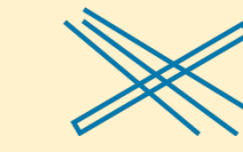




VR and gamification to train spatial awareness



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Introduction

Goal: To develop, test and carry out a method to secure children and adolescents with HL optimum inclusion. The specific goals of the project are:

- To train children and adolescents with HL to navigate in different listening situations
- To give families, teachers, speech and language pathologists around children and adolescents with HL knowledge and the necessary tools to optimise social and academic inclusion.

Methodology

- 2 year project period – September 2021 – September 2023
- Funded by VELUX-fonden
- 22 children, aged 8-12 year
 - 16 children fitted with bilateral cochlear implants
 - 5 children fitted with bilateral hearing aids
 - 1 child with bimodal hearing solution; i.e. one hearing aid and one cochlear implant
- Pretest of app: 26 aged-matched children with normal hearing
- School year 2021-2022: 2. to 5. grade
- Total number of respondents (e.g. children, parents, teachers, speech and language pathologists): 170
- 15 different municipalities from Region Hovedstaden and Region Sjælland are represented in the project
- Children are divided into two groups and work as each others control

Activities

- VR training with the LYT IGEN-app twice a week for 3 months
 - Goal: Enhance the children's spatial awareness
- Focus group meetings before and after the training period
 - Goals:
 - What do children with HL of today think about their everyday life?
 - Which strategies do they use to optimise listening situations?
 - Do they feel responsible of their own hearing?
 - Exchange of experience with other children at the same age
 - Did the app enhance their spatial awareness?
- Systematic observations in the schools before and after the training period: 250 hours of observations
 - Goal: To identify the childrens strategies and responsibility of their listening situations, observe effect of training with the app
- Social well-being: SDQ and CBVS questionnaires before and after the training
 - Goal: To map the childrens social well-being
- Dialogue meetings with the local speech and language pathologists
 - Goal: to partner with the local authorities who are responsible for implementing a final app

User-centered design

VR-app designed and developed by Multisensory Experience Lab, AAU

- Two scenarios: Music museum and school yard (hide-and-seek sound play)
- Four children with HL co-created development of the VR-app



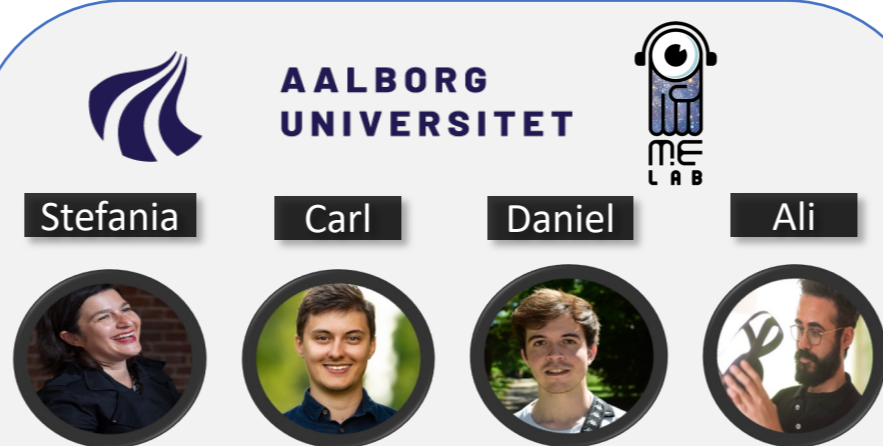
Parental meeting

- Meeting for all parents, while the children participated in focus group meeting
 - Introduction to the project
 - Talked about having a child in the school system
 - It's a challenge to secure consistent use of microphones in the schools
 - Questions about having a HL and strategies
 - The teachers need to know more about having a student with HL
 - Parents expressed great concern for everyday life of their child



Focus group meeting

- One evening from 5pm to 7pm
- Introduction (name and home town) as we have never met before
- Ice-breaker-game
- Pizza
- Questions about having a HL and strategies



Design and development of the VR application



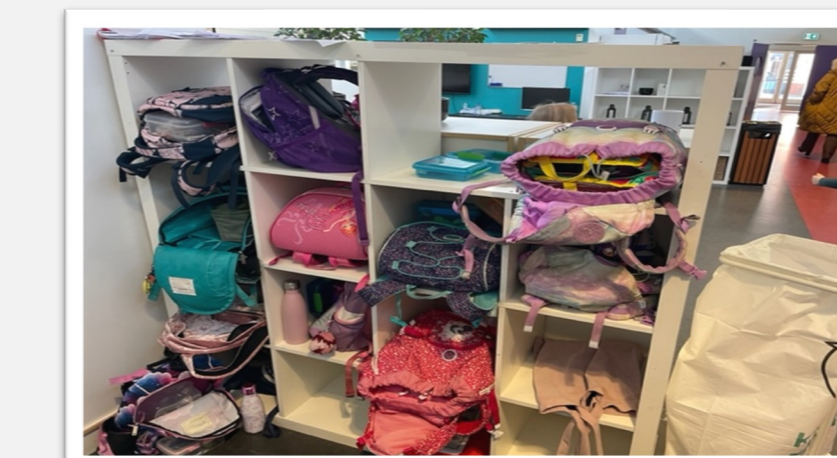
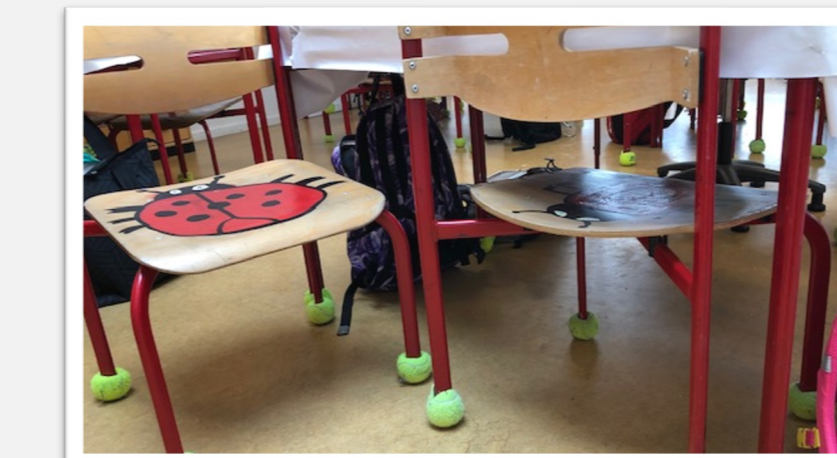
Administration



Evaluating the app
Focus group meeting
Observations in school
Social well-being
Dialogue meeting with local speech and language pathologists

Systematic observations in schools

- Observations; two days – before and after the training from 10 am to 1 pm ☑ same time during the day for all children
- We observe:
 - Use of microphones in the classroom (teacher and students)
 - Use of listening environment in the classroom – e.g. which actions have been taken to reduce noise?
 - The teacher's use of auditory techniques
 - The teacher's attitude towards the child with HL
 - The children's attitude/ consciousness of their own HL
 - How the children act among the classmates



Social well-being

- Goal: To map the childrens social well-being as rated by the children themselves
 - Questionnaires
 - SDQ (Strengths and Difficulties Questionnaires)
 - CBVS (California Bullying Victimization Scale)
 - Do we trace any change between and after the training?

Preliminary results – social well being

Strengths and Difficulties Questionnaire (SDQ)

Total difficulties score (n= 22 børn)

Normal	77,3 %
Slightly increased	18,2 %
High	4,5 %
Very High	0 %

Total strengths score (n= 22 børn)

Normal	81,8 %
Slightly decreased	9,1 %
Low	0 %
Very Low	9,1 %

Preliminary results – social well being

California Bullying Victimization Scale (CBVS)

Prevalence	n = 20
Bullied victim	10 %
Peer-victims	30 %
Not a victim	60 %

WHERE
n = 7, *n = 8

- On the school grounds or sports field (*87,5 %)
- Classrooms (42,9 %)
- Hallways (28,6 %)

WHEN
n = 7, *n = 8

- During breaks (*100 %)
- During classes (42,9 %)
- Before school (14,3 %)

WHO
n = 7, *n = 8

- An adult at home (*87,5 %)
- A friend or friends (57,1 %)
- An adult at school (42,9 %)