Multimodal Technologies and Interaction

MDPI

Article

A Qualitative Study on Digital Aesthetics and Sound Interaction

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Abstract: Many disciplines—from science to art and education—engage with the postdigital concept, where human activities transform into digital activities. The post-COVID-19 era has involved new consequences for societies, where education has increasingly utilized online platforms. Having said that, online pedagogy, with the directions and discourses of the senses, particularly visual and aural, remains under-explored. Studies have addressed the educational implications of the aural sense, but this study explores the nexus between digital aesthetics and sound pedagogy and delves deeper into students' primarily descriptive learning outcomes. A multi-disciplinary class covered aesthetic terminologies, followed by a series of digital arts that envisioned digital, aesthetic, and listening practices. Considering the global agenda's recent "new norms", this study contributes to the postdigital era of sound and acoustic-related sciences.

Keywords: aesthetics; creativity; environment

1. Introduction

Postdigitalism brings to mind an era where human activities include digital features, i.e., social platforms, such as Twitter, Facebook, YouTube, or Vimeo [1]. These activities merge old and new adapting experimentations based on cultural preferences by reinvestigating and reapplying particular notions [2]. While not an archaic concept, individuals and organizations integrate postdigital attributes into their daily lives, including education platforms [3].

Postdigital education takes advantage of the new applications and procedures of various online platforms and technologies. Currently, the digital environment hammers out the common boundaries of teaching and pedagogy. Regardless of their postdigital aspects, educational outlets share common features, including effective communications, course materials, deliverables between instructors and students, and sensory pedagogy that engages all the senses for more effective teaching and learning experiences. With a physical gap in online teaching, the consequences of COVID-19 created challenging circumstances. Considering the transformations of individuals' expressions, communications, and aesthetic preferences and judgments in their daily life, this type of transactive mechanism also affects pedagogy demands, i.e., lockdowns increased the use of enclosed areas and artistic education regarding music and drawing, and particularly interactions with the visual and auditory senses.

The auditory sense plays an essential role in both online and face-to-face education, even though changing technologies affect the auditory patterns of daily life habits. While these changes have become more noticeable in the post-COVID-19 era, postdigital education gives prominence to digital and non-digital technologies [4]. The sensory aspects of the current educational theory serve as a wake-up call as hearing and sound practices have remained under-explored in digital–soundscape relationships.

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Citation: Yildirim, Y.; Arefi, M. A Qualitative Study on Digital Aesthetics and Sound Interaction. *Multimodal Technol. Interact.* **2024**, *8*, 97. https://doi.org/10.3390/mti8110097

Academic Editor: Cristina Portales

Received: 1 August 2024
Revised: 20 October 2024
Accepted: 4 November 2024
Published: 6 November 2024

This study sets out to understand the sound aspects of postdigital education by focusing on course materials and teaching practices, and it addresses the following questions: how do students integrate the seeing and hearing aspects of pedagogy into online platforms? What are the students' outlooks of everyday sounds regarding aesthetics? Combining conceptual and descriptive research methods answered the research questions by examining the class structure and students' deliverables. During the first half of the semester, the students created a series of digital art products by envisioning "digital", "aesthetic", and "listening" practices and addressing education theory in their projects. They concentrated on "environment" and "soundscapes" in the second half of the semester. Since online education in aesthetic and educational theory is gaining more attention [5], this study addresses the global agenda's recent "new norm" standards and contributes to the sensory pedagogy.

2. Related Studies

2.1. Digital Pedagogy and Aural Sense

Postdigital learning is attracting more attention by connecting to education dating back a decade, since its advent with computer sciences in the early 2000s. This interdisciplinary interaction has created conduits at the confluence of humanities, health, public service, social sciences, arts, architecture, computer science, and education [6–10]. Relatedly, they acknowledge processes that occur [11] distinct from refusing digital transformation as an abrupt shift in daily life habits in the early 2000s [12]. Such a transformation altered everyday activities, including teaching and learning. Some studies have applied theory to education and have explored the linkage between social and technological change [13], the online course and learning environment [14,15], instrumental conception as neutrality [16,17], activity theory [18], etc. Aiming to understand the design of products involving three key stakeholders (people, processes, and products), Matthews [19] assessed digital technology and higher education regarding the actor–network theory (ANT). From the practice aspect, Pyyhtinen and Suoranta [20] recorded a pedagogical class diary to observe student participation, class activity, production, and critical thinking in the digital learning experience and surprisingly found that a digital classroom is not an utterly easy task to manage. On the other hand, since the digital environment does not capture the physical and social aspects of learning activity [21], such platforms should also engage the ears, as students utilize their aural sense in addition to vision [22]. This section overall assisted in organizing the postdigital pedagogical approach for the study.

2.2. Aural Sense, Education, and Postdigitalism

A body of literature has examined the pedagogy of sound by surveying students and instructors. By performing soundwalking methods, some studies seek to raise awareness of sound and listening skills, and to link acoustic communications with sound pedagogy [23]. Some other studies have utilized experiment-based or in situ measurement approaches. Hernández et al. [24] performed an experiment with 72 secondary school students on building and structure-related materials and found that the sound experience of building materials relied on acoustic characteristics. Similarly, Varvarigou [25] conducted an experiment with forty-five undergraduate students on a collaborative musical activity for five weeks. This research improved the students' listening and concentration skills and their ability to use other senses in teamwork.

Other studies have explored the digital attributes of acoustic education. Duran et al. [26] examined acoustics in higher education facilities by conducting an in-situ analysis in three lecture rooms in the UK. Uchimura et al. [27] examined the students' and instructors' relationships with acoustic education and created sound-related simulations on digital pedagogy elements, i.e., presentations, simulations, and documentaries. Droumeva [28] conducted an ethnographic study on the sound experience of everyday life. The study collected various art-related creations and revealed the aesthetic products of the eye and ear experience in a metaphorical curation. While Lefebvre [6] and Schafer [6] introduced

the architectural and preservation features of a soundscape, they also carried out some postdigital transition experiments of soundscapes. Accordingly, Cascone [6] posited the idea that the effects of postdigital technology have expired to a level that cannot agitate daily lives. While noise is considered a source of energy and an advanced level of sound for some, it also refers to a chaotic context that somehow raises an unorthodox challenge. Nonetheless, sound and noise interact as part of the social context synthesized with distinct political, social, and ecological layers [29]. These studies shed light on multi-task aural course ideas with detailed practices, i.e., silence, soundscape, noise, etc.

2.3. Postdigital Soundscapes and Contemporary Attributes

Postdigital science and education have already touched upon the soundscape context from various essential views. Sterne [30] and Jandric [31] developed the core meanings of the term. While Sterne [30] implied a more complex meaning, Jandric [31] envisaged a smoother or more straightforward functionality associated with the term in this day and age. To better grasp the intermediation of all aspects in postdigital soundscapes, in both virtual and actual environments, Gershon [32] explored the sonic environment and educational projects by enacting multiple norms. Lewis and Moffett [33] focused on four stages and a sonic environment with various pedagogical approaches for relevant formats, including Zoom classes as well as screen-shared education. Johnson et al. [34] assessed the effects and between-ness of online and in-class sonic environments by using sonic spectrums of socio-technical settings.

The linkage between (aesthetics) pedagogy and sound requires certain attributes, including education, aesthetics, and sound, where education refers to "pointing" as adopted [35]. This definition addresses two approaches by pointing students in a certain direction. Our study expanded these directions by adding a point from students to the instructor and some other sound directions that the instructors were unaware of [35]. Similarly, experiencing aesthetic feelings related to unpredicted circumstances was also added, i.e., comments, arguments, textures, or something heard that changes the perception directions [35]. Instructors should organize such "unpredicted phenomena" with the class structure and materials. The instructor defined the course structure in the syllabus and some other course materials, including core soundscape-related readings (Schafer, Westerkamp, Southworth, etc.), aesthetic pieces, postdigital readings (Jandric, Bull, Ford, etc.), and listening and multi-sensory practices, while the students applied the materials and revealed unexplored sound features.

Since the listening act includes a multi-sensory aspect, Ceraso [36] emphasized such multi-sensory actions by performing a series of listening activities as well as creating listening compositions, including sonic and visual practices that improved students' multi-functional listening skills. At this point, the author distinguished how the sound operates by only listening with ears and using the other senses to complement the individual listening experience. Another study adopted a multi-sensory in situ approach by collecting sound samples and creating art products [37]. The author highlighted several perspectives on multi-sensory involvement, including aural and visual complementarities, where the students engaged with different sounds. Beyond theory and praxis and maintaining transactive relationships, sound pedagogy also pertains to the aesthetics in art-related activities [38,39].

Even though aesthetics typically connects theory to philosophy, the aesthetics and education linkage covers art-oriented teaching and learning experiences, and educational philosophy may remain an alternative direction from such a creative experience [40]. While this study contributes to educational theory and philosophy, particularly in sensory education, another primary concern involves aesthetic contexts within the daily life experience of students based on COVID-19 online education [41]. This section established the listening and creative ideas regarding aesthetics and multi-sensory approaches. So, this study contributes to such an association at the juncture of education and theory. Thus, the aesthetic

concept in postdigital education seeks to assess how undergraduate students perceive sounds and describe their art-related drawings.

3. Materials and Methods

Using a qualitative method in a landscape architecture program in Turkey, this study contributes to sound pedagogy in a pre-scheduled environment-aesthetic course. As Figure 1 shows, the course operated in four phases: general information, an introduction to aesthetics, the pedagogical aspects of the aesthetic and place relationship, and sound. These phases involved key milestones, including an art gallery, a midterm, observations, and listening practices, and the final products generally consisted of art products, i.e., digital and hand drawings, photos, listening practices, depictions of sounds with digital and hand drawings, etc. Affected by COVID-19, the innovative part of the course comprised digital platforms, and the students used remote learning with materials, observations, and practices of sound and aesthetics. This approach played a particularly innovative role in retrospect, as the sound pedagogy in online education has remained under-explored, if not explored at all.

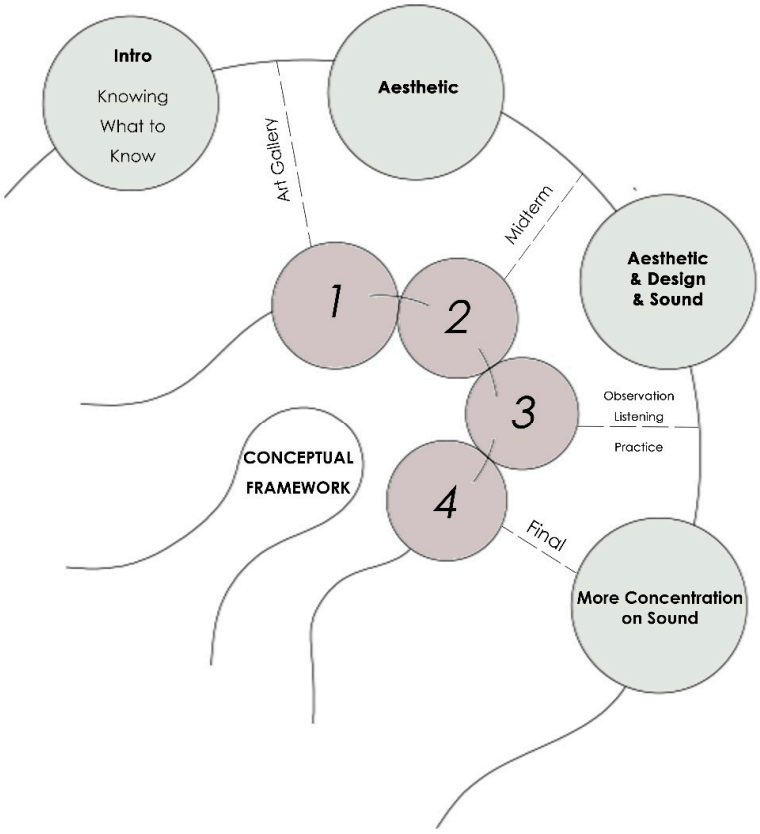

Figure 1. Conceptual framework of the course structure (reproduced with author's permission).

A total of 10 students (8 females and 2 males, aged 19 to 22, with a mean value of 19.9 and an SD of 1.1) enrolled in this online course and used Zoom and Microsoft Teams for class meetings and Google Classroom for course materials and assignment sharing. Various digital tools, including Google Slide Show, Flipsnack, etc., also displayed student deliverables.

3.1. Phase 1: Knowing What to Know

This phase introduced the course objectives and structure, expectations, assignments, critical timelines, and deliverables. The students shared their expectations and potential challenges (if they experienced any) both visually and audibly. After briefly explaining

the course framework, the students were asked to think critically, triangulating aesthetics, design, and the senses. As a course requirement, the students used various readings on related contexts and wrote reflection essays or drew digital graphics on those readings. The instructors emphasized critical thinking and an empathy-oriented experience [20,42].

3.2. Phase 2: Aesthetic and Related Terminologies

Following the "knowing what to know" session, the first two weeks revolved around the general scopes, terms, and relevant concepts on aesthetics. These terms established a linkage between educational theory, the aesthetic context and memory, phenomenology, nature, and ecology. The emphasis placed on these terminologies conveyed aesthetics aurally along with their educational connections. Memory reveals the spatial experience of place, from both the past and the present. Highly associated with experience-based production, phenomenology seemed appropriate. Compared to physics and other tangible scientific experiments, phenomenology captures the essence of existence based on personal experience. The aesthetic context was then incorporated into nature. Individuals try to understand and interpret nature differently, i.e., through philosophy, positivism, religion, and/or perception. The students created digital art products on these assignments (Figure 2), and considered themselves part of nature within the broader aesthetics terms. These terms came up during the course, as sound somehow implies memory and perception-based experience in nature, irrespective of its type or pressure levels. These concepts particularly aimed to explore the fundamentals.

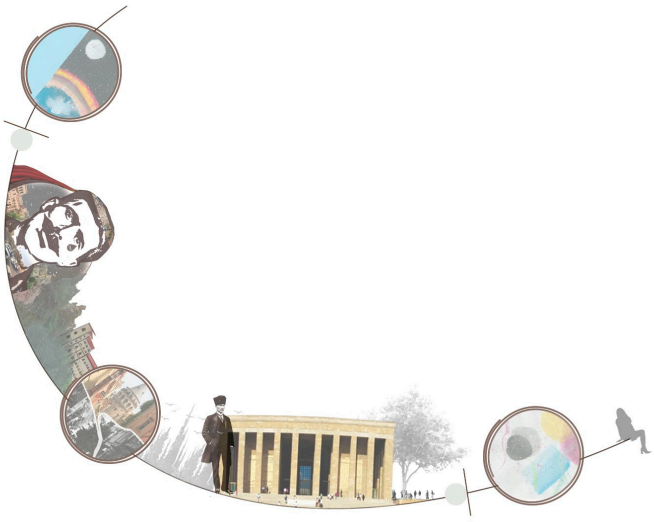

Figure 2. The art products of aesthetic-related assignments (reproduced with author's permission).

Beyond the related terminologies, this phase also evaluated the linkage between aesthetics and perception and made an aural connection to pedagogy. To achieve this, the students critically read, created artistic products, and digitally showed the aesthetic and aural sensory concepts. Their assignment highlighted a digital source that provided virtual walking and driving experiences. The students were assigned the same routes and were asked for their perceptions of sound in short essays and drawings (Figure 3).

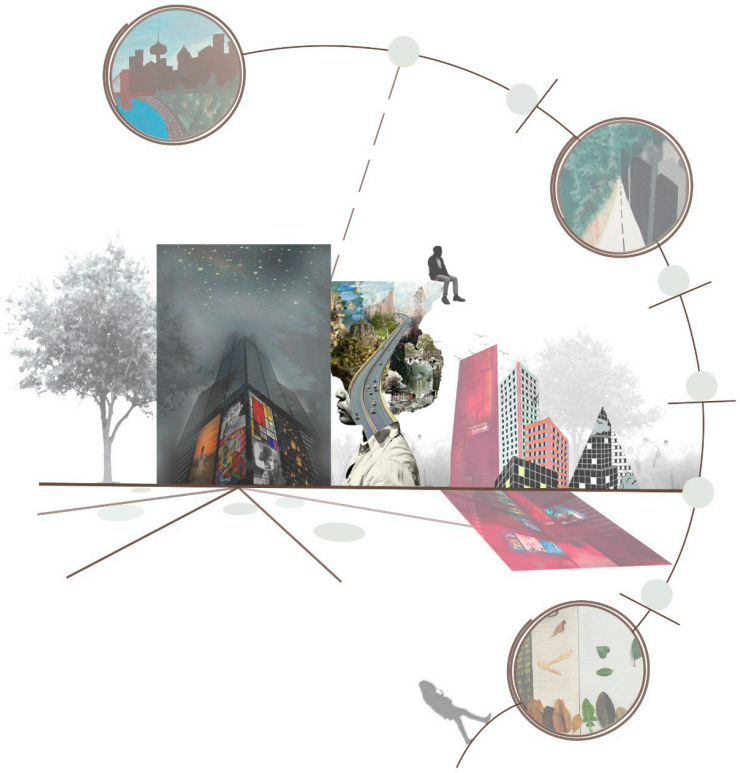

Figure 3. Digital products of listening, for both the walking and driving experience (reproduced with author's permission).

3.3. Phase 3: Aesthetic, Design, and Sound

The next phase of this course focused on aesthetics in architecture, design, and sound attributes. A series of critical discussions, essays, and sound practices covered key contexts, including the educational ramifications of place/placelessness. Then, the urban environment and aesthetics were explored deeper into specific subcategories of how cities produce sounds and different cultures over time, and how the human body in the place and transportation attributes may affect them. Furthermore, some vital pioneering pieces from Henry Lefebvre, Lewis Mumford, Tim Edensor, etc., were discussed to further understand sound [43]. Following provocative class discussions, each student made six sound recordings and sound pressure level measurements using the NIOSH SLM application, including on weekdays and weekends and at different time intervals during the day. Furthermore, the students created digital art products regarding their sound data.

3.4. Phase 4: More Concentration on Sound

The final phase of this course addressed sound, particularly the soundscape contexts of the online class sessions. Various scenarios were used to discuss general information on the soundscape literature, and different techniques, including soundwalking, sound pressure level measurements, survey-based perception factors, etc., came up in various scenarios and were discussed. Beyond these discussions, the students produced creative pedagogical content. Similar to the previous assignment, sound data collection, and processing, the students concentrated on the soundscape-related aspects of the class discussions, and then prepared short essays about their takeaways on the collected and measured sounds. After conducting a contextual analysis of those essays, one student highlighted the core aim of the soundscapes: "While noise sources should be masked or eliminated in urban life, there are many positive sounds simultaneously, and we should keep or protect them". Another standard message of the essay highlighted the importance of Schafer's background and foreground sound practices in sound education. All the students acknowledged that these practices improved their awareness of existing sounds in the environment. Another reading

piece focused on objective and subjective evaluations of sounds. Students also mentioned some critical takeaways from the reading. While they understood the consistency in both objective and subjective reactions to sounds, some students shared opinions regarding the context and pointed out the following: "...While objective and subjective meaning is the key for an urban environment, subjective interpretations of sound preferences should be prioritized for tackling urban problems as individuals experience such problems in their daily life".

The students created artistic outcomes based on their sound data and short essays. As Figure 4 shows, their digital media also reflected what they mentioned in their essays for the disagreements of sounds in the urban environment. However, almost all of them highlighted their optimism about positive sounds of urban life. Table 1 summarizes all the key aspects of the findings.

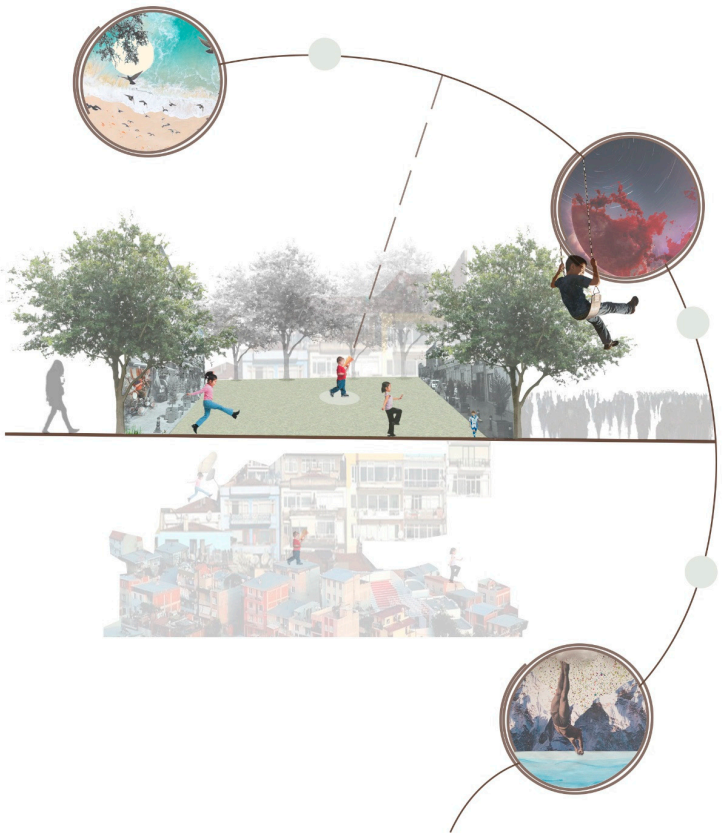

Figure 4. Digital art products of soundscape practices (reproduced with author's permission).

Table 1. Summary of key findings.

Context	Key Arguments/Findings
Knowing what to know	Students' visual and audible experience in daily life. The instructor highlighted critical thinking experiences.
Aesthetics	Memory, phenomenology, nature, and ecology captured the students' attention. Digital art products covered memory and place attachments. Virtual walking and listening activities enhanced aural perceptions.
Design and sound	Students reported how cities suffer from placelessness. Students performed sound pressure level measurements and sound recordings, and digital provocative products followed them.
Sound implications	Sound practices improved the students' awareness. Online education and digital tools are useful for such efforts.

4. Results and Discussion

The study results demonstrate that sensory pedagogy is feasible in terms of multimodal technological aspects, albeit with different motivations, i.e., a worldwide pandemic. With this in mind, the postdigital notion acts as the key instrument conveying sensory pedagogy through digital and non-digital features. The results also pinpoint the challenging theoretical and philosophical terms as well as potential coping mechanisms. For example, aesthetics showcase how sensory-based disciplines and daily life practices, as well as digital assignments on students' experiences along with fun-fact materials, overcome such difficulties. Accordingly, this study obtained various essential nexuses between pedagogy, sense, and aesthetics, with advanced feedback from the students and their assignments.

4.1. Online Education and Sensory Pedagogy

Sensory pedagogy already constitutes complex practices, including eye movements, voice tones, the surrounding body, and non-body movements. While sensory pedagogy faces formidable challenges, changing the class environment, although not new, abruptly and swiftly resulted in both online and sensory pedagogies with the shocking magnitudes of the COVID-19 pandemic. The pedagogical senses react differently through distance education, where the aural sense is even more challenged due to changing the silence, motion, acoustics, and listening sensory dimensions of the classroom environment [43]. Considering the key aspects of postdigitalism, the class structure took advantage of both materials and assignments. While some class assignments were geared towards the preparation aspects of teaching, including reading and listening practices, others concentrated on the action aspects, such as digital art creation. Yet other assignments fulfilled postdigitalism from various perspectives, including critical reading, listening to and watching related media, writing essays, creating digital artistic products, taking photos, measuring and recording sound samples, and sharing these materials via online platforms. Thus, even though embracing postdigital education initially seemed challenging, the class framework helped to pursue the pedagogical aspects of these goals.

4.2. Aesthetic Theory and Sound Pedagogy

The term aesthetics is evolving with changing trends, and the class environment reacts to such changes. Such changes continue within online education, and the sensory perspective of distance learning makes students and instructors more conscious of and attentive to changing the sound environment. Adjustments in the initial settings of online teaching affected the aesthetic contexts in different settings. Combining heavily theory-based aesthetic concepts and more hands-on sound pedagogy seemed challenging at the outset. Addressing this concern enhanced concepts with well-known practice- and application-based course materials for new ideas. After all, theories and hypotheses are typically conveyed in these manners. At this point, digital platforms and applications extensively utilized the course settings [44]. The instructors revisited the sound pedagogy with theory- and practice-based assignments to evoke the auditory senses, eventually emanating the aesthetic dimensions of education philosophy in the online teaching era instead of limited classroom settings.

4.3. Student and Instructor Reflections

The students did not consider online education to be as challenging as they thought it would be at first. However, based on their statements, grasping the course structure proved challenging, particularly in dealing with the theoretical aspects of aesthetics. They then highlighted the sound education phase, which turned out to be more technical and applicable, and enjoyed many postdigital soundwalking and digital art creation activities during the stay-at-home and curfew mandates over the COVID-19 period. Since many other pedagogical pieces of literature were embraced [45], the class heavily relied upon student efforts, i.e., readings, critical discussions, digital art products, sound recordings, measurements, the submission of assignments and presentations, etc. As such, the class

structure continued both synchronously and asynchronously. The students were the main actors and the vital aspect of the course while the instructor curated the facilitated settings. The course instructor pre-organized all the materials mentioned above to activate various outputs, including novel postdigital sound education.

5. Conclusions

The class established a learning environment for applying postdigitalism associated with sound and its various creative activities. To achieve this, this study mainly focused on the auditory sense, but with a broader scope on aesthetics. The reason for untangling this association had to do with the nature of aesthetics, which already engages sensory learning. While aesthetics provides a somewhat subjective understanding, the nexus between aesthetics and sound pedagogy engages art and the daily life experience, as this study previously underlined. Even though not new, establishing a holistic understanding of sound education in an emergency, through online education, demonstrated both the applicability and the necessity of such efforts in education theory. Thus, this study demonstrates that postdigital environments also stimulate the aural senses, while in-class education facilities and infrastructure (or non-infrastructure) may hinder such practical aesthetic theory, art products, and sound practices. As we move forward (or not) through the pandemic, sensory pedagogy will adjust based on trends rather than solely on the physical class environments, and beyond these understandings, sound pedagogy will endure in various disciplinary discourses.

Considering the implications of the class structure on student projects, the students initiated several interesting approaches to postdigitalism. One student concentrated on her childhood memories along with all urban settings to include multi-sensory points of view. The project demonstrated a polarized world of urbanized and non-urbanized designation. The student mentioned the memory of her neighborhood with flying birds, the sea, and wave sounds as well as her favorite playground-related ambiance, while the other side of the medal mentioned high-rise and dense apartments with a loss of all-natural sounds. However, she emphasized that she is also getting along with the current situation, as the changing world needs to make an adjustment to human and machine harmony.

This study faced some limitations. First, while the sound level measurements were conducted with the same application, the instructors disengaged in the calibration process due to remote learning. The class also relied heavily on students' reflections, perceptions, and personal products. In other words, the output and interpretation of the class materials might be biased, as they hinged on student materials. As other studies have also highlighted [45], the class structure faced uncertain sound practices with online education, as verified and confirmed by the challenging class delivery methods. Future studies may concentrate on a more diverse student body, possibly from multiple disciplines, which could help to understand their dispositions on sensory pedagogy. Furthermore, comparing artificial-intelligence-related instruments with physical and online lectures on digital products may address the deficits and inadequacies of current educational trends. Nonetheless, this study aimed to contribute to sound pedagogy within the scope of online education. Thus, teaching sensory pedagogy, particularly through audition, may pass the borders of a "physical wall" and "socio-demographic limitation" with novel know-how.

Author Contributions: Conceptualization, Y.Y.; methodology, Y.Y. and M.A.; software, Y.Y.; validation, Y.Y. and M.A.; formal analysis, Y.Y. and M.A.; investigation, Y.Y. and M.A.; resources, Y.Y.; data curation, Y.Y.; writing—original draft preparation, Y.Y.; writing—review and editing, Y.Y. and M.A.; visualization, Y.Y.; supervision, Y.Y. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable. IRB protocol submission is not required. Using non-identifiable existing or secondary information or identifying information that is not private and is publicly available does not meet the federal regulatory criteria for oversight.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data available on request from the authors.

Acknowledgments: Thanks are extended to the undergraduate students for their projects and art.

Conflicts of Interest: Author Mahyar Arefi was employed by the company Huahui Engineering Group. The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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