Curating the Classroom: How the Classroom Design Can Help Build 21st Century Skills

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Abstract

This paper summarizes the importance of classroom organization and design on learning. As we move into an "information age," we must teach our children to respect and value learning, problem solving, and collaboration. These skills are not supported through the traditional classroom where students sit in rows, listening quietly to a lecturing teacher. For this reason, the modern teacher must approach classroom design as thoughtfully as their curriculum. Classroom design has been shown to support performance, attendance, classroom culture, and engagement. By implementing intentional classroom seating, learning stations, pathways, and visuals, a teacher is able to create an optimal learning environment. The classroom is not just a space for learning, but an integral part of the learning experience.

Curating the Classroom

"We shape our buildings; thereafter they shape us" - Winston Churchill

Introduction

The world today is quickly becoming more complex and interrelated than it ever has been before. Technology is accelerating and changing daily. Issues such as climate change, food security, and health care threaten our communities and are also concerns at the global level. In this globalized society, we must have leaders and workers that are able to assess contemporary issues and work collaboratively and critically to find solutions to problems. We need members of society that understand the importance of knowledge and learning. As we move into what some are calling "the information age," knowledge becomes the base of power to make change in the world (Steelcase Collaborative, 2000; Van Note Chism & Bickford, 2002). Because we face these complicated issues at local and international levels, our need for strong schools with astute teachers increases every day. Therefore, we must promote efficient and effective teaching strategies that have been proven by research and applied theory to help our students become the leaders that the world needs. One such strategy, which has been proven to help classroom culture and performance in students, is intentional classroom design.

A student who is able to cultivate critical thinking and problem-solving skills in school has the ability to successfully compete in the global marketplace and to contribute to society (Ravitch, 2013). In many texts, this modern thinker is called the "21st century learner." This ideal learner thinks critically, is actively engaged with the material presented, makes connections across disciplines, works collaboratively, is able to understand issues on macro and micro levels, and monitors their own behavior and learning (Ridley & Walther, 1995; Wilson, 2002; Van Note Chism & Bickford, 2002). This type of student is able to draw associations between existing ideas and concepts to find new solutions. They are prepared for the workforce and have self-

directed appreciation for knowledge and diversity of thought, making them not only an important member to the economy, but to society itself (Steelcase Collaborative, 2000).

Before we reach the capable, thoughtful adult able to engage in diverse ideas and apply past knowledge to new experiences, we find a child in school. Yet many children are testing below grade level and resent school as a whole (Ravitch, 2013). In the American classroom, because school attendance is required, little effort is made to establish the learning environment as an inviting and welcoming place for students (Thornburg, 2014). If children do not want to be in school, do not feel engaged in their environment, why would they be inspired to learn while they are in the classroom? There have been many different forms of interventions applied on local and national scales to try and help students perform at grade level. These interventions often come in the form of introducing new testing, technology, material resources, staff members, or curriculum re-development. Each intervention requires teachers to re-organize their class and often times re-learn how they teach. Classroom design is inconsistent, however, and while we pour resources into finding a new way to teach the 21st century student, most classrooms look the same as they did fifty years ago. Across grade levels, students sit in desks that face the front of the classroom as the teacher leads them through standardized worksheets and low-level processing activities (Brooks & Brooks, 1999). This passive form of learning does not challenge or provide the adequate support systems for the American students. As Diane Ravitch states in her book *Reign of Error*, "you can't do the right things until you stop doing the wrong things" (Ravitch, 2013). If our educational system needs to be re-imagined, why hasn't the classroom, the physical location of learning for thousands of students, changed? In this paper, I suggest that a simple, cost-effective way to make meaningful changes in how students learn and teachers teach is to re-imagine classroom design. Supported by research, I submit that

when the physical classroom environment is organized in a thoughtful and intentional manner, students are able to engage with learning in a powerful way. Building on the work of Jean Piaget and Abraham Maslow, I apply constructivist approaches and design theory to give tangible recommendations for how teachers can increase classroom learning through the design of the classroom environment.

History of the Classroom

Historically, the schoolroom has been lecture-based or otherwise referred to as employing "transmission theory" (Van Note Chism & Bickford, 2002; Beichner, 2014). The American education system that we know today was developed during the era of industrialization. In a time where the nation needed factory workers to run assembly lines and mass produce materials demanded by society, it made sense that students were taught to take in information and then simply repeat the information back to the teacher. The teacher is the keeper of all of the information, while the students are the quiet receptacle for knowledge. In this model, the students are seated in neat, symmetrical rows facing the front of the room (Figure 1;Thornburg, 2014). They are expected to adopt a type of tunnel vision, focusing only on the teacher who dictates important knowledge at the front of the room, or on their own work at their own desk (Scott-Webber, 2004). The teacher tells the students information. Then, the students present the same information back to the teacher through their assignments to prove their understanding of the subject. In this model, the teacher is the "actor," and the students are the "audience," watching attentively and quietly (Wilson, 2002). Students who do not comply with these rigid roles and within the constraints of this environment are seen as disruptive, troublemakers, or stupid. The teacher, generally being the only one able to speak and move freely, holds all of the power and privileges in the classroom. By lecturing, and speaking to, rather than with the

students, the teacher invites little interaction. The students' thoughts, questions, opinions, and general individuality are ignored because they are not being directly engaged in the material. In this classroom organization, the teacher's voice and thoughts dominate the conversation (Brooks & Brooks, 1999).

Lecture-based learning has been proven to be an impractical approach for fostering 21st century learning skills. Lecturing does not inspire course-related thoughts or interest, meaning learners do not feel motivated to practice with self-directed learning. The impersonal aspect of lecturing is ineffective at instilling behavioral and social skills that are key for successful collaboration in the classroom (Van Note Chism & Bickford, 2002). The singular voice of a lecturer or textbook limits creativity and problem-solving because it presents one set of truths (Brooks & Brooks, 1999). While at times, an expert voice is needed to explain concepts or ideas, the classroom instruction and exploration of learning should not center upon a singular voice. An effective teacher should be able to present information and then step back to allow students to define their own understanding of the topic. This does not mean that there are no incorrect answers, so the teacher must stand by to clarify expectations and respond to contextual factors (Gordon, 2009). Relying primarily upon lecturing isolates students that are either below or above the expected skill-level of the lecture, creating either anxiety or boredom for the individual (Thornburg, 2014). All of this is not to say that the lecture style of teaching should be completely eliminated from the classroom but it should be de-emphasized because the lecture-based classroom does not engage the learner in 21st century skills (Wilson, 2002).

The lecture space and organization of the traditional classroom room similarly limits the learning possibilities. Arranging the desks in rows that all face forward and in one direction is isolating for the students (Figure 1). In this configuration, the front of the room, where the

teacher is presenting the new information, is the singular focal point. Because the learners are physically removed from their peers both in the seating arrangement and by the line-of-sight, peer-to-peer contact is suppressed. This classroom environment teaches students that there is one right answer that is found at the front of the room, and is determined by the teacher. The students are not encouraged to interact with each other, and in that way, the classroom organization undermines discussion and collaborative discovery. The student is figuratively chained to their desk, often times this is their only personal space in the classroom. In this solitude, we expect them to learn academic, emotional, and social skills. This type of classroom lacks both an awareness of student needs and an understanding of how the physical space affects the individual.

The Classroom Matters

The physical classroom is a significant element of the school experience. Our surrounding environment stimulates our senses and invites or stifles creativity (Thornburg, 2014). There is a large body of research that supports the claim that the physical environment directly affects human behavior in terms of social interactions, motivation, and development (Van Note Chism & Bickford, 2002; Scott-Webber 2004). Research has also shown that a "good classroom environment" is highly correlated with student performance, attendance levels, and final grades (Van Note Chism & Bickford, 2002). The teacher, in order to create a "good classroom environment" must be thoughtful and intentional in how they curate the classroom. A "good classroom environment" is an inclusive, safe environment where students feel emotionally and academically supported to take risks and explore new ideas individually and through collaboration their peers (Ridley & Walther, 1995). A classroom's space should be as well thought out as the curriculum.

The idea that the classroom space influences learning is not new. Psychologically, the human brain is tremendously affected by its environments (CERI 2007). For one, physical discomfort affects the quality and quantity of an individual's performance (Van Note Chism & Bickford, 2002). In this way, uncomfortable furniture, visual barriers, and social conflict can negatively impact a student's understanding of topics and quality of work. While social conflicts may not seem to be a result of the physical environment, in practice, the classroom organization influences a teacher's perception of their student's abilities. This perception will be internalized by the class, and in turn, affects a student's academic and personal behavior and the way in which he or she interacts with their peers (Shuncke, 1978). In a classroom with underlying currents of discomfort and anxiety, the students will not perform at their highest ability (CERI, 2007). Poorly organized classrooms can incite challenging behaviors such as tantrums, outward aggression, disinterest, and distractibility (Lawry, Danko, & Strain, 2000). Scott-Webber (2004) found that inconsistencies between the design of an area and the intended activities that fill this area could lead to a reduction of productivity. Because learning is developmental, the learning environment must meet the fundamental human needs outlined in Maslow's Hierarchy of Needs in order to encourage openness and learning (Maslow, 1943). If a student does not feel supported, safe, or respected in his or her environment, they will not be able to engage in the challenges of new material or feel driven to explore previous ideas. In this way, maintaining a positive classroom environment helps students learn (Ridley & Walthers, 1995).

In classrooms where the student feels connected to the material and space, they are more willing to meet challenges with a positive attitude. Recently, constructivist classrooms have become very popular because they implement this idea. Research shows that there is a connection between classroom layout and constructivist education (Thornburg,

2014). Constructivism is an approach to teaching that focuses on personal exploration of topics and the process of constructing knowledge (Brooks & Brooks, 1999). In a constructivist classroom, the teacher creates lessons and activities that allow students to explore new topics and revisit prior knowledge. Every student enters the classroom with preconceived ideas about how the world works, and the teacher organizes lessons that challenge these ideas guiding the student to develop a personal understanding of the material. In constructivist classrooms, the student is encouraged to think critically and collaboratively in order to build their understanding of a topic. This practice of discovery and questioning of ideas builds critical thinking skills and self-motivated learning. A reshaping of the classroom should also be met with a reshaping of teaching culture, and constructivism seems to marry the two nicely. With constructivism, teachers thoughtfully organize their curriculum to align with their students' background and interests. A similar mind set is necessary for the re-organization of the classroom.

Recommendations

Ideally, a teacher would be able to choose the furniture and architectural layout of the classroom. However, teachers are rarely involved in the design of their learning space (Sommer & Olsen, 1980; Van Note Chism & Bickford, 2002). Often, at the beginning of the year, a teacher is assigned to an empty classroom with the appropriate number of chairs and desks for the intended class size and maybe a few bookshelves, a chalkboard, or other traditional classroom objects. From this shell, the teacher must create the space for a successful and supportive learning environment. Even so, by considering situational factors, such as class size, and the scope of the curriculum, the teacher should be able to design a classroom that is relevant, interesting, and engaging. Without obtaining any new or unusual materials, the teacher can do this by considering space, movement, and visuals.

First, the teacher must identify the stations desired in his or her classroom. Stations can include desk groupings, reading areas, exploratory areas, project spaces, group spaces, movement areas, display spaces, and any other spaces needed for the type of activities that occur in that particular classroom (Van Note Chism & Bickford, 2002). Structuring the environment first requires the teacher to respond to the furniture they are given. Often times the largest piece of classroom furniture are the student desks. In most schools, desks are expected in every classroom so the teacher must first identify where these should be placed in the classroom before moving onto more freeform stations.

Desk seating is of particular importance. Students should be placed in small groups and should have assignments that encourage collaboration and discussion within these groups. This helps students appreciate diversity of thought and build critical social skills such as sharing, listening, and finding solutions. All students should be able to have a clear view of the teacher when he or she is presenting information and at the same be able to see their peers in their table group. Wilson (2002) found that having a "theatre in the round" approach worked well for a particular science class (Figure 2). Here, the students sat in small groups along the perimeter of the classroom with their back to the interior of the classroom. When needed, they could turn their bodies to face the inside of the room to receive instruction or participate in a large group discussion. Having students seated around the exterior of the room also allowed for a large, open space, which could be used for a variety of different activities. Another idea for desk arrangements is to use desks that are easy to move so that the classroom can accommodate group work, individual work, and classroom discussions (Van Note Chism & Bickford, 2002). The desks should be arranged so that students can work on their assignments with minimal distraction, can work collaboratively with others, and do not limit classroom activities. In Figure

3, we see a classroom that utilizes a diagonal for seats. Each seat has a partner directly across from it and is paired in a small "island" of peers. Theoretically, each student could move their desk back a foot or two and have a personal workspace. Similarly, group work can rotate around a variety of grouping arrangements including, two, three, six, twelve, and whole class activities.

Having clearly defined areas in the classroom helps students focus on the activity at hand and understand what kind of behaviors are expected of them in that space (Lawry, Danko, & Strain, 2000). Given that most classrooms have limited space, the stations should be integral to the curriculum throughout the year. For instance, if the class spends one month learning about dinosaurs, an entire station should not be dedicated to dinosaurs. Instead, having a more general theme like "exploring living things" would allow a teacher to have a space where students can always go to further their understanding and knowledge of living things which may include dinosaurs at one point. For spaces like this, it is good to rotate the manipulatives throughout the year to keep the exploration relevant but also novel and exciting (Lawry, Danko, & Strain, 2000). The teacher must recognize what qualities, furniture, or equipment that the station needs to be effective. A reading station needs good lighting, which can be provided through the introduction of a standing, incandescent lamp, to help students see the words on the page, and comfortable seating so students can relax and read. Placing an art or science station near the sink will help with easy clean up. When identifying locations for the stations, it is important to recognize the space needed to help the activity go smoothly and successfully. The teacher also must determine how much oversight is needed for each station. Other key questions include: when will students be able to use these stations? How will they know when they can use them? Piagetian theory would suggest that some stations should be self-directed to help students explore, make mistakes, and learn from those mistakes (Moore & Sugiyama,

2007). Having a variety of different stations students can explore, when time allows, helps students to identify areas of personal academic interest and practice self-motivated learning. Students that set their own goals for learning tend to feel more confident about their intellectual capabilities (Ridley & Walther, 1995, p 39).

Once the teacher has identified what will happen in their classroom, they must consider logical pathways of movement. Identifying daily pathways, such as the route from the classroom entrance to the desk area or from a specific station to the bathroom, and areas where decisions are made or actions are taken will help the teacher identify areas that may become bottlenecked with too many students at one time. Areas that are likely to get over crowded will create anxiety for some students and distract others from the task at hand. If the teacher finds such an area, they can solve the problem by asking themselves a few questions: 1) Why is this particular area so heavily used? 2) Is it possible to create an alternative pathway? 3) Are there specific objects or spaces that complicate the movement of the area? 4) Could those objects or the pathway be moved? The teacher should be able to easily move around in the classroom so that each student has the opportunity for one-on-one instruction and support, if needed. Having the teacher be able to circulate freely throughout the classroom removes any physical or symbolic barriers between the teacher and the student, helping to build a trusting relationship (Van Note Chism & Bickford, 2002). Like the stations, each classroom's particular pathways are unique to the activities and students that fill it.

There should be space in the classroom for free movement or physical activity. If needed, a teacher could make this a station. Research has shown that physical activity, even if it is just a stretching break between lessons, reduces stress, improves motor coordination and language development, and is generally beneficial to brain health and development (CERI,

2007). While there may be times when all students need to be seated, there should also be designated periods throughout the day where students can move about freely.

The last element a teacher must consider when designing their classroom is visual stimulation. Visual categories are divided into: decorative and instructional visuals, and general visibility in the classroom. Many teachers decorate their room with posters, colorful construction paper, and catchy phrases to make the environment livelier. Sommer and Olsen (1980) found that when they introduced various decorative elements to an otherwise drab room, the room's usage tripled. Compared to other traditional rooms, students that had classes in a decorative room voluntarily contributed more in class and there was an increase in peer-to-peer discussion (Sommer & Olsen, 1980). Sommer and Olsen (1980) called this re-imagined learning environment a "Soft Classroom" contrasting from the hard, rigid classroom that existed before it with linoleum tiles and fluorescent lights. This study is important because it shows that a physical change in the learning environment inspired students to be more engaged with the space, their learning, and their classroom community. By employing "soft" decorations, students will feel more comfortable in the classroom and less anxious about learning, allowing them to engage fully in challenging academic exercises. Elements that create a "soft classroom" include comfortable chairs, plants, indirect lighting, and color. Another form of decoration can be students' work. By displaying class projects on a bulletin board, students are able to visually see the diversity of thought and approaches for solving the assigned problem. Showcasing these qualities emphasizes that they are important to the classroom and that every student's work is valued in the classroom. Creating instructional visuals that connect with the students, either through references to popular culture or to classroom culture, personalizes the visuals. Aligning with constructivism, creating visuals that have meaning to the individual helps them to connect

with the material more than images that simply have a general visual intrigue (Brooks & Brooks, 1993). Instructional materials should be visible to every student in the classroom if it relates to general classroom expectations. If the instructional material relates only to a station, it should be prominently displayed at that station.

Visibility, between peers and the teacher, is important because it affects the social interactions that take place in the class (Van Note Chism & Bickford, 2002). If students can clearly see the teacher, the student feels his or her presence. If the teacher has created a positive and supportive classroom environment, their presence reminds the student of the teacher's interest in the student's success. For a teacher to assure visibility in their classroom, they should explore the room with no students in it. Placing themselves around the room, sitting in desks and in the stations, will help them to identify problem areas. Visibility issues can contribute to anxiety or discomfort, which negatively impacts learning, memory, motivation, and attention (CERI, 2007). In Figure 3, visibility is assured because instructions and demonstrations are given in the center of the room. Being aware of visibility issues in the classroom will help to maintain an effective learning environment.

As mentioned earlier, each classroom space is different. None of these recommendations are absolutes because each class requires different areas of support. Additionally, while my recommendations are laid out in steps, it is crucial to recognize that with the creation of each new physical classroom element, previous elements must be re-evaluated. The best way to create the ideal classroom environment is to be aware of students' needs. If a teacher organizes classroom space to encourage key skills, such as collaboration and problem solving, as an extension of the classroom learning, then students will be conditioned to understand that the classroom is a place for meaningful interactions. Feeling connected with one's surrounding

environment supports learning because it helps to create flow. The theory of flow states that when a student's skill level matches the academic challenge, they are able to fully engage in learning (Thornburg, 2014). Building on this idea, if a student's environment matches their academic and emotional state, the student should also feel encouraged to engage in challenging activities. To have a successful classroom, it is important to have a space that is not only informed by research but also shows sensitivity and awareness of students' needs which creates flow.

Summary

As teachers, if we want to help our children learn in school, we must intentionally design the classroom to incite excitement and interest in the learning environment. When planning the year's curriculum, the teacher should be just as thoughtful about the planning of space. To support deeper learning and problem solving, we must resolve the disconnect between the learning space and the learning activities. Both of these elements should support each other in order to create a cohesive classroom. Proper planning of the environment can support the desired behavior in students (Scott-Webber, 2004). Applying design that is informed by educational research will help students feel emotionally and academically secure in the classroom, in turn, challenging them to explore 21st century skills. Using the "traditional" classroom layout of a lecture-based classroom does a disservice to our students who feel uninspired and repressed. Sommer and Olsen (1980) found that when they introduced comfortable seating, open spaces, color, and decoration to a classroom, students not only responded positively to the changes but also participated in class and engaged in peer-to-peer conversation more often. In the classroom, it is important to consider seating arrangement, stations, movement possibilities, and visuals. Although the teacher cannot tear down walls and

may have limited access to classroom funds, they can still create an effective learning environment. Scouring second hand stores to find standing lamps for indirect "soft" lighting, asking for desks with wheels for easier rearrangement, and using decorations that directly relate to the subject matter being explored in class are just a few examples of how this can be done. Changes to the classroom environment can be made at any time during the year. While the range of classroom design interventions is wide, small changes can make a significant improvement in classroom culture and learning. Teachers should make informed, thoughtful decisions about classroom organization to help support their students in their construction of knowledge.

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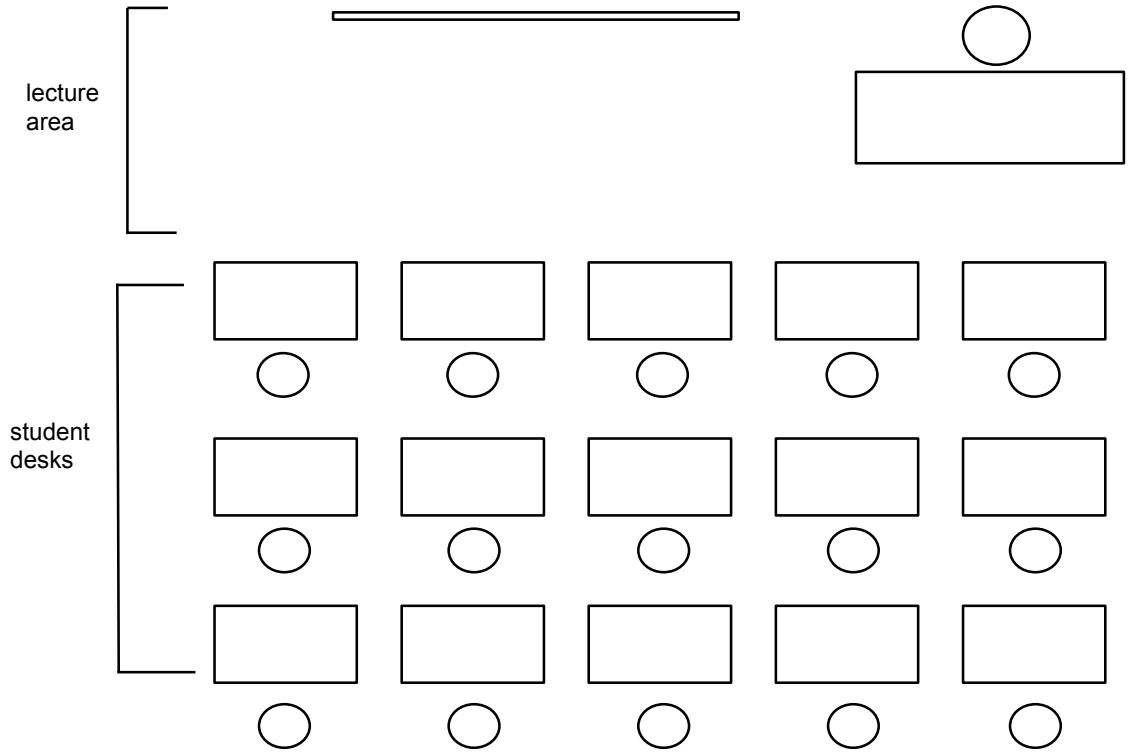

Figure 1.
Lecture Based Classroom Design

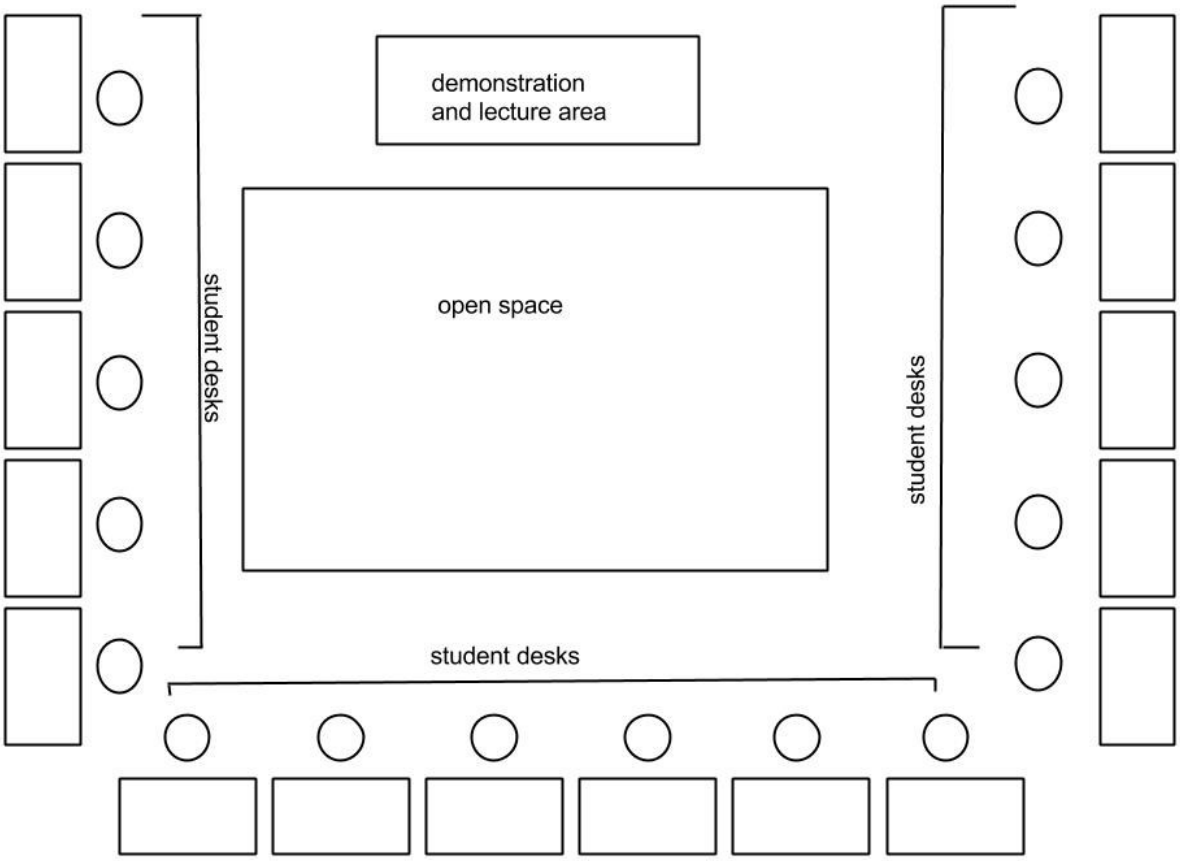

Figure 2.
Wilson's "Theatre in the Round" Science Class

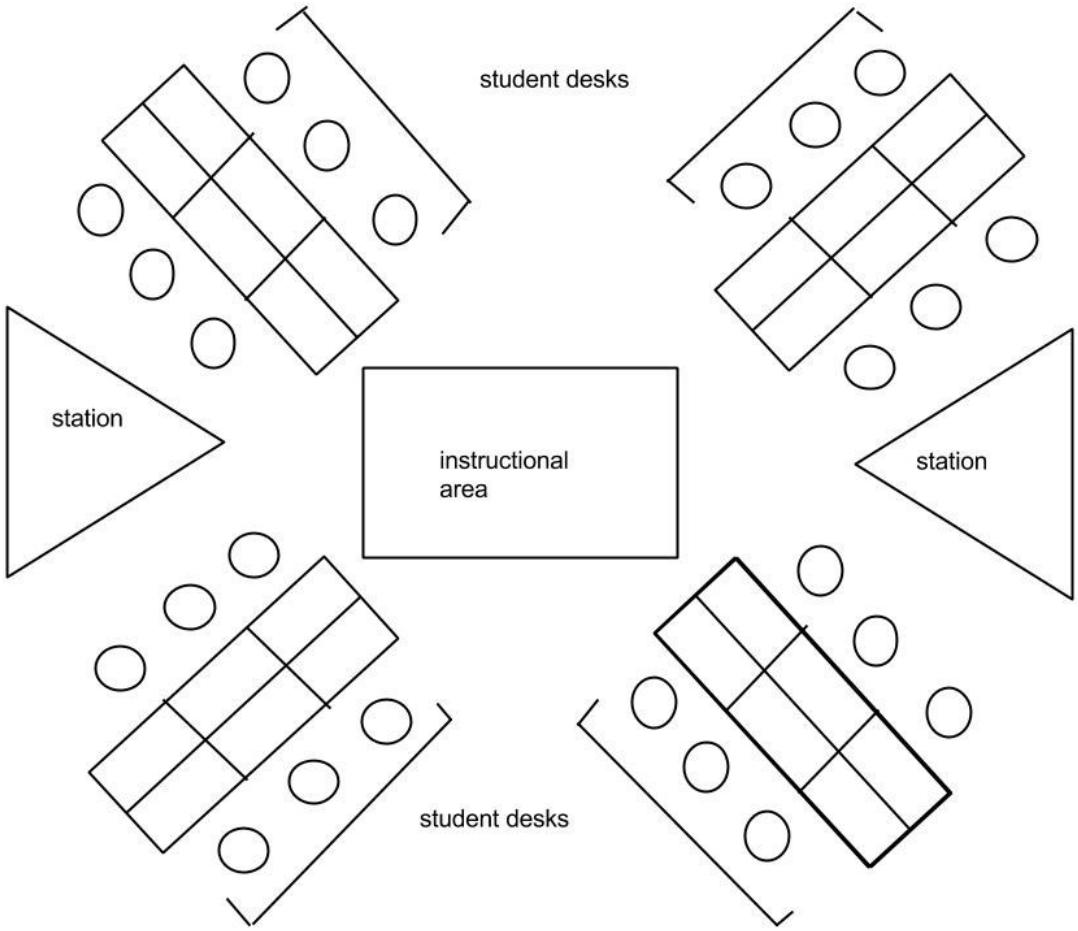

Figure 3.
Diagonal Seating with Open Center and Stations