

# Attentiveness in Action. “Sounds for Mortal Ear” for three Voices and Glass harp

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## Summary

This article documents and discusses a fascinating workshop organized by the EU-funded Project SENSE., which combines music and physics to display the potential of transdisciplinary STEAM or art-integrated STEM education. Attendees participated in a distinctive concert experience called “Sounds for Mortal Ear” (for three voices and glass harp), which was designed to encourage reflection on the integration of arts and music with STEM subjects. The article delves into the workshop's approach, emphasizing the significance of basing discussions on shared experiences rather than purely theoretical concepts. It is important to note that the workshop's unique approach was well-received by attendees and has the potential to inspire similar initiatives in the future.

**KEYWORDS:** art-integrative science education, STEAM, attentiveness, transdisciplinarity, musical composition

**EMNEORD:** kunst og vitenskap i læring, STEAM, oppmerksomhet, tverrfaglighet, musikkomposisjon

# Foreword

This contribution is part of a series of publications that reports ongoing developments, reflections and work in progress achieved in the EU funded Project SENSE. The new European Roadmap to STEAM education.

SENSE. The New European Roadmap to STEAM Education puts forward an art-integrative science education, grounded into a sensory and participatory approach to STEAM education. Taking the shape of a roadmap to creative and holistic STEAM learning to support today's learners and educators, the SENSE.STEAM approach embeds sustainability, participation and social inclusion, creativity and inquiry at its core. This ambition will sustain the development of our New European Roadmap for STEAM Education building awareness, action, and advocacy for future-making STEAM education.

"Attentiveness in Action. Sounds for Mortal Ear" serves as a pivotal component within this multifaceted STEAM structure: from its educational introduction to the resonating discussions that followed the concert experience. This experiential journey fosters both conceptual understanding and immersive engagement, propelling the discourse surrounding STEAM education forward. By choosing to understand the 'A' in STEAM as both, 'art' and 'attentiveness', this contribution underscores the transformative power of the arts in cultivating sensory experiences and nurturing imaginative exploration within broader disciplinary and socio-environmental contexts. Through attentiveness, we embark on a journey of profound discovery, both inward and outward, shaping the very essence of our educational landscape.

We hope you enjoy reading this article.

Edinburgh and Bergen,

Laura Colucci-Gray and Lydia Schulze Heuling

# **Attentiveness in Action. Sounds for Mortal Ear – an integrated STEAM experience**

How can it look like, in a very concrete sense, to provide an art-integrative science experience, where the artistic disciplines with their specific forms of knowing and doing meet scientific and technological disciplines, which are thought to be the supreme way of doing and knowing, on an equal level?

Listening to «Sounds for Motal Ear» at a concert (in Tårnsalen, University of Bergen on 15 November 2022) was the middle section of a three-part workshop structured into a a) presentation, b) concert and b) collective reflection and feedback. The composition was thought to give rise to a shared experience among the workshop participants to reflect on the central topic: how to combine the A in Arts with the STEM subjects. The approach used here was suitable with the overall strategy of the SENSE. workshop, asking questions about multiple epistemologies and the interconnectedness of doing, knowing and sharing: it is impossible to discuss the topic of transdisciplinary STEAM education purely theoretically; co-creation and collective reflection need to be grounded in a common experience.

Building on the rich phenomena of “singing glasses” and their dialogue with human voices in the musical composition, this practice invited participants to a visual and auditory encounter and aesthetic experience of a spectrum of phenomena, from glass (quartz and silica) and their musical expression to their unique sound in the concert hall. Each phenomenon invited participation of the senses, particularly sight, hearing and touch, and the sensory participation invited aesthetic appreciation and inquiry, integrating sensing and reflecting.

The workshop aimed to explore, share and discuss the possibilities and obstacles of an art-integrative science education. The workshop was three-fold: first, an introduction to how I have worked (phenomenologically) with composing the piece Sounds for Mortal Ear, second, the performance of the work, and third, a group and plenary reflection on the STEAM opportunities. The aim of the introduction was to suggest a specific STEAM methodology, where art (in this

case music) is equal to science (in this case physics) from the very beginning of the creative-educational exploration process. The aim of the concert was twofold:

- First, to create and discuss an “art-science performance”: By create I mean combining a (predeveloped) composition with more improvised elements. By discuss I mean reflecting on the possibilities of learning from joint creation by various participants.
- Second, to connect composer, performer and physicist in an integrative learning process, where the borders between knowledge creation and (artistic) performance is erased.

I will now take you through the five steps of the process, what I refer to as a STEAM methodology, from the starting point in listening to the crystal glass, via the creation and performing of the piece to the reflections on the educational aspects the day after the concert.

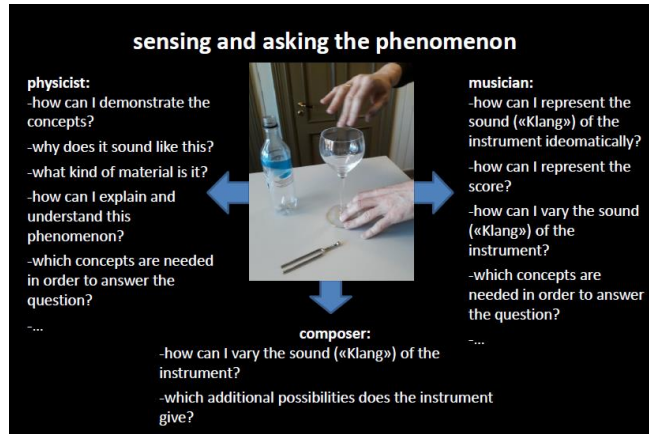
### **Step I. The starting point**



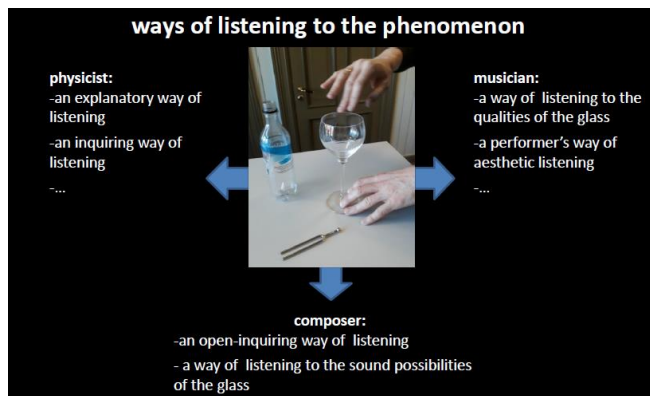
I have chosen the sound of a crystal glass (produced by rubbing the finger on the rim of the glass) because I regard the sound as a phenomenon that potentially integrates physics and music. Attentive listening to the sound is an exercise in first, letting the phenomenon speak, and second, allowing for a reflection on how our ears are guided by (conscious/unconscious) intentions.

## Step II. Introducing physics, music, and composition

As a next step, I compare the sound according to three different intentions: The physicist/physics teacher, the musician and the composer will all three sense the sound differently and they will create three different ways of “asking” the phenomenon:



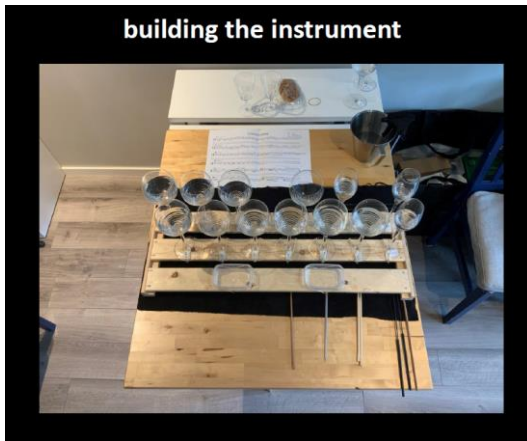
Three different intentions relate further to three modes of listening: the physicist/physics teacher, the musician and the composer will all three listen differently to the sounding phenomenon:



## Step III: Creating expression (the composition steps)

After having developed the three relations to the sounding phenomenon, the next step is twofold:

(i) Developing an instrument from the glasses (a Glass harp)



(ii) Writing the score (for three voices and glass harp)



#### **Step IV: Performing/listening to the composition**

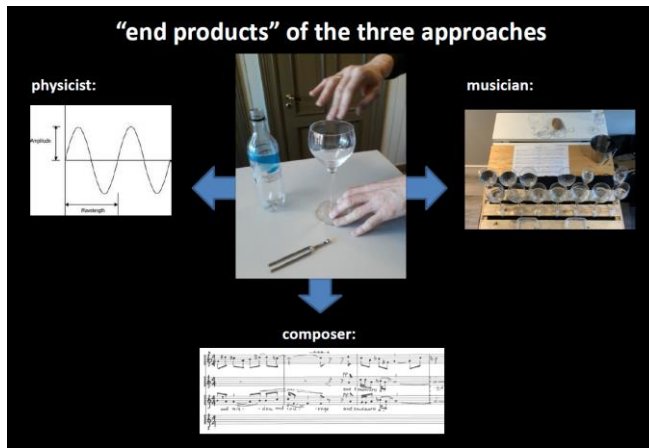
In a conventional setting, the performance of “Sounds for Mortal Ear” is regarded as the end point of the creative process: An audience listens to this piece, performed by the musicians at the concert. In this STEAM setting, however, the performance is merely one step of the creative process where the listeners relate the experience to topics of art-integrative science education.



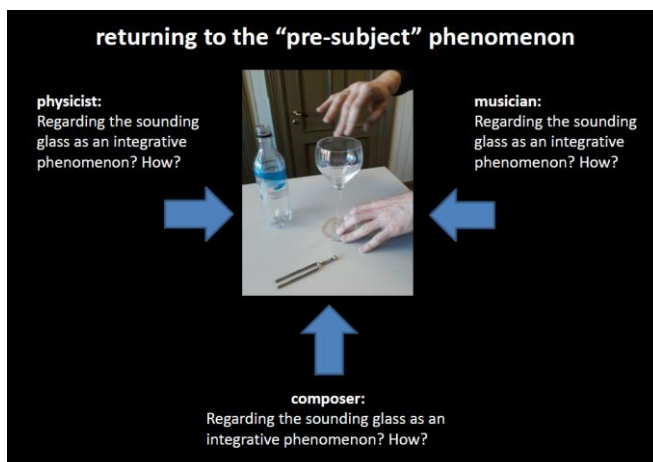


## Step V: Reflecting on/researching the concert in terms of joint learning

This part involves methods for documenting and analysing, creating mutual arenas for analysing the learning process (mutual learning = mutual analysis and reflection), as well as communicating the results.



(i) As a phenomenologist, I start by exploring the sounding phenomenon and then going into three different activities. The question is now: How to ensure that the "end products" of the activities of the physics teacher, the musicians and the composer are re-integrated, that is, brought back to the phenomenon? The idea is that we now "return to the things themselves" (Husserl), in this case to the sounding glass in its predisciplinary appearance:



(ii) Resonances in groups and plenary after the concert, the third part of this workshop, gave the participants the possibility to share the experiences with listening to the music and discuss potential STEAM opportunities. Two out of several of the discussion questions for the reflection were:

- How to challenge the subject-specific way of listening; as a science/physics teacher, as a music teacher?
- What can the science/physics teacher and the art/music teacher learn from each other by choosing, experiencing and reflecting on common themes/phenomena?

One of the groups noted as follows:

*Through the concert - what resonated with you?* What resonated with me was the space - the overall - the soul space, but also space around me. And as the concert moved along, there were moments when this resonance touched to the point of answer in me – a tear, a smile.

*With what ear did you listen – physicists, composers etc.?* The air (ear) I listened with was the air (ear) of my soul – mainly – throughout. And at times the ear was in and out listening more to particulars; movements of tones among tones, movements of hands among tones, movements of voice – of words, of myself.

*Sharing of experiences?* Edwin: I compose, but leave it is all up to the audience what they hear.

Pers 1 ... without me it would not be... Pers 2 ... it did not resonate, I was disappointed – could enjoy the handcraft of it. Pers 3 I was surprised by the room, the sound in a wooden room. Pers 4 ... it was like a choral, atmospheric soundscape.

The “bridge question” connecting science and art - sharing of thoughts in plenary - here some examples:

- ... my ears were full of (visioning?) = (it's like to) listen with your bones = (it's like) expanding the sensing

- ... moving – how the sounds came together – resonances = (it's like) water
- ... will you destroy the music (by talking about it) – how do we overcome this...
- ... different resonances in different parts of me – volumes of myself...
- ... outcome oriented vs. being in an aesthetic experience / alignment attunement – how do you take those principles from aesthetic experience (and make them fruitful for science)
- ... (the very) high tones (from the glasses) – low tones (from the voices) – embodied experience of them
- ... after the concert, the hands-on experience when the audience came up to the stage and tried. I was thinking so what for education? How could we use a similar mode there?
- ... my writing reflects my soul state.
- ... was surprised to sit down – (felt) free – (could if I wanted) fall asleep = (it is a) freedom contract. Listening – individual experience – left free – in its (the concert's) constrained set up.
- ... the ear of an educator; how I could use this with my students – engaging – could raise many questions!
- ... the room = (how to) describe the space for someone with visual impairment.
- ... could give prisms out (to see what was happening in the glasses) = (it would give you an) ecology of knowing.
- ... (what struck me) was how highest form of simplicity and complexity comes together in this piece.
- ... (where science and art came together for me was in the moment the singer) poured the water in the glass. It combines through surprise. (This moment was where it came together.)

- ... we seem to over-evaluate the digital nature – we still can and want to put hands onto the glass.

As a reflection on these reflections, and on the workshop as a whole, I suggest to work both concrete and conceptual when developing the ideas of STEAM education further: To specify the relation between STEM, STEAM and SENSE. STEAM should in some way or the other relate to concrete projects and practical attempts to integrate art and science in education (not art into science education). In addition, there is a need for (new or additional) conceptualizing rather than merely attempting to give STEAM content, letter by letter. During the ending session/reflection of the Bergen workshop, I realized how much more applicable it is to talk about A as attentiveness compared to A as art. It is easier to communicate – and avoid the question of what we mean by art, a discussion that is in danger of derailing the development of sound STEAM practices. The skill of attentiveness is common in the fields of science (think of the accurate observations of scientists like Galilei and Darwin!), pedagogy (listening to each individual pupil with his/her genuine learning requirement) and art and music (training observation skills in the visual arts, listening abilities as a musician).

As the title of this summary of the Bergen STEAM workshop indicates, I use *attentiveness in action* to characterize a common thread throughout the process: letting the phenomenon of sound from a crystal glass unfold, composing the piece “Sounds for Mortal Ear”, performing and listening to the piece at the concert and, finally, discussing potential STEAM opportunities. In all these stages the ability to listen attentively takes on another form, but it is still attentive listening. When relating STEAM to SENSE. STEAM, attentiveness in action indicates a way of understanding the world which is grounded in refined sense experiences.