Applying Soundscape Concepts as a Framework for Engineering and Music Education

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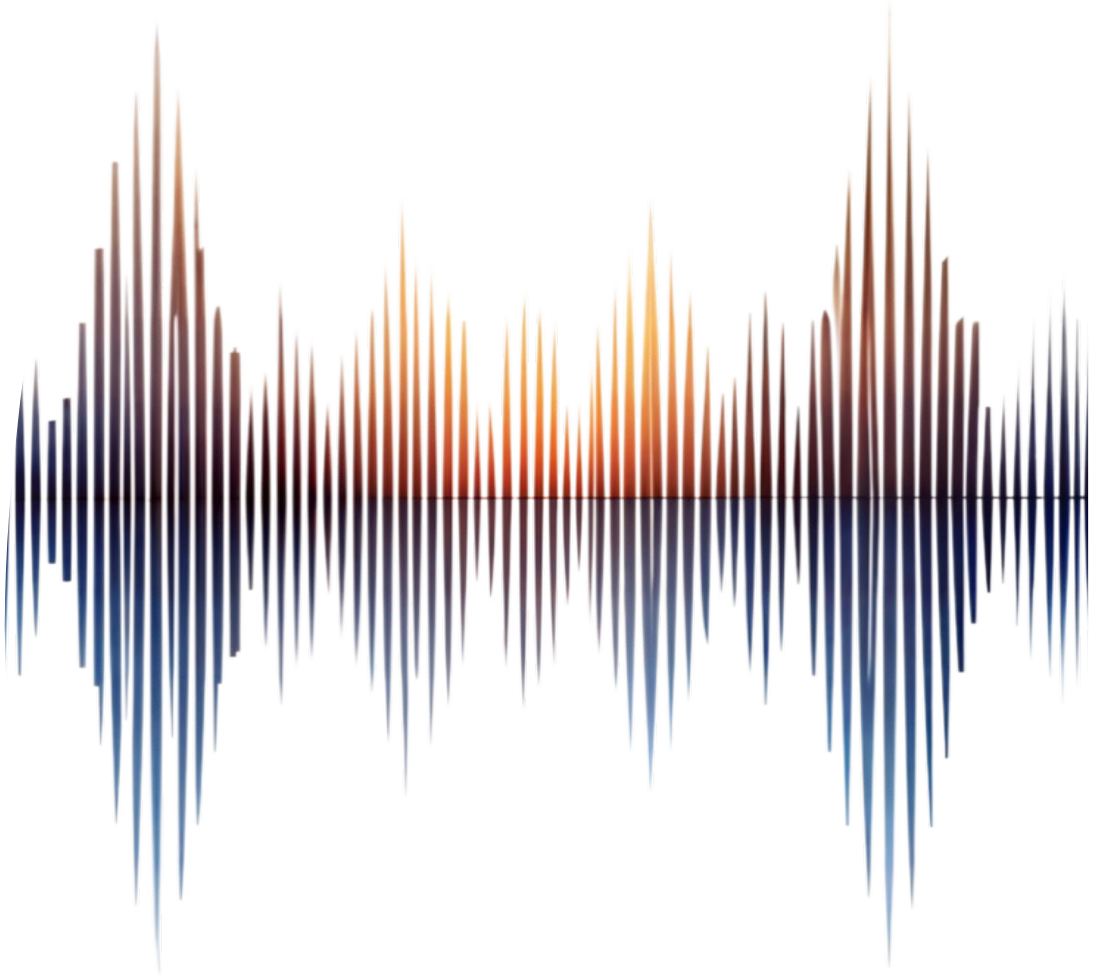
Soundscape

- Environmental sounds
- Noise pollution
- Active listening
- Interdisciplinary field.



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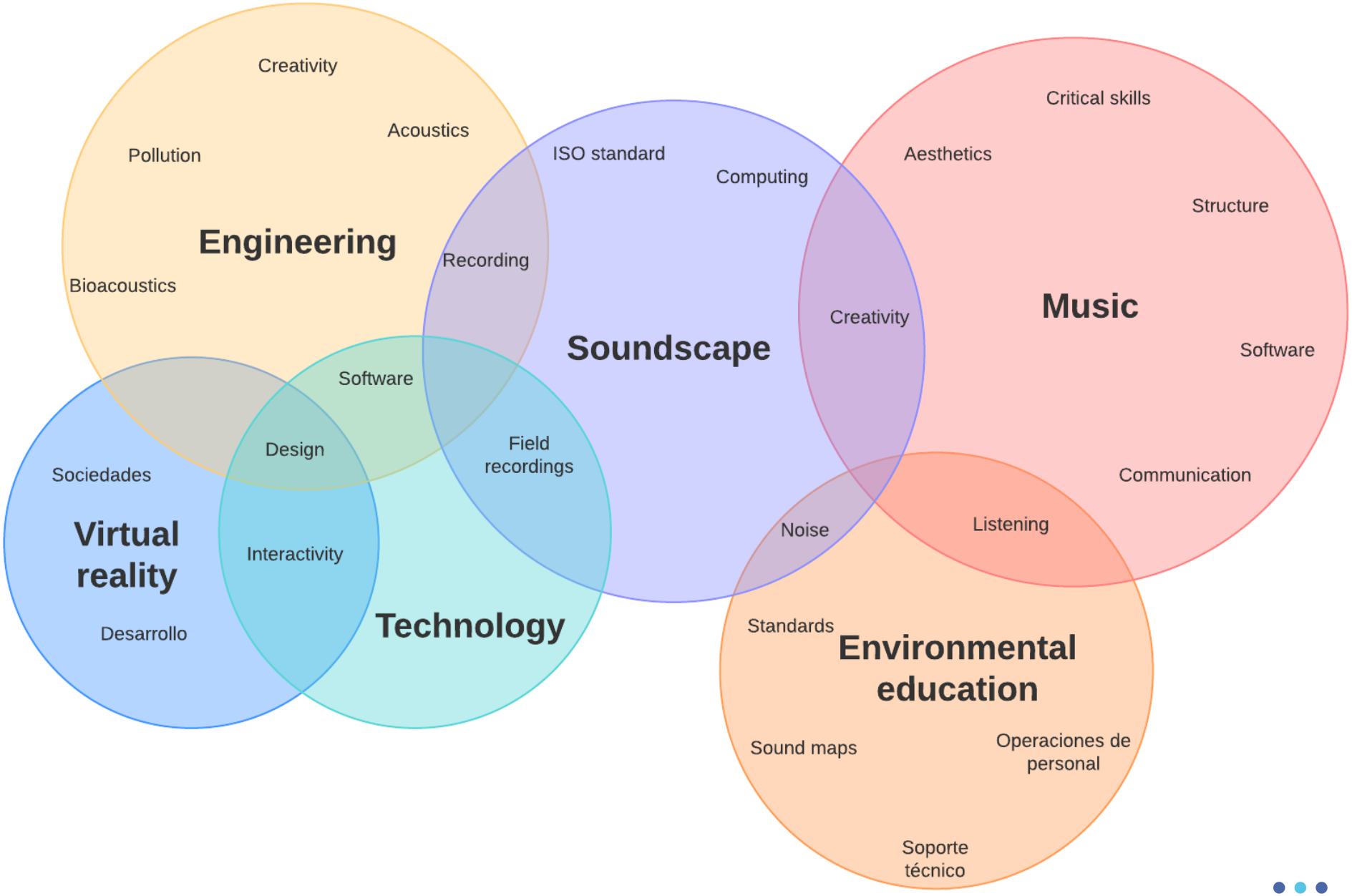
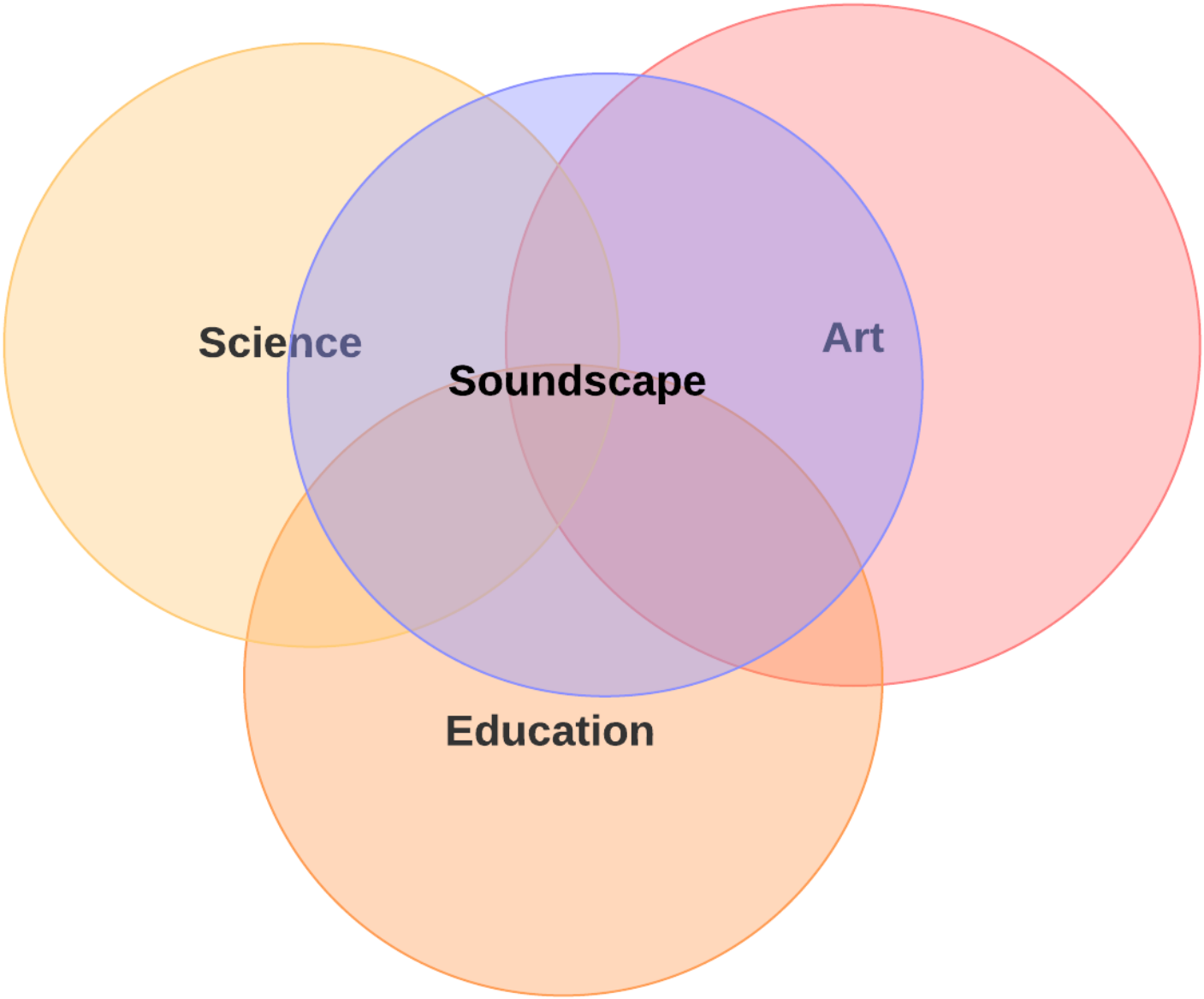
Soundscape: The **acoustic environment** as perceived, understood, and interpreted by a person or people in a particular **context**. (ISO 12913, part 1)


Creativity
Acoustics
Pollution
Engineering
Bioacoustics
ISO standard
Computing
Recording
Soundscape
Critical skills
Aesthetics
Structure
Music
Creativity
Software
Communication
Software
Design
Field recordings
Sociedades
Virtual reality
Interactivity
Desarrollo
Technology
Noise
Listening
Standards
Environmental education
Sound maps
Operaciones de personal
Soporte técnico


Science
Art
Soundscape
Education

Course design

- Runs in the first semester for new Music and Acoustics Engineering students.
- Scope: foundational module with a comprehensive overview of various aspects of sound.

Research questions

1. To what extent do students grasp **disciplinary and interdisciplinary** topics by the course end?
2. Do engineering and music students **assimilate** these topics **differently**?
3. What **features** of the course were **most valued** by students at the end of the semester?

Course design

- **Three main units cover:**
  - **Fundamentals of sound and hearing** (theory)
  - **Soundscape studies** (context)
  - **Audio project** (practical application).

- Teaching methods include lectures, seminars, a recording workshop, and listening sessions.

- Assessment: Written examination (30%), presentation (30%), and final audio project (40%).

Pre-post course surveys

- Pre- and post-course surveys on perceived understanding of specific topics (before and after the course).
- *The statement posed in the survey was: "I have a clear understanding of [SPECIFIC TOPIC]"*

TYPE	TOPICS	Pre-score		Post-score		Subject-specific difference	Aggregate Difference
Theory	Theory of sound	24,36	29%	58,90	95%	67%	53%
	Sound perception	36,12	43%	55,80	90%	47%	
	Musical acoustics	36,12	43%	53,94	87%	44%	
	Sound recording	35,28	42%	58,28	94%	52%	
Context	Soundscape ecology	12,60	15%	55,80	90%	75%	56%
	Sustainability	19,32	23%	45,88	74%	52%	
	Interdisciplinarity	29,40	35%	47,12	76%	41%	
Practical	Audio analysis	47,04	56%	52,70	85%	29%	36%
	Audio editing	32,76	39%	42,78	69%	31%	
	Audio mixing	21,84	26%	47,12	76%	49%	
	AVERAGE	29,48	35%	51,83	84%	49%	

Table 1. Post-pre survey results showing the “strongly agree” and “agree” averaged responses for the 83 survey participants at the start and the end of the course. QUESTION: **“I have a clear understanding of SPECIFIC TOPIC “**

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Theory	Theory of sound	1%	1%	0%	16%
	Sound perception	27%	10%	17%	
	Musical acoustics	17%	2%	15%	
	Sound recording	34%	4%	30%	
Context	Soundscape ecology	-11%	3%	-14%	5%
	Sustainability	6%	-17%	24%	
	Interdisciplinarity	11%	7%	4%	
Practical	Audio analysis	24%	-23%	47%	47%
	Audio editing	44%	-2%	46%	
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Table 2. Differences between engineering and music students before and after the course.

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Table 2. Differences between engineering and music students before and after the course.

Comparative Analysis: Engineering vs. Music Students

- Initially, engineering students demonstrated **stronger technical skills**.
- By the of the course end, music students reached **comparable technical understanding**.
- Interdisciplinary topics, particularly **sustainability**, presented challenges for all students.

Some conclusions

- Contrary to initial assumptions, music students showed an interest in **technical topics**, while engineering students were drawn to the **artistic aspects** of the course.
- The **perceived knowledge gap** between music and engineering students was considerably reduced by the end of the course.
- Contextual interdisciplinary topics, such as **sustainability**, were more **challenging** for all students to grasp.

Challenges and future work

- Interdisciplinary teaching presents **challenges** but also valuable **opportunities** for **enhanced learning**.
- **Greater contextualization** and the early use of **discipline-specific** examples can improve the effectiveness of this approach (Repko).
- Integrating engineering and music students in **shared learning spaces** can foster better **interactions** and support **interdisciplinary learning**.

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Applying Fundamental Soundscape Concepts as a Framework for Introductory Acoustical Engineering and Music Courses*

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In this paper, we propose teaching strategies grounded on an interdisciplinary teaching framework based on the holistic concept of soundscape ecology. The study explores the self-perceived level of understanding engineering and music students exposed to the same foundational course communicated and expressed before and after the course. Results showed that the teaching framework chosen provides a good umbrella for teaching technical, contextual and practical topics. Students seem to grasp better courses related to theory and context than practical activities involving detailed analysis and the use of audio software. Multifaceted topics such as sustainability and interdisciplinary were also difficult to grasp for most students. Compared results for music and engineering showed that, while engineering students showed a substantially more robust background in practical activities related to audio, music students were able to easily reach similar levels of knowledge of these topics by the end of the course. As a way of reducing this gap further, future versions of the proposed course should consider ways of blending engineering and music students in the same classroom environment to foster a greater level of collaboration and interaction among students.

Keywords: soundscape; engineering education; interdisciplinarity; music; creativity; innovation

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