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Belinda Nuth Sloboda   
Indiana University of Pennsylvania, United States

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# The Role of the Interior Designer in the Autistic Classroom: Location and Material Selection are Essential for Success

Belinda Nuth Sloboda, Ed.D

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## Abstract

The importance of location, lighting, and furniture & finishes are three areas an interior designer cannot overlook. This presentation stems from a dissertation on the importance of multi-sensory room usage in elementary schools. The researcher found that the location of the autistic classroom is one of the most important aspects that is often overlooked by both school leaders and the architects who design schools. Natural lighting should also not be ignored as it helps support healthy circadian rhythms and can be a source of sensory regulation and an opportunity for stimulating. Lighting can be detrimental to those with special needs due to the subtle flickering of fluorescent light fixtures, which may not be noticed by the typical person but can be bothersome and interrupt a child with specific sensory issues. Lastly, acoustics, color, and material and furniture selections are critical when designing for students under the autism spectrum. Acoustic control helps to minimize background noise and echo by specifying materials to absorb sound and eliminate reverberation. Research has resulted in a color palette that students on the spectrum respond well to in addition to the importance of seating choice variation within the classroom. Lastly, visual and tactile characteristics of selected materials are vital to satisfy the sensory needs of the students while eliminating unnecessary distractions within the classroom.

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## Introduction

Imagine attending school and struggling to concentrate. Instead, you are preoccupied with the subtle flickering of the fluorescent lights and the noisy children playing in the nearby gymnasium. You start to feel anxious and need something to soothe you but are unsure what will help. In traditional schools, this student would warrant a short visit to the multi-sensory room, or MSR, to help neutralize these annoying distractions by allowing them to satisfy their sensory needs. An MSR is an artificially created area containing equipment and materials designed to stimulate the senses through light, sound, touch, and smell (John, 2017). Once the anxiety subsides and they are relaxed, they can return to class and continue with their learning. Alternatively, an over- or under-stimulated student in a well-designed classroom would thrive just fine. They could simply choose a chair that meets their sensory needs or go to a quiet area in the room to have a respite. This allows the student to meet their sensory needs without leaving the classroom, thus not interrupting the learning process. A well-designed classroom can help a student with special needs in many ways. Unfortunately, there has been little research conducted on the

importance of space planning and design regarding helping people with autism spectrum disorder (ASD) or sensory processing disorder (SPD).

### **Background of the Study**

The preliminary guidelines for location and material selection discussed are derived from a study (Nuth Sloboda, 2022) that helped determine the best layout for a multi-sensory room and found ways to incorporate various sensory elements into general classrooms. The study examined the effectiveness of multi-sensory rooms and whether the attributes can be designed into the standard classroom for truly integrated and inclusive education for all. Through research, literature review, and observations afterwards, a beginning set of guidelines started to develop. The following method and results sections are pulled from that study, as they pertain to the proposed guidelines.

### **Significance of the Study**

The study found that multi-sensory rooms can be very costly and are not inclusive of all students while providing isolation for disabled students. Ideally, a properly designed space should be able to incorporate specific considerations to help students with disabilities function efficiently in the space alongside their able-bodied peers. They should not have a reason to “escape” because their needs are being met (Cooper, Heron, & Heward, 2007). These design attributes will not only benefit every student, but teachers and learning support staff as well. Improved acoustics, material selection, spatial layout, and the use of color psychology will provide educational benefits to everyone using the space (Sanchez, Vasquez, & Serrano, 2011). The best way to research this was to understand what works well in the MSRs in order to incorporate some elements into all-inclusive classrooms.

## **Method**

### **Research Design**

The study used a mixed-methods design that included a qualitative descriptive design, which is most appropriate for achieving the aim of the study, as well a questionnaire to help show validity based upon triangulation (Tracy, 2013). The quantitative portion utilized questionnaires that were sent out to all special education teachers in a medium-sized public school district in Western Pennsylvania. These provided general usage information that was used to formulate interview questions for the qualitative portion of the study. Participation was voluntary and participants were free to decline answering questions if they wish. The method used for the qualitative part of the study was a semi-structured interview that consisted of twenty questions delivered by an in-person interviewing process. The research examined the MSR usage in further detail as well as which layout and element(s) worked best for their students.

## **Results**

These preliminary guidelines are derived from the results found in the Nuth Sloboda (2022) study. The results for

one of the research questions concerning the most beneficial elements of an MSR is discussed here. The special education teachers that were interviewed for the qualitative portion of the study all agreed on certain beneficial elements for a classroom. This was talked about on both the micro and macro levels. On the micro level, actual sensory aids were discussed and the most beneficial were noted. On the macro level, design elements such as location, lighting, and material selection were discussed and rated by importance, which will be discussed here.

**Macro Level Elements** Macro level elements from the study included location, lighting, and material selection. These important elements need to be incorporated in the predesign phase of new construction or remodeling of schools. Unfortunately, these elements are often an oversight and the MSR or special education classroom placement are often an afterthought.

### *Location*

One of the most important design elements discussed was location. Two out of the five schools studied had their multi-sensory room adjacent to the special education classrooms. This provided a convenient path to the MSR and made it an efficient transition for students using the space. In the other schools, the walking path was not so direct or close by. The sometimes-unruly students had to walk past other classrooms on their way to the MSR, occasionally creating a commotion and bringing unwanted attention to themselves. Thus, having the MSR located adjacent to the special education classrooms is a must.

In three out of the five elementary schools, the MSR was located by the cafeteria and/or food preparation room. This caused strong odors to waft into the room and oftentimes disturbed the students using the room. One teacher said that a child who could benefit from the room refused to go there due to the unpleasant odors from the food in the nearby vicinity.

Another issue with the cafeteria being close by is the commotion of students going to and from the lunchroom. This commotion disturbs the students working in the multi-sensory room. The students tend to lose their train of thought and instead pay attention to the passers-by in the hall. This same issue could arise from an auditorium or gymnasium being adjacent as well. The noise, instead of the smell, could be an inconvenience for students utilizing the MSR or special education classroom.

### *Lighting*

Natural lighting and views were seen as beneficial to all occupants in the room. Two out of the five rooms in the study did not have a window and this was seen as a negative in the teachers' opinions. However, the rooms that had windows, being able to adjust the view and amount of sunlight entering the space was imperative. One school in the study used curtains and blinds to block unwanted distractions if needed, such as foot traffic or landscaping. They said their students enjoyed seeing the outside weather and playing with the sunlight as it fell through the window.

As for the mechanical light fixtures, a dimmer switch, or separate switches for lights, were most requested by the teachers. A few of the MSRs used fabric to shield the ceiling light fixtures and lessen the brightness. Teachers in these schools also used light covers in their special education classrooms (see Figure 1).



Figure 1. Fabric Use to Reduce Brightness

Note. Objects were added to light covers to add visual interest (Source: Nuth Sloboda).

A dimmer switch allows them to adjust the brightness of the light fixtures easily depending on the children's needs, without having the need to apply fabric over the light fixtures. Separate light switches will allow different combinations of lights to be turned on and off.

#### *Material selection*

Selecting the proper materials takes research and time. It is not as simple as placing extra furniture in from another classroom. One school interviewed in the Nuth Sloboda (2022) study did not have access to their MSR due to its poor state. Unfortunately, unruly students over time had damaged a lot of the furniture and sensory aids, so a functioning multi-sensory room was not an option. A large amount of money would be needed to fix the room, which was not feasible at the time.

## **Discussion**

### **The Importance of Location**

While this study focused on multi-sensory rooms, these preliminary guidelines are utilizing the findings for designing an autistic classroom. Many students using the MSR are autistic students, so there is a close relationship between the two types of rooms. The location of the autistic classroom is one of the most important aspects that is often overlooked by both school leaders and the architects who design the schools. This study revealed that unpleasant odors and sounds from adjacent cafeteria or food preparation areas were detrimental to the positive experience of an autistic classroom. By locating the room away from unwanted noise (gymnasiums and cafeterias) and odors (food prep areas and cafeterias), it will only benefit all the students so they can relax and enjoy the space instead of being distracted and agitated.

Another adjacency that should not be overlooked is locating the autistic classroom by the multi-sensory room. Special education students use both the MSR and their classroom daily, so close vicinity makes it easier for everyone involved. This will limit the time it takes to travel to and from the room and reduce the number of distractions getting there. In the schools studied, the ones with multi-sensory rooms adjacent, or nearby, the special education classrooms were coveted and used often. On the contrary, the schools studied that had multi-sensory rooms further away from the special education rooms did not use them quite as often as they should. The main reasons for this are the lack of staff available to walk the child to the MSR, the time involved to get there, and distractions along the way.

The significance of view and natural lighting cannot be emphasized enough. The calming feeling of nature can do wonders to relieve stress and the benefits of Vitamin D from sunlight offer nutritional and health benefits that cannot be matched. Incidentally, a multi-sensory room in the study had a window to the outside which allowed a distracting view due to the large size and low position of it on the wall. A favorable position is a windowsill height of 4' AFF (above finished floor) or higher which offers an upward view of nature without the distraction of outdoor activities.

### **The Importance of Lighting**

Continuing with the topic of window locations and views is the natural lighting that comes from them. Simply placing a window higher on the wall will allow sunlight to filter in without the distraction of seeing outside activities. Light can also be a source of sensory regulation and an opportunity for stimming, as users will often appreciate naturally occurring light effects for this purpose. In addition, window treatments that can be adjusted to filter sunlight throughout the day should be included. This allows the teacher to adjust the brightness while still allowing natural sunlight to filter through. While a direct view of the outdoors should be limited so as not to introduce distractions, the use of adjustable window shading and blinds working in conjunction with conventional lighting is an ideal solution. Lastly, natural lighting should not be overlooked as it helps support healthy circadian rhythms.

Color temperature is another aspect that is often overlooked. According to the U.S. Green Building Council (2022), the WELL Building Standard “is a performance-based system for measuring, certifying, and monitoring features of the built environment that impact human health and wellbeing, through air, water, nourishment, light, fitness, comfort, and mind”. WELL certification stresses the importance of circadian rhythm by offering flexibility for adjusting the color temperature from 2700 K, mimicking early morning equivalents, to mid-morning amounts at 4700 K, and finally to 6500 K during peak noon equivalents (WELL certified, n.d.). LED lighting offers this flexibility in both color temperature as well as light intensity. This is a great option when natural lighting is not available or not advantageous.

While this may not seem important to the average person, fluorescent lighting can be detrimental to those with special needs. The subtle flickering of the light may not be noticed by the typical person but can be bothersome and interrupt a child with specific sensory issues. This type of lighting is found to trigger seizures in children

(Martin, 2016), so LED (light-emitting diode) lighting is more favorable. LEDs are energy efficient, cool to the touch, and have a long life, far surpassing incandescent and halogens.

The concept of layered lighting is not new to interior designers, but it is to educational settings. Allowing the capability to choose one, two, or multiple types of lighting for a space is important. This can be achieved by switching different light fixtures for independent operation. The ambient, or general, lighting can be on a dimmer switch for overall control of brightness by adjusting the light levels in the room. Indirect lighting is preferred to avoid distraction from the light source and its brightness. Task lighting can be on another switch for ease of use when needed. Decorative or accent lighting can be on a switch that can be operated when the sensory need requires it. This may include bubble tubes, sensory mood eggs, or sensory mood balls.

### **The Importance of Material Selection**

The role of the interior designer or architect specifies the material used for the walls, floor, and ceiling, both for the construction and the finish application. They also specify furniture used within the space. This can be further broken down into smaller focus areas such as acoustics, color, and materials and furniture.

#### ***Acoustics***

To minimize background noise and echo, proper ceiling materials should be used to absorb sound and eliminate reverberation and echo. This can be achieved by using sound dampening ceiling tiles or cloud panels, wall-mounted sound-absorbent materials, or sound-absorbent acoustic flooring systems such as carpet tiles or vinyl.

The level of sound control should vary depending on the need of the space; activities of higher focus require a higher level of sound control, whereas a high stimulus area may require a lower level for less sound control. Provisions should be made for different levels of control so users can get used to functioning in different sound levels. Care must be taken to avoid the “greenhouse effect,” where students rely on intensive acoustical control and cannot function in a typical environment. Research has shown that sounds below 55 decibels (dB) are best for reducing negative behavior in autistic individuals. Sounds between the 55-70 dB range dramatically increase distressed behaviors (Kanakri, 2014).

Rooms should be located as far as possible from the auditorium, gymnasium, and lunchroom to minimize the noise levels. Rooms should also be positioned away from HVAC ducting and handling units. All air outlets should be tightly installed with sound insulation to avoid any vibration noise.

#### ***Color***

A neutral color palette is preferred. Any accent or contrast should be added judiciously with utility and purpose. Contrast should be limited to transitioning and defining boundaries as opposed to creating visual stimulation for stimulation’s sake. Natural and earth tones are the preferred choice.

Research has shown a preference for the blue to green color spectrum and a slight aversion to yellow in autistic individuals (Grandgeorge & Masataka, 2016). This could be the calming effect of the cool colors and the over-stimulation of the warm colors (see Figure 2). Gradual transitions of color, and the use of complementary colors, can provide a comfortable feeling as well.

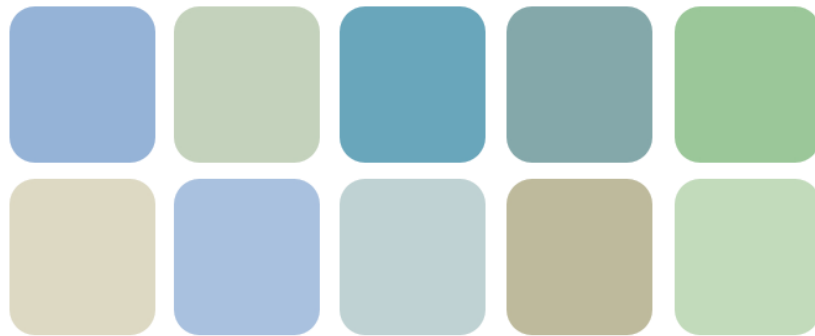


Figure 2. Color Palette for Autism-Friendly Classrooms

Note. Neutral colors with subdued tints and shades (Source: Nuth Sloboda).

Lastly, color psychology is another aspect of color (and lighting) that LED light fixtures can make beneficial rather easily. This can be accomplished by using an indirect RGB (red, green, blue) light washed over a neutral painted wall surface or as a backlight to create a temporary color that is adaptable to each student's needs. This lighting technique could prove very helpful in a calming space. The color green is known to put students at ease while blue can promote calmness and tranquility. Teachers can choose a light color that will help their students throughout the day. For example, they may choose a blue color to help calm down over-stimulated students or a green color to get ready for an exam (see Figure 3). It must be noted that the paint color can change the appearance of the light, so a neutral paint color is preferred.



Figure 3. Color Psychology Using LED Lighting

Note. The first image is natural lighting while the third image has a tint of red mixed in (Source: Author).

### ***Materials and Furniture***

Non-slip surfaces, stable fixation, and soft edges minimize physical harm and avoid injury. Solid and durable furniture is required to endure banging and other hard use by the students. Natural materials are preferred; these include wood, stone, and cotton-based fabric. Tactility should be a guiding factor when selecting material that will be in direct contact with users. Textural quality can always be added with loose furnishings such as pillows and blankets. It is easier to add texture than to remove it if the texture becomes uncomfortable for some users.



Lastly, maintenance and care of use must be simple and inexpensive. Robustness is important so the materials have a long life, can be cleaned often, and withstand daily wear before needing replacing.

A variety of seating should be included so students can choose which chair fits their sensory needs. Offering a selection of bouncy, rocking, hammock, cushioned, balance, and spinning chairs will meet their variety of needs. While the use of casters can help to reconfigure the space without offensive noise, this could be a distraction for users who have sensory issues with spinning, etc. Limited use is best in this case.

### **The Importance of Design Integration in the Classroom**

The importance of design integration became evident during the COVID pandemic. Schools were not using their multi-sensory rooms to prevent the spread of germs. Teachers improvised the best they could to incorporate sensory breaks into their classroom routine. They created sensory bins that were used to mimic items found in the MSR. Also, in instances where the multi-sensory room is being utilized by another teacher/therapist or simply cannot be used for possible contamination, an integrated solution must be considered for the classroom.

Designing a larger classroom size during space planning will allow for the integration of a sensory corner or closet if needed. This could provide a calming area for an over, or under, stimulated child to retreat to satisfy their sensory needs. They would still be within sight of the teacher and be included in the learning occurring in the classroom. This area is needed to provide a respite for students who need to get away and compose themselves. This could be a small alcove or quiet seating arrangement that provides a neutral sensory environment. Individual control of lighting and sound levels should be made available, if possible, in these areas. Full body tactile stimulation from soft furnishings can be a powerful support. Contour chairs and sofas help provide this.

Another design element is to include space allocated for the storage of sensory bins and aids that can be utilized within the classroom if the need arises. This allows the paraprofessional to continue assisting students in the classroom instead of leaving the room to walk the sensory-deprived student to the multi-sensory room. Furniture to help with this includes bookshelves and free-standing storage units. Aids such as fidget toys, sensory supports, ear plugs, etc. can be stored here. Students can see the items in bins, and there is a picture on the bin that matches the picture on the shelf on which it belongs. This helps with order and sequence, which is longed for by autistic users.

Routine and predictability are critical for autistic individuals and the spatial sequencing of a room can make or break them. Areas should be organized in a logical manner, based upon the typical scheduled use of the space. Specific areas need to be space planned to provide sensory cues as to the user's expectations in each space, with minimal ambiguity. An area for transitioning into the classroom is needed to hang-up coats, place bookbags, etc. An area for individualized instruction is needed so students can work independently at their desks. Another area for one-on-one learning with a teacher to work on IEPs (individualized education plan) is important as the students know when they are in that particular area what is expected of them. Lastly, a group area where all the students can gather around a whiteboard is important to facilitate group interaction.

## Conclusion

In conclusion, special design consideration should be given in the early space planning stages of the school design to incorporate proper material selection and location of the autistic classroom. During this programming stage, designers or architects could discuss space requirements requested by the special education teachers to allow proper spacing and room for all the desired aids.

Ultimately, the special education students are the ones who are being overlooked. Their needs should be noted, and a space should be designed accordingly. Then teachers will be able to focus solely on teaching the students instead of dealing with unwanted behavior throughout the day. Would it not be ideal if autistic classrooms were designed specifically for the children who need them instead of being an afterthought? Just imagine where our children would be if all their sensory needs were met in one space!

## Recommendations

The insight obtained through this study can be incorporated into a set of guidelines for the space planning of an autistic classroom, or multi-sensory room, within the school design. Including this information into the initial planning of the school will benefit everyone involved and allow the students to realize their full potential. Instead of placing the autistic classroom into an unused room, why not space plan it in a proper position within the school during the design phase so that a thoughtful selection of adjacencies, materials, and finishes can occur. This room placement should not continue to be an afterthought. Our children deserve better.

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### **Author Information**

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**Belinda Nuth Sloboda, Ed.D**

 <https://orcid.org/0009-0009-4466-761X>

Assistant Professor of Interior Design

Indiana University of Pennsylvania (IUP)

511 South Drive, Indiana, PA 15705

USA

Contact e-mail: [b.a.nuth@iup.edu](mailto:b.a.nuth@iup.edu)

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