SAMSUNG

INSPIRATIONAL CASES | WINNER 2023 | CHILE

#FAIRSOCIETY

Device contributes to the inclusion of students with Autism Spectrum Disorder (ASD)

The tool monitors noise pollution and thus reduces discomfort and learning difficulties for students with ASD, as well as promoting empathy and awareness

TEACHER
Carlos Felipe Zuleta Alfaro

STUDENTS
Benjamín Labra
Daniela Morales
Esteban Reyes
Matías Jorquera
Vicente Labra

COMUNITY/CITY
Valparaíso

SCHOOL
Colegio Esperanza de Quilpué

PROJECT NAME
Seekers of Silence

STEM AREAS
Science, Technology, Engineering, and Mathematics

OTHER AREAS OF KNOWLEDGE
Sociology

Empathy was the central theme for the winning project of the 10th edition of Solve for Tomorrow in Chile. Guided by teacher Carlos Felipe Zuleta Alfaro from Colegio Esperanza de Quilpué, the Seekers of Silence initiative (S.O.S. is the abbreviation) promotes the inclusion of students diagnosed with Autism Spectrum Disorder (ASD). This condition affects the interaction and communication of the person with the outside world and presents various signs, such as feeling uncomfortable in social environments and situations. Although there are 70 million people with TEA around the world, they suffer from prejudice and have their needs often invisibilized. This project created a device to guarantee more comfort to all students by detecting noise levels in real-time.

“If concrete actions are not taken, discrimination can occur unintentionally. For example, it is common for people with ASD to have high hearing sensitivity. One student we spoke with said that he loved to play. Still, he did not want to go out to recess because his classmates would scream and that makes him uncomfortable,” says Alfaro, who is a mathematics teacher, uncle of a child with TEA, and has been studying noise pollution for years. In the case of Seekers of Silence, any excess noise that causes an alteration in the student’s learning or mood is considered.

When the teacher suggested creating a solution to the issue, the students embraced the idea and began researching. Five young people between the ages of 16 and 18, who are in the fourth grade, (that is the last year of compulsory schooling) were involved. They were selected for their academic performance, interest, and availability.

“We did a study and the truth is that many times the response has been to remove the student from the room. Instead of reducing noise pollution so that the student would not have to worry, the solution is to segregate him. This deprives him of learning and social interaction, in addition to promoting little empathy on the part of the rest of the class as well,” believes Alfaro.

The device produces a visual alert for excess noise

After a survey with students, the group identified two critical points: the school cafeteria and the classrooms. But, in the end, it was decided to focus on the classroom because it is the space that impacts learning. Then, current solutions were investigated and first they thought about using noise-reducing headphones. “But, like other solutions we saw, it was a partial response, it didn’t change the root of the problem”, the teacher said.

The Seekers of Silence mechanism uses LED lights, creating a traffic light effect to represent the decibels (a unit used to measure the intensity of sound and other physical quantities) captured. When the light stays red it is because the limit of 40 decibels (dB) is exceeded. The app then notifies responsible adults, so they can act and return to appropriate levels, which vary by class. The device also helps people with attention deficit and other conditions that are more sensitive to sound.

SAMSUNG

Eureka moment!

Coming up with a final prototype was a challenge, and the turning point was when they decided to switch from an app to a panic control. Despite being the initial idea, they realized that an app wasn't very practical, because it would depend on the students themselves having the task of picking up their cell phones, opening the app and reporting the noise when they felt annoyed by it. To improve the user experience, they tested new formats for issuing this alert. "In the end, we created a much simpler and automatic panic control, with two channels that could be triggered in the event of extreme noise to replace the app", says the teacher.

Successive tests have improved the device

At first, the device could not identify what was an extreme noise, other times some of the lights did not work. "An important point was to select a microphone that would detect the distance from the classroom as well. We had to test in the first row, in the second, and so on until the end and also configuring the decibels", recalls Alfaro.

After the prototype was ready, it was time for practical testing. The team installed the mechanism and tested it in several rooms, measuring the noises while the course continued its routine, checking if everything was going well and noting the limits that each class established as recommended, adjusting the levels, and making improvements throughout this phase.

"The school community was significant to the success of the experiment. The teachers could do tests and ask questions regarding the development of the project. The students adapted to the instructions and actively participated. We had the opportunity to test them a lot," he says.

Finally, the device allows to measure the recommended level in each class and now serves to monitor if those limits are respected daily. Although there are variations, all limits minimally respect the World Health Organization (WHO) guidance of 50 dB.

From one STEM project to greater care of the other

For the teacher, this type of project raises awareness about the impact that actions have on another person.

SAMSUNG

"I knew that they managed the content well, but for me, the most enriching thing is that the students went to university with life skills that this project gave them,"

the educator says proudly.

Among the skills developed during this period, the teacher highlights that the Solve for Tomorrow tutoring helped improve the team's communication skills, such as preparing a pitch (presentation to demonstrate an idea).

For a less noisy world

Seekers of Silence does not end at Solve for Tomorrow. The group is taking a Data Analysis course in Python (a high-level programming language) to continue improving the tool and plan to publish a web page soon. In addition, they are looking for alliances to continue implementing the initiative in other locations. "We are interested in expanding the project and we have been contacted by several schools, not only in the Valparaíso region but also from other locations in the country," he reveals.

For the teacher, the project is capable of being easily reproduced in other schools, because it is low-cost and uses relatively simple technology. "I think it can also be extrapolated to different areas, such as work offices, the gym and waiting rooms. The impact it has is tremendous. The coexistence of the community in general can improve," he adds. At school, the reaction of the teachers and officials was extraordinary. "Moms who had children with ASD told me that these students had to leave class at least twice a week due to the level of noise pollution and that this device could change the lives of the students if it were implemented from the beginning of the school year", reinforces Alfaro.

SAMSUNG

Focus on practice!

Take a look at the teacher's guide on how to develop a mechanism to control and combat noise pollution in the classroom.

1 Empathy

Based on the experience that teacher Carlos Felipe Zuleta Alfaro already had with the issue of noise pollution, four students of excellence from the school set out to understand what challenges people with the autism spectrum face in the school context. With this, they discovered that excessive noise in the classroom and common spaces affected the well-being and learning of these people and that they had to do something! The solution had to guarantee the comfort of this group without segregating it from the others.

2 Definition

The team surveyed students to understand their perceptions of noise pollution and found that what is considered excessive can be different from class to class. For example, in a room without students with ASD, the allowed level is generally higher than when they were there.

3 Ideation

Each student in the group had specific functions, but always with the willingness to help each other. With preliminary research and testing, some viable solutions were ruled out and the minimum viable product was designed. The device would be like a traffic light, to indicate the levels of noise pollution by lights.

SAMSUNG

4 Prototype

The structure and size of the traffic light changed over time, as well as the choice of parts. When the school acquired a 3D printer, they made a box that would be the base of the device. Inside it, there are audio sensors connected to LED lights, which create a traffic light effect to represent the decibels captured and signal red when the noise is excessive.

5 Teste

With the prototype ready, the team took it to various classrooms to put it into action. The other teachers and students at the center participated in this phase, indicating at what level noise pollution becomes a nuisance. A recommended limit was set for each classroom and the students set out to improve the device as they were testing. In total, it was approximately six months of work.