Solarium for Your Cranium

Rationale

The solarium was inspired by the dome at a semi-local zoo. While visiting there, we noticed the amount of energy expended by the plants and animals inside. With the dome constructed with mostly glass and metal, light was able to pass through and aid the health of plants and animals. While observing the animals inside the large glass dome, it was hard to not to notice the amount of activity expended by the animals as well. With the observation, we begun to inquire the importance of natural light to life and most importantly, the health benefits.

Light has been important for the progression of mankind. We have evolved our internal clock to sync with natural daylight and darkness. The internal clock, circadian rhythm, which regulates everything that happens in your body at different times of the day. The human body is complex and is very in tune with the natural world around us and most body functions happen without our knowledge. One function in particular is our body's ability to refresh itself with the sleep-wake cycle. The sleep-wake cycle is a circadian rhythm that releases biochemicals triggered by light and darkness. Think of serotonin and melatonin as antonyms. Melatonin being the neurotransmitter that tells the body to get in the sleep mode. Opposite, serotonin transmitted is used to wake up the body, get it in gear for the day, appetite, blood pressure & pulse, body weight, and critical to development.

For our circadian rhythms to be healthy and in sync, our body relies on natural light exposure during the wake hours. The solarium dome would increase the amount of natural sunlight and according to the Annals New York Academy of Science increase alertness and motor activity. There have been many trends in school architectural design, especially regarding the amount of light and the effects. According to *Effects of School Design on Student Outcomes,* the most harmful environment for students is to be placed in a classroom with minimal amount of natural light, especially concentrated in one area of the room. The dome would allow for ample lighting to enter from all directions and the entire school day resulting in an increase of a healthy circadian rhythm.

Daylighting and Full-Spectrum Lighting Design states exposure to natural light benefits your overall performances and may lessen absences or academically productive. In the case study of Durant Middle School, an abundance of natural light was used within the school building. As a result, the school has the highest attendance rate in the county. Compared to alternative lighting methods, natural lighting reduces eye strain making it more easy for our eyes to function properly. Research suggests, light is also important in controlling the body's sleep-wake cycle, in which the pineal gland aids in production and releasing of melatonin and serotonin. According to natural light and education, a study was carried out to study the benefits of natural lighting on students' health. The results included teeth being healthier, less dental appointments, body height and weight which are linked and regulated, and less likely to miss school because of normal illnesses.

Although attending school in a dome sounds odd, solariums benefit the understanding in the process of learning and gaining knowledge. It has been proven that a student that is exposed to full spectrum lighting would attend school 3.2 to 3.8 days more per year, which a solarium would provide. Natural lighting has a positive effect on students' attitude and performance while being educated. In a county in Capistrano School District in Orange County, California, students with the most daylight in their classroom progressed 20% faster on their math tests and 26% faster on reading tests in one year compared to schools with the least amount of daylight. The Poudre Schools District in Fort Collins, Colorado discovered an improvement of 7% in test scores in classes that used natural daylight and 14% to 18% improvement in schools with windows with a larger span than an average schools. The solarium would basically be a large, dome shaped window with the same benefits as a large window, as the examples above show. Natural lighting passing through a solarium covering a large area would allow students to study plant life such as a school garden. This would allow interactive experimenting in science classes and help for normal classwork regarding plants and natural light effects on things inside of the solarium. Students that learn "hands on" would benefit from the solarium, while all of them would be able to experience something most people don't have the luxury to have while being educated. With a large area where natural light could pass through, the solarium would altogether be a helpful learning tool for students.

The increase in natural light within the school day results in benefits for student health, student accountability for learning while at school, and the teachers ability to spend quality time educating. The solarium dome is an innovative building project and learning environment for our school district and community.

Project Description

We are creating an awareness campaign for the building addition of a school solarium dome. The campaign would bring awareness to the school district and community of the benefits of natural light versus artificial light effects on health and school performance. The solarium would be a large glass domed area that allows natural light to pass through and utilize as little additional building materials such as metal to maximize the amount of natural light admit. The solarium would be a large glass dome commons. The multi-purpose area would serve teachers and students as an extension area to the regular classroom setting throughout the educational day. During critical times of the day such as meals, students would increase their exposure to natural light creating a healthy body and improving school performance.

Next Steps

The next step for our team would be to create an awareness campaign. The campaign would not only focus on the health benefits, but the steps for our community to form an advocate group. To begin advocating for the addition of the solarium dome to our school, the group would need to collect data on the current sizes of windows, the cost of the project, and school data such as attendance. The team would make arrangements to meet with the mayor, city council, and the board of education and determine steps needed to proceed with the awareness campaign. Once the steps have been determined, the team will then need to create a goal, set calendar dates for the goals, and set locations for the campaign. During the campaign, the team will need to collect data to determine the effectiveness of the campaign. Periodically, the team will need to meet to reflect on the impact of the campaign and make adjustments where needed.

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