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Classroom Environment: Emphasis on Seating Arrangement

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This paper reports of the importance of the classroom environment, and has a major focus on seating arrangement. A survey was distributed to ten different school districts, and reports were collected from 64 different teachers who taught varying grade levels and subjects. The analyzed data showed that the majority of teachers choose to use combination seating arrangements rather than row seating. The data also reports on why teachers prefer to use grouping in their classrooms, and shares information on the benefits of this type of arrangements.

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Classroom Environment: Emphasis on Seating Arrangement

By

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Submitted in partial fulfillment of the requirements for the degree

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Supervised by

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Table of Contents

Review of the Literature 4
Methodology 23
Results 24
Discussion 36
Conclusion 38
References 39
Appendix A 43
Appendix B 46

List of Tables & Figures

Table 1. Teaching Levels of Responders 24

Figure 1. The range of students’ abilities 26

Figure 2. Seating arrangements currently being used. 27

Figure 3. Seating arrangements most commonly used. 28

Figure 4. Frequency of change in seating arrangement. 29

Figure 5. Frequency of heterogeneous seating. 31

Figure 6. Frequency of homogeneous seating. 32

Figure 7. Allowing of students to choose their seats. 33

Figure 8. Seating arrangement best used for struggling students’ attention. 34

Figure 9. Seating arrangements where students are most easily distracted. 35

Figure 10. Seating arrangement where students are most on task. 36
Abstract

This paper reports of the importance of the classroom environment, and has a major focus on seating arrangement. A survey was distributed to ten different school districts, and reports were collected from 64 different teachers who taught varying grade levels and subjects. The analyzed data showed that the majority of teachers choose to use combination seating arrangements rather than row seating. The data also reports on why teachers prefer to use grouping in their classrooms, and shares information on the benefits of this type of arrangements.

Classroom Environment: Emphasis on Seating Arrangement

There are many factors that can affect a student on a daily basis. Some of these factors can be very beneficial to the students’ day, while others can be detrimental. In the classroom, teachers tend to take on a parental role. Teachers want to see their students succeed. They want to see students excel academically as well as seeing them interactive positively throughout the day. Unfortunately, there are many factors that can influence a students’ day that a teacher has no control of. There are a lot of outside factors that can affect the kind of day a student can have. For example, a student could be struggling to find their identity, or could have experienced the loss of a loved-one.

There are a few things that a teacher can have some control over. It is the sole power of the teacher to control the physical environment, while a student is in school. The physical environment of the students’ school and classroom can also play a positive or negative part on a students’ day. But, if teachers are able to figure out how to change or keep certain beneficial aspects of the school environment, then this can have a very positive influence on the students’ experiences while at school. Some of these physical
features that can be manipulated include lighting, acoustics, color scheming, seating arrangements, seat locations, the proper use of classroom space, and accommodating the physical aspects for students with special needs.

Literature Review

The environment of the school building and the classrooms play a very important role in a students’ day. The following review of literature reveals some of the research that has been done to show which areas in the school and classroom environments are the most beneficial towards the behavior and education of the students. To better understand the different areas that are of importance to this topic, the review of literature has been divided into seven sections: School building environment, classroom environment, seating preference, classroom spatial needs, seating arrangement, the classroom environment and special needs students, and case studies.

School Building Environment

There have been a number of articles written that have focused on the design of the school building. They emphasized on the idea that the environment of the school as a whole has a major impact on education. Tanner (2000) found that the one part of the educational system that society does not hold to a higher standard is the way schools are planned, designed, and built. The problem that he has found is standards have been raised for students, teachers, administrators, yet, when school building design is considered, there continues to be a struggle. He stated that, one reason to conduct research on educational architecture is the investment of billions of dollars on school construction in the USA and at the international level. However, his assumption that “bad school houses are silent killers of teaching and learning” (p. 309) is even more
reason to study the relationship between the physical environment and academic achievement (Tanner 2000).

Some of the key points as to why Tanner felt needs for research in this area were addressed by David and Weinstein (1987). Those are that environmental experiences in childhood continue to be influential throughout life; therefore, the way a school is designed and built can influence student learning. Planners, teachers, school administrators, architects, and designers must recognize the emerging impressions on students formed by the architecture and physical attributes of spaces and schools. Built environments have direct and symbolic impacts on children (David & Weinstein, 1987).

Tanner (2000) noted that the geometric orientation of the built environment is important for lighting and can influence the utilization of the school. Proper orientation provides, for example, a cool side and a warm side, a clam side, and a windy side, and views of nature. Good design ensures access to the sunny side of the structure and makes outdoor space usable. Through this study Tanner (2000) observed that schools which were in harmony with nature tended to have students who earned higher test scores, and that they were supported by positive outdoor spaces.

More recently, Tanner (2009) followed up his previous research with a more comprehensive study. His study took samples from 71 different schools, and focused on movement and circulation patterns, natural lighting, and classrooms with views. The first concern in his study was places and spaces where people were free to move about without feeling confined or in a crowded environment. He found that schools that had freer flowing movement and circulation patterns had greater reading comprehension, language arts, mathematics, and science scores.
The second concern of his study was regarding patterns of day lighting. His study found that natural light in classrooms: classrooms that have light from windows, skylights, borrowed light, reflected light, and artificial light, and classrooms with artificial light plus normal light from the outside, preferably on two sides of every room was ideal for student learning and comfort. Schools that had those types of lighting had greater science and reading vocabulary scores.

The third concern of the study was in regards to patterns of view. It was originally hypothesized that classroom windows with views, those that overlooked the outside, provided a positive aspect to the school environment. His study found that there was little quantitative evidence to support this. Having windows in a room continued to be of importance, but in regards to what the windows overlooked remained to be inconsequential (Tanner 2009).

Another look at the building environment was taken by Hansen and Childs (1998). They looked at Orem High School in Orem, Ohio to see what environmental aspects of the building were beneficial students. They saw that there were places for students to sit, relax and enjoy the school. They found that there were open spaces with casual furniture, with pictures and flowers to provide decoration. Instead of athletic trophies, people saw a beautiful aquarium when they first enter the building. Also, instead of the typical grey or tan school hallways, the hallways of Orem High School were accented with the school colors. They found that through these aspects the students took more pride in their school environment, thus leading to more pride in their own schoolwork (Hansen & Childs, 1998).
The principal of the Crow Island School in Winnetka, Illinois also took a look at the school environment impacting the students learning. Herbert (1998) researched her school building and found some beneficial aspects that added to their learning environment. She saw that two windowed walls in every classroom invite the outdoors inside. Each classroom had an exterior door leading to a courtyard, so students may observe the plants or simply rest for a moment. She also noted that the school’s skylights that bring in additional natural light into the hallways, which students can use as work areas as needed (Herbert, 1998).

*Classroom Environment*

Besides looking at the school as a whole there have been quite a few articles that have places focus on the design of the classroom by itself, and the importance of its design in the educational process. Cookson (2006) talked about this importance. He said that classroom realignment must happen before teachers can expect improvement in student performance. Removing unneeded materials and reducing the amount of furniture was within the power of the teachers. Teachers created a logical classroom arrangements that embraced learning (Cookson 2006).

Some of the aspects that have been addressed by researchers, concerning the classroom environment, include the location of the teacher, acoustics, lighting, temperature, and color schemes. Wall (1993) put a lot of emphasis on how the location of the teacher in the classroom can actually affect the behavior of the students. He found that the teacher should position themselves in the classroom so that students must talk loudly enough to allow all their classmates to readily hear what is being said. This required the teachers to leave their desks at the front of the room and move around as
various students speak. When there were more students involved in listening, the classrooms were less chaotic and more productive. The students also felt like they were included in the discussion taking place, and that sense of inclusion encouraged greater concentration and less inclination toward disruptive behavior. If students were excluded from the discussion they tended to let their attention wander and settle on things happening in their immediate surroundings, which led to more disruptive behavior (Wall 1993).

Even in the lower grade levels the importance of classroom environment has been established. Doctoroff (2001) found that there were certain aspects that greatly affect the environment of pre-k classrooms. In many instances, environmental enrichment or modifications have resulted in changes in the child’s behavior and learning with less effort or intrusion than would be the case with more direct teacher intervention. She found that play activities in which children must attend to detail, such as art, reading, puzzles, and manipulatives, need to be in well-lighted areas, and preferably with good natural lighting. She also found that spacing centers evenly throughout the room aided in the control of noise level. High noise levels have the potential to impede communication during social play. In general, noise levels should be moderate so that children and teachers can be responsive to each other’s social cues. She found that the creation of high-quality inclusive play environments was based on the premise that the play of all young children must be supported. The environmental support for play encompassed a wide range of strategies, ranging from well-defined, individual areas for play and strategic selection and placement of play materials to making the play space and materials fully accessible. A classroom play environment that is carefully planned has
the potential to enrich and extend the play possibilities for all of the children (Doctoroff, 2001).

The aesthetics of a classroom play a very key role in the classroom environment. There is a section in The Handbook of Environmental Psychology that dealt with the importance of the aesthetics in a classroom. The handbook reported that a classroom that is softer can be very beneficial to the attitude of the students. By adding softer lighting, plants, posters, cushions, and rugs a classroom can become more relaxing and more conducive to student interaction. Classrooms need not be plain and hard. Inexpensive changes can make a room more pleasant and result in very tangible benefits (Bechtel & Churman, 2002).

Day light also affects student performance. The Heschong Mahone Group (1999) conducted a study that examined student performance data from three elementary school districts and looked for correlation to the amount of daylight provided by each classroom environment. They analyzed scores from 21,000 second through fifth grade students in three states. Each classroom was assigned a series of codes on a 0-to-5 scale, indicating the size and tint of its windows, the presence and type of any skylighting, and the overall amount of daylight expected. They found that in Orange County, CA, students with the most daylight progressed 20% faster on math tests and 26% faster on reading tests. The students in classrooms with large windows progressed 15% and 23% faster, respectively. They also found that in the school districts in Seattle, WA and Fort Collins, CO, the students in classrooms with the most daylight were found to have 7% to 18% higher scores than those in classrooms with the least.
A study of 90 elementary schools tracked student behavior, and health over the course of a year in four classrooms with varying daylighting levels. The results indicated that “work in classrooms without daylight may upset the basic hormone pattern and this in turn may influence children’s ability to concentrate and cooperate, and also eventually have an impact on annual body growth and absenteeism” (Plympton, Conway, & Epstein, 2000, p. 1).

Harner (1974) explored relationships between air temperature and student performance in reading and mathematics. He found that reading speed and reading comprehension appear to be the most affected by increased temperature. The research showed that a significant reduction in reading speed and reading comprehension occurs between the temperatures of 73.4 and 80.6 Fahrenheit. It also showed that the ideal air temperature range for reading appeared to be 68 to 73.4 degrees Fahrenheit. Mathematical operations such as multiplication, addition, and factoring have been shown to be significantly reduced by an air temperature of 77 degrees Fahrenheit. The reduction in performance began above 74 degrees Fahrenheit, and it was found that the mathematical operations are performed best in a temperature range of 68 to 74 degrees Fahrenheit. Harner also concluded that “under ideal thermal conditions, students worked faster and produced a higher percentage of answers” (p. 5). The thermal environment also affected the retention of learning: not only do students learn more, but also they retain the knowledge longer when it is learned in an ideal thermal environment (Harner, 1974).

One study by Taylor and Gousie (1988) found that research on the effects of noise has not demonstrated clear negative effects on learning over short periods of time.
However, the long-term effects demonstrate the need for more careful attention to noise levels. Noisy environments tend to result in “poorer auditory discrimination and less tolerance for frustration by children” (p. 24). It was also found that high noise levels adversely affect teaching time.

A paper by Siebien and Gold, which was put out by the American Speech-Language-Hearing Association, provided different methods to provide for High-Quality Acoustical Environments in Schools. Some of these methods were to carefully select and design proper HVAC systems for the schools. Having specifically designed systems would cut back on the background noise in the classroom. Limiting the height of the ceilings can decrease the reverberations in the room. They stated that ceiling heights that provide for a reasonable sense of space in the range of 9-12 feet will usually provide satisfactory results. Providing a classroom with sound-absorbing surfaces on ceilings and walls will also cut back on unwanted noise. Installing carpeting in classrooms will cut out the noises of fidgety students and the movement of desks and chairs. Also, when designing the set-up of a classroom, the overall set-up should emphasize classroom furniture arrangements and teaching techniques that reduce the distance between the teacher and the students (Siebien & Gold 2000).

In 2008, there was research done by Wilmes, Harrington, Kohler-Evans, and Sumpter in regards to students’ senses and how the brain perceives the classroom environment. According to the studies done on noise levels, learners have divergent preferences. Some desired complete silence, while others preferred busy, noisy environments. Instructors need to be sensitive to these results and to both preferences to ensure optimal learning (Wilmes et al., 2008).
Wilmes, Harrington, Kohler-Evans, and Sumpter also found that color has an impact on emotions. The following responses were found most common among their test subjects. Red tends to raise blood pressure, pulse rate, respiration, and excites brainwaves. Orange is similar to red but less pronounced in its effect. Blue tends to lower blood pressure and pulse rate. Blue is considered the most tranquil color. They found that a blue environment may be helpful in learning, such as in a classroom with hyperactive students. However, for the regular classroom, blue may be a bit too calming for the students. Green is also a fairly calming color, though less so than blue. Yellow, has been associated with certain degrees of stress and apprehension, yet stimulates a sense of well being and optimism. Bright colors tend to increase creativity and energy. Dark colors, conversely, lower stress and elicit feelings of peacefulness. The colors yellow, light orange, beige, and off-white were found to be the most useful for optimal learning because they seem to stimulate positive feelings. They also found that there was a relationship between memory and color. Learners tended to remember associations with colors more accurately than those with mere black-white patterns.

Wilmes, Harrington, Kohler-Evans, and Sumpter continued their research by looking at light. They found that lighting, like color, has an impact on learning effectiveness. Their studies showed that soft full spectrum lighting is optimal for learning. They noted that the negative side to that is that in most educational classrooms, standard florescent lighting is the most frequent source (Wilmes et al., 2008).

Seating Preference

There have been a few studies done to show that where a person sits in a classroom does not have much effect on their behavior or grades.
A study done by Armstrong and Chang (2007) found no evidence that seat location affects student achievement even when the students sit a considerable distance from the instructor. Their results indicated that the relationship between seat location and student performance was very weak and could account for less than 7% of the variation seen in student scores. This was consistent with the view that any relationship observed between seat location and test scores was primarily due to the motivation and capabilities inherent to the students and not the location of the seats (Armstrong & Chang 2007).

An experiment done by Kalinowski and Taper (2007) showed that sitting in the back of a classroom rather than the front did not have a detrimental effect on the students’ performance on exams. During the experiment when students were assigned seats their grades were not affected, and when students chose their own seats they had the same ending results no matter where they were located.

Students’ degree of territoriality based on gender and seat preference in different types of classroom arrangements was studied by Kaya and Burgess (2007). The types of classroom arrangements included rows of tablet-arm chairs, U-shaped, clusters, and rows of tables with individual chairs. The study was carried out through a survey at a large public institution in the southeast region of the United States. Their results indicated that students who preferred seats at the end of rows of tables with individual chairs and tablet-arm chair arrangement had higher scores on claiming a particular seat than those who preferred middle seats in a row. In rows of tables with individual chair arrangement, students who preferred seats at the end of rows also had more need to define their own territory than students who preferred middle seats in a row. No significant results were found in the U-shaped and cluster layouts. Females had higher scores on claiming a
particular seat than males regardless of seating arrangement. This study also found that in classroom settings where students are required or elect to bring several items to class, for example, a backpack, jacket, and handbag, in addition to notebooks and textbooks, defining one’s own territory may become increasingly important as a means of comfortably engaging in active learning (Kaya & Burgess 2007). These studies were done in a college level classroom, and may be contradictory if the same studies were done at the elementary and secondary level.

Classroom Spatial Needs

There have been a number of studies done to show how the amount of space that is available in a classroom can have an effect on the behavior of the students and the overall environment of the classroom. Achilles (1999) reported that “one place to start observing classrooms is to consider space, space use, and the environment or context of the teaching-learning process” (p. 36). He continues to report the importance of personal space in regards to confined areas. “Sociologists, urban planners, and law enforcement persons have noticed the stressful effects of crowding on human behavior (p. 37). Some of the items that Achilles (1999) urges teachers to look at regarding space usage in the classroom are: vertical vs. horizontal use of space, a required space for learning centers in the primary grades, using space as a function of student behavior: sharing, and territoriality, class size as factors in fatigue and air quality and noise levels throughout the day (Achilles 1999).

In 2003, Duncanson found that classroom space impacts how teachers and students behave. He found that classrooms with small amounts of space were prone to have inefficient pathways and look cluttered. In part, it was found that this situation was
caused by the large amount of room teachers reserved for their own use and the large amount of space covered by other pieces of furniture. The arrangement of the furniture hampered the natural flow patterns and created small open spaces for students to work. Thus teachers more or less identified and assigned the spaces that were to be used by students while working on an activity (Duncanson, 2003).

In more recent years, Duncanson collaborated with Volpe (2009) to continue his study on the impacts of spatial usage in the classroom. Their study was based on the belief that the way in which a teacher organizes their classroom space can significantly affect student achievement. They state that teachers who understand the basic elements of classroom design can plan their classroom organization to affect student learning. They noted in their research that a teacher who needs a desk to define a personal area should consider carefully how much space is sacrificed. They found that it was not uncommon for some teachers to claim 20% or more of the available floor space. It was suggested by the researchers that teachers should imagine and consider where students will gather, as those areas need to be connected with easy access pathways. It was also suggested that removing unnecessary furniture from the classroom is one fairly easy for teachers to improve the educational setting. Their findings showed that this action alone was able to add over 100 square feet of open space. It was also suggested that educators should consider discarding such furniture and materials such as the teacher’s desk, excess student desks, and seldom used AV equipment. They found that when these changes have been made to a classroom environment, students notice and utilize the increased space immediately (Duncanson & Volpe 2009).
Richards (2006) also reported on the benefits of having adequate space in a classroom environment. She reported that wasted time spent moving chairs or desks, as well as inadequate space, can break the flow of the learning engagement. Also, when students are feeling crowded, or have their backs to the teacher this can create an invitation for distraction. She also called the educators attention to what she calls the action zone. She found that students located in the center front of the room tend to participate the most and that groups that fall outside this zone will often be less engaged. She encourages educators to pay attention to this detail when considering classroom space. She reported that when all children experience close proximity to the teacher, they are more likely to stay engaged (Richards, 2006).

Seating Arrangements

The views on the arrangement of classrooms and seating arrangements have changed over the past few decades. In the 70’s the classroom setting was mostly focused on the traditional row set-up classroom. Weinstein (1979) found that there was a tremendous surge of interest in determining the influence of the school setting on students. But, through her researches she found that the physical environment of the conventional classroom had little impact on achievement. When the classrooms varied in terms of furniture arrangement, aesthetic appeal, and the presence or absences of windows were compared, the differences in achievement were non-significant. She also found that short-term exposure to typical school noise appeared to have no effect on performance. Also, her studies of laboratory investigations of density-performance relationships were inconclusive. On the other side of her research results she did find that there was considerable evidence that the classroom environment can affect the non-
achievement of students’ behaviors and attitudes. The research regarding high levels of
density resulted in dissatisfaction, decreased social interaction, and increased aggression.
What she called soft classrooms were associated with better attendance, greater
participation, and more positive attitudes towards class, the instructor and classmates.
Relatively minor design modifications to an already functioning classroom also showed
to produce changes in students’ spatial behavior, increased interactions with materials, a
decrease in interruptions, and more substantial questioning (Weinstein, 1979).

In 1992, Weinstein continued to look at the environment of the classroom, and
how the seating arrangement affects the students. She emphasizes that teachers, trainers,
and instructional designers need to consider the direct and indirect effects of various
spatial arrangements and determine which formations would maximize the effectiveness
of the designed instruction. She reported that the quality of work completed increased
when students were in rows, compared to students in clusters, although the quality of
work remained the same. She also stated that classroom teachers reported that there was
a noticeable improvement in classroom behavior when the students were seated in rows.
Comparatively, she also reported that it was not difficult to see why arrangements like
circles and clusters would be superior to rows for activities like discussions. Having the
students sit face-to-face promoted social interaction by providing opportunities for eye
contact and non-verbal communication. Row formations, on the other hand, minimized
social contact and helped to focus individuals on the tasks at hand (Weinstein, 1992).

In a more recent study done by Patton, Snell, Knight, and Gerkin (2001) there
began to show an increase in the small group clustered classroom, and the moving away
from the traditional row seating arrangement. The researchers mapped and classified
seating arrangements that were in actual use across 294 regular classrooms in 21 public elementary schools. They also asked 138 elementary regular classroom teachers to describe, in a survey, the rationales for the seating designs they typically employed. Their findings were in contrast to similar research done a decade before. Their results showed that small group cluster designs were used pervasively. Their study reported that 76% of observed classrooms and 94% of surveyed respondents have shifted towards the cluster arrangement. This was due to the belief of many contemporary teachers that this type of seating arrangement contributed directly to the students’ educational growth through the effects of socially facilitated learning (Patton et al., 2001).

*Classroom Environment and Special Needs Students*

As many classrooms have been more focused on the inclusion of all students, there has been a significant look at how the design of the classroom environment needs to be more facilitating towards the benefit of special needs students. Even in 1996 when Greenewald and Walsh looked at the classroom environment, they saw a need for adapting the classroom to aid in accommodating special needs students. Their research focused directly on one student who had been classified with ADHD. Before their intervention, observations of the student were taken. These observations included a lot of impulsive behavior, including shouting out answers without raising one’s hand or interrupting when others were talking. There was non-attending behavior was also noted as non focusing eyes on the person speaking or on the work at hand, commenting on irrelevant topics, playing with materials, and moving about inappropriately. One of the simplest interventions that were implemented by the researchers was dealing with the physical environment of the classroom. The physical design was altered to allow all the
students to choose where to sit for some activities. Assigned seating at separate desks was used for independent written work and carrels were provided for students who felt dividers would improve their ability to concentrate. This change along with some other management interventions aided in reducing the non-attending behaviors by 75%, which more than exceeded their expectations (Greenewald & Walsh 1996).

The environmental accommodations for students with ADHD was also noticed by Carbone (2001). He found that although the effect of physical design was receiving attention for children with sensory and physical disabilities, there were populations of students with ADHD that could also profit from structural interventions. Such classroom accommodations were very simple, practical, and required very little time and effort on the classroom teacher’s part. He suggested arranging a classroom in a traditional row-seating pattern, because this would be the most structured and predictable option. The ADHD student should also be positioned in the front row, where he or she is less likely to be disturbed by neighbors. The teacher can also provide immediate feedback and close monitoring by placing the student in close proximity to his or her desk. Surrounding the student with well-behaved, attentive classmates can also help to encourage positive behavior by peer interactions. It was also suggested that an isolated area of the room be created. This area can be used for an over stimulated student to get away from any outside distractions. The area can also be used for under aroused students to let off some steam and not be a distraction to the class. Providing additional desks in the classroom can also provide for an alternative location for the student to get away. The researcher also suggested the incorporation of interactive centers to help the hyperactive student to work on their motor skills. In addition to the arrangement of the room the teacher has
also been asked to remove potentially distracting features of the room, such as posters and flashy bulletin boards, from the direct view of the hyperactive student (Carbone, 2001).

A well organized play environment is essential for all children, but is critical for children who have difficulty focusing their attention, selecting among activity options, sustaining play, controlling impulses, and/or regulating emotions of arousal. Doctoroff (2001), found that this kind of environment is perfectly suited for these characteristics that have been observed in children with conditions such as ADHD.

The need for incorporating better acoustics into the classroom has also been researched due to the increased inclusion of students that are hearing impaired. Nelson (2003) found that there was substantial evidence to indicate that children require more favorable acoustical conditions than he found in most classrooms. Through his research, he found that students in regular classrooms need a target signal that is at least 15 decibels above the level of the background noise throughout the room, that HVAC noise needs to be kept at a minimum, and there needs to be an incorporation of sound absorbing surfaces to minimize reverberations. Nelson reported that children who are developing normally and those who have special needs have their own acoustical requirements. There need to be acoustical controls in place so that all children can reach their full potential to hear in their classrooms (Nelson, 2003).

Sorkin (2000) reported a need for a change in the Americans with Disabilities Act to better support the needs of hearing impaired students. He noted that both children with central auditory processing disorders and those with attention deficit disorders may be helped by an improved acoustical environment. Individuals who have vision
impairments also require good listening environments because they are relying on their hearing for receiving information (Sorkin, 2000).

**Case Studies**

There have been a few case studies done to show that there is a need for the improvement of the classroom environment. One of the earlier case studies was implemented into an instructional unit. In Manfre’s (1976) Unified Science and Mathematics for Elementary Schools (USMES) Teacher Resource Book he discussed how a number of classes took on class projects to design a better classroom. They addressed the question: How can we make our classroom a better place to live and learn? In a fifth grade classroom the students discussed a large list of areas in need of improvement: furniture arrangement, furniture design, classroom management, room decorations and heating. A first grade class worked on their classroom design problem for the majority of the school year, dedicating a few hours a week to improve the areas of room arrangement, noise, floors, the teacher’s desk, organizing the art center, and organizing the games. In another fifth grade class the students worked on improving two main areas that they suggested: rearranging the furniture and adding a study area to the classroom. In a sixth grade class, the discussions converged onto two main issues: furniture and temperature. And students in another sixth grade class surveyed their class to find the preferences in seating plans and furniture arrangement. This manual was used as a guide to help show how students can take pride and ownership in their classroom when they are included in its arrangement and design (Manfre, 1976).

In 1998, Bonus and Riordan did a study that was focused on student behavior based on specific seating arrangements. Their study looked at several types of seating
arrangements including u-shaped, clusters, and row arrangement. They found that the ideal seating arrangement could not be easily defined because one arrangement cannot meet the goals of every lesson. From their data gathered, it was recommended that row arrangement be used for test-taking and independent activities in which the teacher needs to assess student learning on an individual basis. The configuration of the u-shape was beneficial to the ease of class discussion, student presentations, and role-playing activities along with facilitating cooperative learning activities. The use of cluster was beneficial for the use of group work because the groups were already formed. The ultimate conclusion of their study was that teachers should move away from the notion of fixed seating arrangements and remember to adjust their seats according to a specific activity. In order to select the appropriate seating arrangement the teacher needs to consider the method of instruction being used, the spatial design of the room, and the amount and types of interaction desired (Bonus & Riordan 1998).

Duncanson and Achilles reported on presented in 2009 in regards to the using of space in the classroom. The study was conducted by two classrooms, grade three and four, in a rural elementary school. The teachers of these classrooms were presented with guidelines to improve classroom arrangement and increase floor space. These guidelines were to remove unneeded material, to identify the areas used for learning, plan pathways, and to arrange needed furniture. It was found that new space was used to display books, expose learning centers, display quality work, and provide gathering areas for small groups of students. With this new ample space, the teachers shifted from working in monochromic time to polychromic time and easily managed small groups of students. The class activities shifted from rote learning to high level thinking, and the shared
dynamic created an environment where students produced their best work (Duncanson & Achilles 2009).

The design and environment of schools and classrooms have been a topic of interest for many years. Each generation implements new tactics and reintroduces methods that have always been used. The importance of the classroom arrangement and the school environment will continue to be important as long as it is a major factor in the education of our students.

Methodology

A survey was used to examine teacher responses to the arrangement of classrooms. The survey, which is attached at Appendix A, was distributed with the applications provided on www.surveymonkey.com. The survey was attached as a link in an email sent to three hundred teachers. The email included an introduction letter which explained who was conducting the survey, and the importance of the survey. This introduction letter is included as Appendix B. The survey was distributed to ten school districts. The demographics of the schools where the survey was distributed include private parochial schools, upper class suburban schools, and lower class urban schools.

After the surveys were distributed, four weeks were given for teachers to properly respond. A friendly reminder was then sent as an email for those who had not yet responded to the survey. Collection on the surveys was concluded five weeks after the survey was distributed.

When reporting the results of the survey, each question was analyzed individually. The survey consisted of twenty three questions. Five of the questions
required a very simple response; describing their school and classroom setting. Ten of the questions required Teachers to answer multiple choice questions. These multiple choice questions described what types of seating arrangements were being used, and under what circumstances were different types of seating arrangements used. Eight other questions asked Teachers to expand on why an answer was chosen. Where the results were quantitative the responses were reported as a percentage. The questions that required a written response were reported as a summary, with a few examples given, to best represent all of the data that was collected. All of these questions can be examined in Appendix A.

This research was to be considered an importance if the data from the survey showed that the proper arrangement of the classroom is an important factor when a teacher sets up their classroom.

Results

There were sixty nine surveys that were returned. Out of those sixty nine, sixty four of them were completely answered. Sixty of the people who participated in the survey were kindergarten through eighth grade teachers. Forty four of those teachers were middle school teachers, those teaching sixth, seventh, and eighth grade students. There were only four responses from upper level teachers, which included ninth, tenth, eleventh, and twelfth grade teachers. These numbers are represented in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Teaching Level of Responders</th>
<th>Elementary Teachers</th>
<th>Middle School Teachers</th>
<th>High School Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre k-5</td>
<td>6, 7, 8</td>
<td>9, 10, 11, 12</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>44</td>
<td>4</td>
</tr>
</tbody>
</table>
There was a wide range of subjects being taught by the responders. Twenty one teachers responded as teaching all of the core subjects. Thirteen teachers were English/Reading/Language Arts teachers. Seven of the teachers responded as to being Special Education teachers. Seven of the teachers also responded as to being Science teachers. There were eight responders that were Math teachers, five that were Social Studies teachers, two Art teachers, and one English as a Second Language teacher.

The teachers that answered the survey have a very large range of experience in teaching. The average experience teaching for all the teachers that responded to the survey was thirteen years, with a range from one month to thirty eight years. The classrooms that the responders teach in also have a wide range in the amount of students per class. The average number of students per classroom was twenty two students, with a range from five to thirty five.

The responders to the survey came from ten different school districts. The teachers who responded from New York State were from the Monroe County Catholic Schools, East Irondequoit, Webster, Rush Henrietta, Syracuse, Binghamton City School District, and New York City. Responders that came from school districts out of New York State were from Chesterfield County, VA, Washington County Schools, MD, and Calvert County Schools, MD.

The ability levels of the students ranged through the classrooms of the teachers who responded to the survey. The ability levels were based upon how difficult the student finds the content of subject(s) taught by the responder. The ability levels ranged from classrooms having mostly low students, mostly high students, average students, and classrooms with extremely low and extremely high students. 45.6% of the classrooms
were considered to have average ability level students. 16.2% of the classrooms had mostly low students, and 11.8% had mostly high students. 26.5% of the classrooms had extremely low and extremely high students (Figure 1).

Figure 1. The range of students’ abilities.

The seating arrangements that were currently being used in the classrooms varied greatly. Only 14.9% of the classrooms were using row seating. 6% of the classrooms were using u-shaped arrangements, and 59.7% were putting students in pairs, threes, or groups of four or more. There were no teachers that were using a circle formation in their classroom. The 19.4% of teachers who responded to using another form of seating mostly responded that they used some sort of tables, or that they use a combination or arrangements throughout the room (Figure 2).

The seating arrangements that are most commonly used is putting students in pairs, threes, or groups of four or more, with 89.6% of the teachers using this syle of
arrangement. 16.4% of teachers most commonly used rows in their classrooms. 10.4% use a u-shaped type of arrangement, and 11.9% most commonly use another type of arrangement.

![Seating Arrangements](image)

**Figure 2.** Seating arrangements currently being used.

The teachers that use another arrangement most commonly stated that they use tables that are oddly shaped. Such as the kidney shaped tabled, or a combination of long tables and circle tables (Figure 3).

Teachers were then asked to explain why they prefer their most commonly used seating arrangement. Teachers that most commonly use pairs and grouping had very similar explanations. Many of the statements include responses about the benefits of students working cooperatively together. That it is important for the students to learn from each other. The students are able to help each other, and it is beneficial for the students both socially and academically. That grouping is more conducive for hands-on
activities and for discussions without the distraction of getting up.

Figure 3. Seating arrangements most commonly used.

One teacher stated that “students have a lot to learn from each other. I find that they are more focused and/or motivated when working together with a peer. As I monitor group work, I know a student truly understands a concept when they can ‘teach’ it to a peer.”

The teachers who most commonly use rows in their classroom stated that it makes it easier for all students to see the front of the room, and that it is easier for the teacher to see all of the students. These teachers wanted to make sure their students were directed toward the focus point of the classroom. One teacher, who uses rows, stated that “no one’s back is to the board and when you place students physically facing the desired focus area, it is easier to get and maintain their attention.”

Some teachers end up using multiple arrangements in their classrooms throughout the year. 29.2% of the responders change their seating arrangements once every marking
period. 20% change their seating once per month, and 10.8% change their seating only once a year. 40% of the teachers change their seating arrangements at other frequencies throughout the year (Figure 4). Of the teacher that responded to other, they most frequent response was that they do not change their seating arrangements at all. They only time they feel they need a change in seating arrangement is when it is conducive to a particular activity, or if the current arrangement is causing a behavioral problem.

![Figure 4. Frequency of change in seating arrangement.](image)

Teachers that tend to change their seating arrangements more frequently did this for a number of reasons. Some wanted to continue to give students a variety of different groups. Some wanted to provide a new view for themselves and the students, and that it is an easy way to mix up the abilities and personalities. One teacher stated that “students will say that it looks like a new room. It also gives the students an opportunity to work cooperatively with a new team of peers.” The teachers that did not frequently change
their arrangements, or did not change their arrangements at all felt that the students needed a routine. They felt that if the students worked well with their current setup, then why change it. They also felt that the students like to know what they are walking into when they are entering their classroom, and that it decreases the amount of time that is taken at the beginning of class for attendance. A teacher, who supported a less frequent rearrangement of seating, supported this by saying, “I do not like to change seats if they work. I will change seats if students begin to get restless or stop working together.”

Another item that influences teachers’ decision for seating arrangement is the ability levels of the students. When the teachers were asked where they usually place the advanced learners the most common answer was that they were spread evenly throughout the room, and that they were strategically placed near students that could use a little extra peer help. Vice versa, when the teachers were asked where they usually seat the struggling students, the most common answer was that they were strategically placed near the students that could support them and help them out. The struggling students were also placed near the front of the room, or in close proximity to the teacher.

The majority of teachers seat their students in a heterogeneous order. A seating arrangement that is considered to be in a heterogeneous order is one that mixes students throughout the room, regardless of learning ability level or social skills. 46.9% sometimes and 46.9% always seat their students in a heterogeneous order. Only 6.3% of the teachers never seat their students in a heterogeneous order (Figure 5). Of the teachers that either sometimes or always seat students in a heterogeneous order, the reasons given include that this aids in students personalities to interact. That this type of seating helps students to learn with students with different abilities, that it mixes up all the
characteristics of the students, and that it helps all students to benefit from each other. This type of seating also helped for the struggling students to gain from being mixed in with the advanced learners and the advanced learners to gain from helping and modeling for the struggling students. One teacher stated that “students can learn (the best at times) from each other. This type of seating enables students to guide learning from each other and allows students to work with a variety of unique learners. Everyone has an ‘intelligence’ that allows them to connect material. By sharing experiences, attitudes and perspectives, we open up the classroom into one ‘big think tank’ with everyone having a voice and sharing how they relate to the material.” Another teacher agreed by saying, “I believe it is good for students from both ends of the spectrum to sit with others that have different ability levels because they can learn from one another.”

Figure 5. Frequency of heterogeneous seating.
Only a small number of teachers always seat their students in a homogeneous order. A homogeneous seating arrangement would place the students in a way that would organize students together by learning ability level, social skill level, or even by sex. Only 3.1% of teachers always seat their students in this type of order. 45.3% of teachers never seat their students in a homogeneous order, and 51.6% of teachers only sometimes seat their students in a homogeneous order (Figure 6). The teachers that sometimes place students in homogeneous seating orders stated that this was due to a specific activity or assignment. If the assignment or activity required the students to be grouped by their ability level, or if it was a specifically differentiated activity, then homogeneous seating was beneficial.

![Pie chart showing the frequency of homogeneous seating.](image)

*Figure 6. Frequency of homogeneous seating.*

Only 6.3% of the teachers allow their students to choose their own seats.
20.3% of the teachers never let their students choose their own seats, and 73.4% of the teachers only sometimes allow their students to choose their own seats (Figure 7). The teachers that only allow their students to sometimes choose their own seats did this only at times when certain activities allowed for that kind of flexibility. The majority of teachers felt that being able to control the seating arrangement of their students offered a better way for classroom management. If they could control where the students sat, then they were able to better control their classroom as a whole.

When the teachers looked at their own classrooms and other classrooms they were able to notice whether there are types of seating arrangements that allow struggling students to be more attentive. 50.1% of the teachers feel that struggling students are more attentive when seated in pairs, threes, or groups of four or more.

![Figure 7. Allowing of students to choose their seats.](chart.png)
14.1% of the teachers felt that struggling students were more attentive when seated in rows. 7.8% thought u-shaped seating would be best. 4.7% felt that a circle shaped arrangement would be best, and 23.4% felt that another type of seating would be better (Figure 8). Teachers that prefer another type of seating arrangement to keep the attention of the struggling students felt that those students needed to be kept away from easy distractions, and kept in close proximity to the teacher.

There are types of seating that teachers feel lead to students being more distracted. 44.4% of the teachers felt that students are the most easily distracted when they are in groups of four or more.

![Pie chart showing seating preferences](chart.png)

*Figure 8. Seating arrangement best used for struggling students’ attention.*

Only 11.1% of the teachers felt that students were distracted when they sat in rows, but 15.9% of the teachers felt that students were easily distracted when they sat in a
circle (Figure 9). Most of the teachers agree that students are more easily distracted if they are facing other students. They also agree that this also depends on the situation and the specific activities that are being done during that time.

When discussing the type of seating arrangement in which teachers noticed students being the most on task, 52.4% felt that this was mostly done when students were in either rows or pairs. 22.3% of the teachers felt that their students were most on task when they were seated in groups of three or more, and 17.5% of the teachers felt their students were more on task in other seating arrangements (Figure 10).

![Pie Chart](image)

**Figure 9.** Seating arrangements where students are most easily distracted.

Those teachers that felt that another type of seating was more conducive to keeping students on task because they felt that keeping the students on task is part of classroom management, and that this depends on the teacher and the classroom atmosphere.
The type of desk or table that the teachers were currently using varied greatly. A lot of the teachers responded that they were currently using normal or standard desks. A number responded that they were using small tables. But, all of the teachers responded that they were able to place these desks or tables in whatever manner was best for the activity or lesson that was being done during class. Most of the teachers were happy with the current choice of desk or table that was currently in their classroom, but there were a few that would choose a different type of desk or table if they were given a choice. Some of the teachers who had desks would like to be able to use tables, and most would prefer for the students to be given a bigger work area at their desk or table.

![Figure 10. Seating arrangement where students are most on task.](image)

**Discussion**

This study has led to a better understanding in the area of classroom environment, and the importance of seating arrangement. As discussed in the review of literature, there
has been a shift in the way that teachers set up their classrooms. A few decades ago teachers were all committed to setting all of their classrooms in row seating, and more recently the more common type of seating arrangement is placing students in pairs, threes, or in groups of four or more. The study done by Patton, Snell, Knight, and Gerkin (2001) showed this increase in the small group clustered classroom, and the moving away from the traditional row seating arrangement. Their results showed that small group cluster designs were used pervasively. Their study reported that 76% of observed classrooms and 94% of surveyed respondents have shifted towards the cluster arrangement. This was due to the belief of many contemporary teachers that this type of seating arrangement contributed directly to the students’ educational growth through the effects of socially facilitated learning (Patton et al., 2001). This aligns well with the survey data reporting 87% of the teachers using an arrangement other than row seating (Figure 3). This is most likely due to teachers becoming advocates for cooperative learning. There has also been a shift in most classrooms using desk to using tables, or a combination of desks and tables.

The data from the survey also supports the idea that teachers have been using seating arrangement to encourage the philosophy of inclusion learning. 86% of the teachers place struggling students in arrangements other than rows (Figure 8). Weinstein reported that it was not difficult to see why arrangements like circles and clusters would be superior to rows for activities like discussions. Having the students sit face-to-face promoted social interaction by providing opportunities for eye contact and non-verbal communication. Row formations, on the other hand, minimized social contact and helped to focus individuals on the tasks at hand (Weinstein, 1992). The majority of
teachers regularly place struggling students close to their higher learning students, so that they can learn from each other.

Even though this data shows that students are more easily distracted when they are placed in some style of grouping, teachers are still leaning towards using these types of seating arrangements. 45% of the teachers felt that students were the most easily distracted in groups of four or more (Figure 9). This is because teachers want students to work with each other; if the activity is done successfully then behavioral problems will be kept to a minimum.

Conclusion

In doing this research it was found that teachers would like to always use the type of seating arrangement that provides the best type of atmosphere for their current activity. Due to time constraints, room restrictions, and the adversity of students this cannot always be done. Rows are being used less and less, and alternative arrangements are being used more and more.

To continue this research, there are certain areas that need to be looked at in more detail. Research should see if a correlation between activities and seating arrangements exists. Also, if the permanent structure of the classroom plays an important role in how a seating arrangement is chosen. Research should also be done to see how the choice of seating arrangement affects a controlled classroom. Observations can be made over a period of time with a certain arrangement, and then another arrangement, with the students and classroom remaining the same. This would hopefully report a correlation between the choice of seating arrangement and student behavior. Studies should also be done to better understand the effects of increased natural lighting, and the inclusion of
living organisms into the classroom. This information would be very beneficial if the results showed an improvement in students’ behavior and content retention.

References


Carbone, E. (2001). Arranging the classroom with an eye (and ear) to students with ADHD. *Teaching Exceptional Children*. 34(2), 72-81.


opportunity to learn by planning space: a case study.” Paper presented at the
International Society for Educational Planning. Savannah, GA. October 8-10.

Duncanson, E. & Volpe, J. (2009). Freeing students to succeed by changing

attending behavior of an ADHD chapter 1 Student: an action research study”
Paper presented at the Annual Meeting of the American Educational Research

*Educational Leadership*. 56(1), 14-17.

Facility Planner*. 12(2), 4-6.

*Educational Leadership*. 56(1), 69.

Heschong Mahone Group (1999, August 20). *Daylighting in schools: an investigation
into the relationship between daylighting and human performance*. Fair Oaks,
CA: Pacific Gas And Electric Co.

perceptions in an introductory biology class. *Journal of College Science
Teaching*. 36(4).

Kaya, N. & Burgess, B. (2007). Territoriality: seat preferences in different types of


Appendix A

What grade(s) do you teach?

What subject(s) do you teach?

How many years have you been teaching?

How many students do you have in your class? If you teach multiple classes please provide an average.

What school district are you currently teaching at?

What is the range of your students abilities?
   a) Extreme low to extreme high
   b) Mostly low
   c) Average
   d) Mostly High

What type of seating arrangement are you currently using in your classroom?
   a) Rows
   b) Pairs
   c) Triplets
   d) Groups of four or more
   e) U-shaped
   f) Circle
   g) Other

Which type(s) of seating arrangements do you most commonly use?
   a) Rows
   b) Pairs
   c) Triplets
   d) Groups of four or more
   e) U-shaped
   f) Circle
   g) Other

Please provide a brief explanation as to why you prefer this type of seating arrangement.
Appendix A (con’t)

How often do you change your seating arrangements?
   a) Once per marking period
   b) Once per month
   c) Once per year
   d) Other

Briefly explain your reasoning for the previous question. Why do you choose to change your seating arrangement at that frequency?

Where do you usually seat your advanced learners?

Where do you usually seat your struggling students?

Do you seat your students in a heterogeneous order?
   a) Sometimes
   b) Always
   c) Never

If you answered SOMETIMES or ALWAYS, please explain the circumstances in which you use this arrangement.

Do you seat your students in a homogeneous order?
   a) Sometimes
   b) Always
   c) Never

If you answered SOMETIMES or ALWAYS, please explain the circumstances in which you use this arrangement.
Appendix A (con’t)

How often do you allow students to choose their own seats?
   a) Sometimes
   b) Always
   c) Never

Is there a type of seating arrangement that you notice struggling students being more attentive?
   a) Rows
   b) Pairs
   c) Triplets
   d) Groups of four or more
   e) U-shaped
   f) Circle
   g) Other

Which type of seating arrangement do you notice students being the most easily distracted?
   a) Rows
   b) Pairs
   c) Triplets
   d) Groups of four or more
   e) U-shaped
   f) Circle
   g) Other

Which type of seating arrangement do you notice students being the most on task?
   a) Rows
   b) Pairs
   c) Triplets
   d) Groups of four or more
   e) U-shaped
   f) Circle
   g) Other

What type of student desk or table are you currently using?

Is there a type of student desk or table you would prefer in order to create an environment that promotes more on-task behavior? Briefly explain.
Appendix B

Dear Educator,

I am a Master degree candidate in the Math, Science, and Technology Education program at St. John Fisher College in Rochester, NY. A partial requirement for the completion of my degree is to conduct research in a specific area of education, and report my findings in my Master’s Thesis.

It is my belief that where we conduct instruction is just as important as how we conduct instruction. When teachers walk into their classrooms for the first time they try to visualize what their classrooms will look like, and most importantly, how their desks or tables will be arranged. Through my research I hope to see patterns in how seating is arranged, as well as some reasoning as to why teachers chose such arrangements. I also hope to find if there are seating arrangements that are more susceptible to distractions, or more beneficial for classroom management.

I have put together a short survey that should only take 15 minutes to complete, and with your help we will be closer to understanding another part of our educational system.

The survey can be found at [http://www.surveymonkey.com/s/teachingenvironment](http://www.surveymonkey.com/s/teachingenvironment)

If the above link does not take you to the survey, please copy and paste the URL into your web browser.

The results will be presented to a class, and will not be published or used anywhere else.

Thank you for taking part in this research.

Sincerely,

David Wasnock

Masters Candidate

St. John Fisher College

If have any questions about the survey please feel free to email me at dpw03848@sjfc.edu