivalent	Post-Test Grade Equivalent	Grade Equivalent Change (+/-)	Percent Change in Grade Equivalent
Student 1	3.90	4.10	0.20	5.13%	3.70	4.80	1.10	29.73%
Student 2	3.70	4.80	1.10	29.73%	5.10	5.70	0.60	11.76%
Student 3	4.50	5.20	0.70	15.56%	4.70	4.70	0.00	0.00%
Student 4	0.80	1.80	1.00	125.00%	3.60	3.60	0.00	0.00%
Student 5	2.50	2.50	0.00	0.00%	3.50	4.60	1.10	31.43%
Student 6	1.00	1.10	0.10	10.00%	2.80	3.00	0.20	7.14%
Student 7	3.20	4.20	1.00	31.25%	3.70	4.10	0.40	10.81%
Student 8	6.30	7.60	1.30	20.63%	5.10	6.00	0.90	17.65%
Student 9	2.50	3.20	0.70	28.00%	3.00	3.80	0.80	26.67%
Student 10	2.40	3.20	0.80	33.33%	1.60	2.50	0.90	56.25%
Student 11	3.00	3.60	0.60	20.00%	2.30	3.20	0.90	39.13%
Student 12	1.00	1.20	0.20	20.00%	2.00	2.70	0.70	35.00%
Student 13	3.50	4.50	1.00	28.57%	4.10	4.20	0.10	2.44%
Student 14	3.50	3.80	0.30	8.57%	4.30	4.50	0.20	4.65%
Student 15	3.50	4.00	0.50	14.29%	3.80	3.80	0.00	0.00%
Student 16	1.00	1.10	0.10	10.00%	2.10	4.60	2.50	119.05%
Student 17	3.10	3.50	0.40	12.90%	3.30	3.90	0.60	18.18%
Student 18	3.60	3.90	0.30	8.33%	4.30	5.20	0.90	20.93%
Student 19	5.20	5.90	0.70	13.46%	4.00	4.60	0.60	15.00%
Student 20	2.40	2.80	0.40	16.67%	2.60	3.30	0.70	26.92%
	STAR Reading				STAR Math			
	Pre-Test Class Grade Equivalent	Post-Test Class Grade Equivalent	Class Change of Grade Equivalent	Class Percent Change in Grade Equivalent	Pre-Test Class Grade Equivalent	Post-Test Class Grade Equivalent	Class Change of Grade Equivalent	Class Percent Change in Grade Equivalent
Averages	3.03	3.60	0.57	22.57%	3.48	4.14	0.66	23.64%
Medians	3.15	3.70	0.55	16.11%	3.65	4.15	0.65	17.91%

Appendix I

STAR Data for Classroom #2 (Control Classroom with Traditional Seating).

Classroom #2 (Control Classroom with Traditional Seating)								
	STAR Reading				STAR Math			
	Pre-Test Grade Equivalent	Post-Test Grade Equivalent	Grade Equivalent Change (+/-)	Percent Change in Grade Equivalent	Pre-Test Grade Equivalent	Post-Test Grade Equivalent	Grade Equivalent Change (+/-)	Percent Change in Grade Equivalent
Student A	4.10	3.90	-0.20	-4.88%	3.40	3.50	0.10	2.94%
Student B	5.00	6.20	1.20	24.00%	5.00	5.10	0.10	2.00%
Student C	1.60	1.40	-0.20	-12.50%	2.30	1.20	-1.10	-47.83%
Student D	1.20	2.70	1.50	125.00%	3.30	3.90	0.60	18.18%
Student E	4.90	5.40	0.50	10.20%	4.10	3.80	-0.30	-7.32%
Student F	2.80	3.50	0.70	25.00%	4.40	4.00	-0.40	-9.09%
Student G	2.20	2.40	0.20	9.09%	2.70	3.50	0.80	29.63%
Student H	3.40	4.00	0.60	17.65%	3.50	4.90	1.40	40.00%
Student I	2.30	2.30	0.00	0.00%	3.80	4.10	0.30	7.89%
Student J	3.20	3.30	0.10	3.12%	2.80	3.00	0.20	7.14%
Student K	4.10	3.80	-0.30	-7.32%	4.10	3.60	-0.50	-12.20%
Student L	2.10	2.60	0.50	23.81%	3.20	3.70	0.50	15.63%
Student M	2.00	2.00	0.00	0.00%	3.60	3.00	-0.60	-16.67%
Student N	3.40	3.60	0.20	5.88%	3.60	3.20	-0.40	-11.11%
Student O	1.80	2.60	0.80	44.44%	3.00	3.20	0.20	6.67%
Student P	2.60	3.00	0.40	15.38%	3.30	3.30	0.00	0.00%
Student Q	2.80	4.50	1.70	60.71%	2.60	3.80	1.20	46.15%
Student R	2.70	2.50	-0.20	-7.41%	3.10	3.70	0.60	19.35%
	STAR Reading				STAR Math			
	Pre-Test Class Grade Equivalent	Post-Test Class Grade Equivalent	Class Change of Grade Equivalent	Class Percent Change in Grade Equivalent	Pre-Test Class Grade Equivalent	Post-Test Class Grade Equivalent	Class Change of Grade Equivalent	Class Percent Change in Grade Equivalent
Averages	2.90	3.32	0.42	18.46%	3.43	3.58	0.15	5.08%
Medians	2.75	3.15	0.30	9.65%	3.35	3.65	0.15	4.80%