The STEAM Journal

Volume 4
Issue 2 *The Specimen of 2020*

Article 4

December 2020

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Recommended Citation

Miller, Tonya D. (2020) "Designing Multi-Sensory Environments: A Powerful Tool for STEAM Learning," *The STEAM Journal*: Vol. 4: Iss. 2, Article 4. DOI: 10.5642/steam.20200402.04
Available at: https://scholarship.claremont.edu/steam/vol4/iss2/4

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STEAM is a bi-annual journal published by the Claremont Colleges Library | ISSN 2327-2074 | http://scholarship.claremont.edu/steam

Designing Multi-Sensory Environments: A Powerful Tool for STEAM Learning

Abstract

Architecture and design are natural facilitators of STEAM learning. This article discusses an interior architecture project requiring students to design a multi-sensory environment within an existing classroom space. The project uniquely addresses the STEAM disciplines and challenges students to explore creative problem-solving to develop unique designs.

Keywords

interior architecture, design, multi-sensory environment

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Designing Multi-Sensory Environments: A Powerful Tool for STEAM Learning

Tonya D. Miller

Responsive Design is an interior architecture course that challenges students to develop creative ideas in response to evolving global issues concerning design's ability to impact the health and wellbeing of people and the environment. The curriculum in this course includes participation in a service-learning project. One such project involved the development of a design for a new multi-sensory environment within an area of an existing classroom for special needs students. Seventeen university students of varying ages participated in this project. The process of designing an interior space is always an exercise in STEAM principles as it necessitates the marriage of technical and artistic considerations. However, this project in particular addresses each of the STEAM discipline areas, and does so with a small-scale project that could easily be replicated by others, even those without an extensive design background.

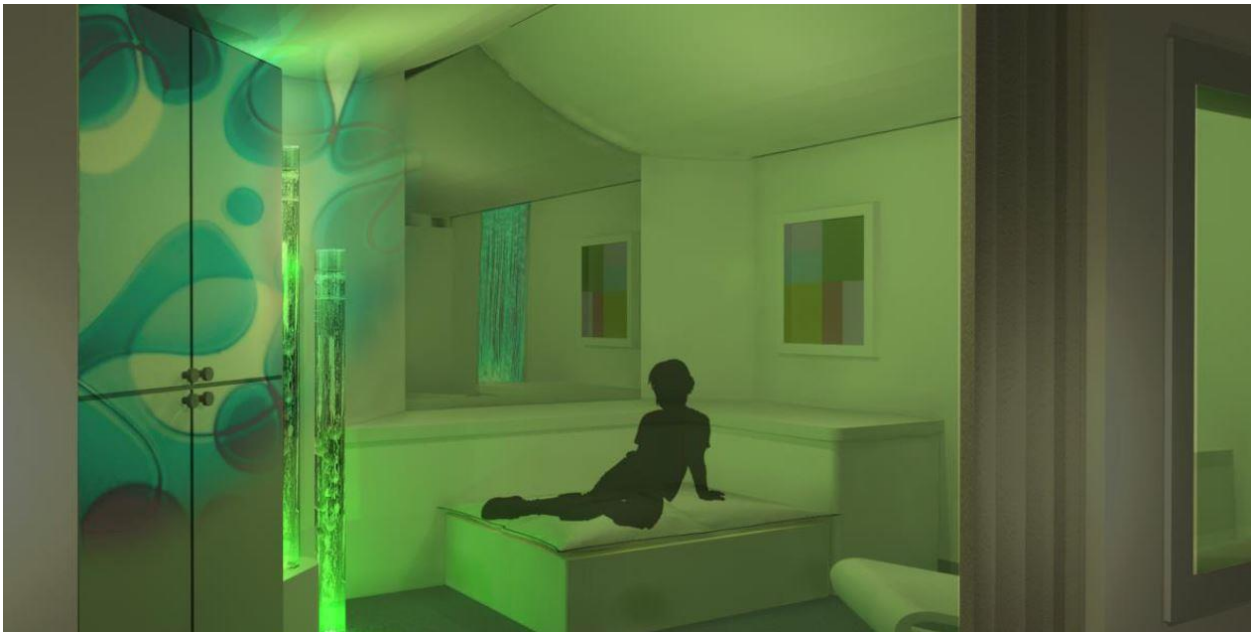
Science

According to a leading expert in the field of occupational therapy, Linda Messbauer, a multi-sensory environment is "a dedicated room/space designed to block out noise, control space, temperature and lighting. It is an artificially created venue that utilizes multi-sensory equipment to stimulate the senses and promote pleasure and/or feelings of well-being" (2010). These spaces have been shown to have positive impacts on individuals with a range of conditions including autism, dementia, and anxiety. Before students began exploring the physical space, they were asked to investigate the conditions affecting the users of the space and gather information regarding the neuro-physiological effects of multi-sensory environments. The final project deliverables included a written summary of each students' research.

Technology

In order to specify what would go in the space they were creating, students also had to learn about the different types of technology that are currently used in these multi-sensory environments in order to achieve the desired effects. Students toured a large-scale multi-sensory room that incorporated much of the cutting-edge equipment used in these applications. The following equipment was recommended for their space: a small bubble tube, a mirror ball, an Optikinetics projector, a hanging or rocking chair, and fiber optic tails. However, the assignment provided them with some flexibility to add to or adapt this list in order to achieve their design intent.

In illustrating their final design solutions, students used a variety of computer software programs. Computer-aided drafting programs (such as AutoCAD) were used to draw floor plans. Modeling software (such as Revit or SketchUp) was used to create computer-generated renderings. Video creation software (such as Premier or iMovie) was used to compile videos showcasing their design solutions, and other software (such Adobe InDesign or Microsoft Office programs) was used to put together final research presentations.



Engineering

The existing space they were given to work within was the corner of a larger classroom. This posed some interesting problems when it came to the mechanical and electrical design of the space. It was not within the scope of the project to do major reconfiguration to the electrical or mechanical systems. However, the multi-sensory space needed to have some separate control over the air flow and lighting. Students had to come up with creative solutions to meet this requirement. One particularly creative solution included the use of a theatrical scrim material to

allow air flow and a projection surface without the undesired visual connection to the outside space. Another student developed a multi-layer custom shade that could completely block undesired light from the existing window or allow a gently stimulating star-like pattern created using only sunlight.

Art

As with any design project, students had to consider the aesthetics of the space along with the functionality. Students were asked to carefully consider and explain how they were using the elements and principles of design to achieve the desired intent. They also utilized their artistic skills in the final illustration of their proposed designs.

Math

Students had to utilize math in a variety of ways throughout this project, but two are perhaps most notable. Before students could begin their proposed designs for the space, they had first had to measure the existing space in order to create accurate working drawings. The students worked together to complete this portion of the project. Students were divided into teams of 3-4 and each was assigned a different aspect of the existing space to measure (walls, doors, electrical, mechanical, cabinets). This allowed the class to make the most efficient use of limited time in the existing space. The other notable math-related application was the budgeting exercise that accompanied the project. The school had obtained a $5000 grant to complete this work so students had to create an itemized budget and demonstrate that their design solutions could be executed for $5000 or less. This parameter of the project challenged students to develop creative ways to accomplish the project given the limited amount of funds available.

Conclusions

Resulting student designs were thoughtful, innovative, and responsive to the needs of their client. In a post-project survey, one student commented, “I learned so much through this project that I feel can be related to all projects I work on that would potentially host people with special needs of some sort. I also just enjoyed the opportunity to learn more about a very different type of space and work with an organization that is very community service driven.” This unique experience not only enhanced their technical skills, but it also opened their eyes to a new way of thinking about design.

References

Messbauer, L. (2010). What is A Multi-Sensory Environment? Retrieved from https://lmessbauer.com/what-is-a-multi-sensory-environment/