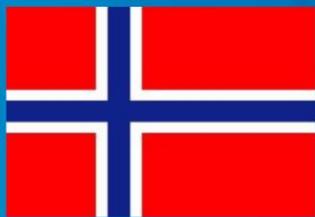




Factors for good acoustic environment in schools and day-care centers

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How to create universally designed kindergartens and schools

In recent decades, new and advanced teaching methods and cultural changes has influenced the sound environment in the kindergartens, schools and after-school programs. The mode of speech still remains, as the most important information carrier in the learning process. Hence, there is a need to create a soundscape that favors speech and minimizes the unwanted disturbing sounds. An unfavorable soundscape drains the mental resources in an increased effort to perceive what the speaker says, instead of understanding and perceiving the message. Research shows that pupils recall about 20 percent less in environments where the soundscape is impairing the learning process. A favorable soundscape is thus required for effective learning where in, children/pupils and staff can thrive and have a focused work for a long time.

LEGAL BASIS

In Norway, we have several laws supporting favorable soundscape in kindergartens, schools and after-school programs. The three important laws in this respect are the Planning and Building Act, the Discrimination and Accessibility Act and the Education Act. The Norwegian Standard for Building Acoustics (NS8175) can be used to document that the sound requirements in the technical regulations of the Plan and Building Act have been met.

The NS8175 act was revised in line with the technical regulations after the Discrimination and Accessibility Act was passed in 2008. Changes were made to the previously existing acceptable limits for reduced vision and hearing in order to accommodate requirements for accessibility for all. In 2012, the NS8175 act was revised in relation to universal design.

The education act underlines that “all pupils in elementary and secondary schools are entitled to suitable physical and psychosocial environment favoring health, well-being and learning”.

The physical school environment includes among others, acoustics and good soundscape

CONSTRUCTION

Planning

Avoid open landscape

- Rooms must have space for individual and group activities
- Special rooms with noisy activities should not be adjacent to quiet rooms.
- Avoid unwanted movement of people in classrooms.
- Design corridors that do not encourage running.

Room acoustics

- Acceptable limits for reverberations and voice transmission (STI)
- Acceptable limits for background noise from fixed installations.
- Reflective ceiling in front of the classroom.

New constructions/major renovation projects:

Follow the requirements of the current technical regulations and limits of the Norwegian Standard.

Before takeover: Check compliance with requirements and procure-documentation

Doors/Windows

- Avoid visual distraction – leads to increased pupil activity that results in distraction (e.g. several doors, large/low windows facing the schoolyard ++)
- No windows facing corridors/adjacent rooms.

Acoustic floor surface

- Acoustics coating
- Carpet tiles

Light (adjustable)

- Obscure
- Possibilities for light intensity adjustment during use of projector or alike.
- Different zones in the room

The order of priority will be different in construction vs. renovation projects

ROOMS

Fixed equipment

- Sound transmission equipment
- Remove/replace with quiet equipment (computers, projectors, printers, etc.)
- Harmonious colors and clear patterns on the interior fittings.
- Do not paint acoustic absorbents (special paints are available)
- Flexible, ceiling height partitions (sound proof), possibly with window with a screen.

Removable equipment

- On purchase of furniture: Consider noise generation, pedagogical adaptation and ergonomics.
- Shelves with binders/books that are sparsely filled up – diffusion/absorption
- Furniture knobs/shock absorbing materials
- Soft surfaces (e.g. felt under oilcloth)
- Parts of larger rooms with noise absorbing partitions/textiles
- Rubber mats in playrooms
- Soft furniture/textiles
- Rooms for play and jumping -/should have extra cushioning (soft cushions/mattresses, etc.)
- Use of furniture to group-divide the room

Teaching devices

- Opt for quiet toys during purchase
- Line toy boxes with felt/placemats
- Use transparent toy boxes to avoid searching
- Use smaller and more toy boxes
- Provide structure and order (e.g. binders with similar or same color.)

GOOD PRACTICE

Use of rooms

- Main classroom
- Flexible group and class sizes
- Make use of rooms/stations to facilitate smaller groups
- No quiet rooms adjacent to activity rooms

Soundscape/noise

- Fresh air during breaks and not during classes (external noise)
- Send children for breaks in groups
- Reading after food break – maintain calm

Communication strategies

- Talk facing the children/pupils and not towards the blackboard
- Location of children/pupils
- Location of teacher in the room
- Approach the children to give messages – do not shout!
- Visual and written mode

Awareness

- Reserve time of day (or a room) for silence
- Set aside regular meetings with sound reduction as a subject
- Sound level meter
- Hearing protection as required. (E.g. during classes including wood work, machines and music)