

Concept document

ARTEN

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Context

Problem Statement

The new rule in the Netherlands mandating primary school children to have at least two hours of physical education every week starting January 2023 has brought attention to a critical issue. This requirement will necessitate PE teachers to spend more time in gym halls where noise levels frequently exceed 90 dB(A). This brings a significant health risk to the teachers, potentially causing problems with attention, hearing loss, migraines, and tinnitus, as well as many others. To address this issue effectively, it is crucial to delve into the problem, understand the context, and identify potential solutions.

Physical Surroundings

Gym halls in primary schools in the Netherlands are the primary setting where physical education takes place. These halls are typically designed for physical activities, with hard surfaces that can amplify sound. The noise levels in these halls can reach levels equivalent to that of a leaf blower or a tube train.

Social Surroundings

The prevailing culture in the Netherlands places a strong emphasis on education and the well-being of children. The government's decision to increase physical education hours reflects the importance placed on children's health and development. Unfortunately, it also negatively influences gym teachers all around the country.

Values and Behaviors

Dutch society values a balanced education that includes physical activity. Parents and educators prioritize the holistic development of children, which aligns with the goal of increasing physical education hours.

Customer Experiences

PE Teachers

Physical education teachers are the primary stakeholders affected by this new rule. They have expressed concerns about the adverse effects of high noise levels in gym halls. Many were already suffering from these effects before the new regulation was introduced. Now, their problems have only accelerated.

Pain Points

PE teachers experience physical and mental discomfort due to high noise levels. They struggle with maintaining students' attention, risk hearing loss, and suffer from migraines and tinnitus, amongst other issues. These issues can significantly impact their job performance and overall quality of life.

Emotions

PE teachers likely feel a mix of frustration, concern for their health, and anxiety about their ability to effectively teach in noisy environments. There might also be a sense of urgency to find a solution to this problem.

Research Insights

Primary Research

Based on the research provided by the cooperating research team in our project, we have some key takeaways that should be highlighted.

During the interview process, nineteen PE teachers were shown video material about a teacher losing their hearing and they were asked for correlation.

The average age of the interview group was 30 years old. Knowing that, the research team was already able to note down some major problems touching upon these people:

1. Tinnitus: (4/19 people)

- temporary - 2
- chronic - 2

2. Environmental complaints (3/19 people)

- loud noise
- bad hearing
- pain complaints (e.g., pain in the ears)

3. Personal complaints (1/19 people)

- at the age of 60, the teachers hardly hear anymore.
-

4. other complaints (11/19 people)

- tiredness (16/19)
- mental fatigue, strictly related to the noise amount (3/19)
- headaches (11/19)
- voice problems (6/19)
- concentration problems after work, less focus (6/19)
- receptor/sensory sensitivity (7/19)
- dizziness

Based off that research, we can see how severe the problem of sound overexposure is in the environment of gym teachers.

Secondary Research

1. Are there any existing technologies or equipment designed to reduce noise levels in gym halls?
2. What are the potential short-term and long-term health effects of prolonged exposure to high noise levels?

Question 1

There are several technologies that reduce noise levels in the gym. Sound Masking Systems: These systems use ambient background noise to mask unwanted sounds, making the existing noise less noticeable. Sound Absorbing Materials: These materials, such as acoustic panels and tiles, can be strategically placed on walls, ceilings, and floors to absorb sound waves and reduce reverberation in gym halls.

Question 2

Prolonged exposure to high noise levels can have a range of short-term and long-term health effects. The specific impact on an individual's health can depend on factors such as the intensity and duration of noise exposure, individual susceptibility, and whether hearing protection is used. Here are potential short-term and long-term health effects associated with exposure to high noise levels ¹:

Short-Term Health Effects:

1. Temporary hearing damage: Difficulty hearing soft sounds, ringing in the ears (tinnitus), or even temporary deafness after exposure to extremely loud noises.
2. Stress and Anxiety: High noise levels can trigger stress and anxiety reactions in individuals.
3. Sleep Disturbances: Noise can disrupt sleep patterns, leading to difficulty falling asleep or waking up during the night. Poor sleep quality can have a range of short-term health consequences.

Long-Term Health Effects:

1. Permanent Hearing Loss: Prolonged exposure to high noise levels can result in permanent hearing loss over time. This condition, known as noise-induced hearing loss (NIHL), is irreversible and can worsen with continued exposure to loud noise.
2. Tinnitus: Tinnitus, or ringing in the ears, can be a persistent long-term consequence of noise exposure. It can be distressing and affect an individual's quality of life.
3. Increased Risk of Cardiovascular Issues: Chronic exposure to high noise levels has been associated with an increased risk of cardiovascular problems, including hypertension (high blood pressure) and an elevated risk of heart disease and stroke.
4. Mental Health Impacts: Noise pollution has been linked to increased stress, anxiety, and even depression in some cases. Prolonged exposure to noise can have a negative impact on overall mental well-being.
5. Cognitive Effects: Noise can interfere with cognitive functions such as concentration, attention, and memory.

Competitive Analysis

To protect both students' and teachers' health and wellbeing, the issue of high noise levels in gym halls during physical education lessons must be addressed. Similar issues in physical education settings have been addressed by other countries and regions through the implementation of plans and solutions. Here are some insights from these initiatives:

- **Limit Class Sizes (USA):** In a physical education class, fewer students can help reduce noise levels. Smaller class numbers create quieter environments by enabling improved teacher-student interaction and instruction without the need to raise one's voice.
- **Noise Awareness and Education (USA):** Educating students about the importance of maintaining a quiet and respectful environment during physical education classes can also

¹

Daniel, E. (2007, April 6). Noise and Hearing Loss: A Review.

be beneficial. Encouraging students to be mindful of their noise levels can contribute to a quieter atmosphere.

- **Noise Reduction Measures (USA):** The amount of noise in gym halls can be significantly decreased by putting noise reduction measures in place. The use of acoustic panels, sound-absorbing materials for the walls and ceilings, and rubberized flooring that absorb impact noises are examples of this. Additionally, schools can divide areas within the gym using curtains or dividers to decrease the transfer of sound.
- **Use of Personal Protective Equipment (Canada):** To protect themselves from excessive noise exposure, teachers can use personal protective equipment (PPE) such as noise-canceling headphones or earplugs. This can decrease the chance of developing health problems related to hearing.
- <https://www.starkey.com/hearing-loss-simulator>

Creating Personas

Creating personas representing different types of PE teachers can help gain a more comprehensive understanding of the target audience. Personas may include details such as age, experience, specific health concerns, and attitudes toward noise levels in gym halls.

Goals

Our organization's purpose is to obtain a better understanding of the problem of excessive noise pollution and to take control of the noise levels in the gym hall. We hope to raise public awareness about hearing loss, tinnitus, and other harmful effects of loud noise. We want to educate people on the dangers of loud noise and the paucity of treatment options for disorders like tinnitus and encourage them to make better choices about their hearing.

Target Audience

The target audience of the project are:

- **Primary School Parents:** Since the new law in the Netherlands requires primary school children to have more physical education, parents of primary school-age children are a key audience. They will be concerned about their children's well-being and might be interested in information about noise levels in gym halls.
- **Primary School Teachers:** Physical education teachers are directly affected by the increased noise levels in gym halls. They might be interested in resources to protect their hearing and information about the effects of prolonged exposure to high noise levels.

- **Healthcare Professionals:** Audiologists, otolaryngologists, and other healthcare professionals who deal with hearing-related issues could be interested in your campaign. They might be interested in educational materials to share with their patients.
- **Students:** High school and college students can also be a target audience, especially those studying subjects related to health, education, or acoustics. They might be interested in the science behind noise pollution and its effects.
- **General Public:** Your campaign should aim to raise awareness among the public about the risks associated with loud noise. This includes people of all ages who may not be aware of the potential consequences of exposure to high noise levels.
- **Government Officials:** Local and national government officials, policymakers, and legislators should also be part of your target audience. They may be interested in understanding the importance of noise regulation and its effects on public health.
- **Corporate Organizations:** Companies that operate gym halls, sports facilities, or engage in activities that generate noise may also be interested in noise reduction solutions and the potential legal implications of excessive noise.
- **Noise Pollution Activists:** Individuals and organizations dedicated to addressing noise pollution issues may be interested in supporting your campaign and spreading the message further.

Main findings

POV

User	Need	Insight
Teachers	Protect Hearing while Teaching	Need a solution that allows them to effectively teach in noisy gym halls without compromising their long-term hearing health. They are already concerned about the potential effects of constant exposure to high noise levels.
Parents of Students	Ensure a Safe and Conducive Learning Environment	Parents are concerned about their children's well-being and education. They want assurance that the school environment is conducive for learning and that potential risks, like high noise levels, are being addressed appropriately.

School Administrators	Ensure Compliance with the New Law	School administrators are looking for a way to meet the new legal requirement of providing at least two hours of physical education every week, but they also need to address the concerns of physical education teachers about high noise levels. They want a solution that benefits both teachers and students.
Healthcare Professionals	Minimize Health Risks Associated with High Noise Levels	Healthcare professionals recognize the potential health risks associated with constant exposure to high noise levels. They understand the importance of preventive measures to protect hearing and overall well-being.
Students	Learn in an Optimal Environment	Students thrive in environments that are conducive to learning. High noise levels can be disruptive and hinder their ability to focus and engage effectively in physical education classes.
Noise Pollution Activists	Advocate for Quieter Environments	Noise pollution activists are dedicated to raising awareness about the impacts of excessive noise on health and well-being. They seek solutions that promote quieter and healthier public spaces, including gym halls.
General Public	Support Initiatives for a Quieter and Healthier Environment	The general public values initiatives that improve the overall quality of public spaces. They are likely to support measures that create quieter and healthier environments, including those in educational institutions like gym halls.

HMW

How Might We make teaching in noisy gym halls more manageable for teachers?

How Might We balance increased physical education hours with a quieter learning environment?

How Might We equip noise control experts with practical tools to reduce gym hall noise?

How Might We assure parents of a safe and peaceful learning environment for their children?

How Might We help teachers maintain their hearing health in high decibel environments?

How Might We create a positive, low-noise gym hall experience for both teachers and students?

How Might We develop campaigns that educate the public about the importance of reducing noise levels in educational spaces, particularly gym halls?

How Might We use technology to visually demonstrate the impact of noise reflections and the benefits of sound management in gym halls?

Visualization of the concept

Our idea for this project is to provide a simple website with educational materials for our users. Using a one-pager we want broaden awareness amongst teachers, as well as offer potential solutions to their everyday sound-exposure connected problems.

In our project, we want to include promotional materials, such as posters and flyers, together with mainstream information resources, such as social media platforms. We also want to include a VR video on our website for a life-like experience of hearing loss, that touches upon PE teachers in the country.

Concept definition

Our concept will hopefully attract attention through its uniqueness. Providing a VR video, we will interest and broaden knowledge amongst curious users. This innovative approach is not widely available, so it will hopefully attract proper attention to the issue we're highlighting.

Iteration plans

Creating iteration plans for this project involves breaking down the project into manageable phases or iterations. Our overview of the project planning:

Iteration 1: Research and Analysis

- Duration: 2 weeks

- Objectives:

- Conduct primary research (surveys, interviews, observations) with PE teachers to gather data on their experiences and pain points, as well as their knowledge regarding related topics.
- Perform a competitive analysis to identify existing solutions and best practices.
- Review relevant literature and regulations on noise levels and occupational health.
- Create initial personas to represent different types of PE teachers.

Iteration 2: Problem Definition and Ideation

- Duration: 3 weeks

- Objectives:

- Analyze the data collected during the research phase to define the specific challenges faced by PE teachers.

- Ideate and brainstorm potential solutions, both technical and procedural, to broaden awareness about noise levels in gym halls.
- Prioritize the most promising solutions based on feasibility and potential impact.
- Develop a clear problem statement and solution objectives.

Iteration 3: Solution Prototyping

- Duration: 5 weeks
- Objectives:
 - Develop prototypes or concepts for noise awareness, which should include a marketing campaign with proper marketing materials.
 - Test and refine the prototypes in gym hall environments, amongst teachers and gym workers.
 - Collect feedback from PE teachers and make necessary adjustments.

Iteration 4: Full Implementation Plan

- Duration: 6 weeks
- Objectives:
 - Based on the results of the prototyping and user testing, finalize the chosen solutions.