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3aED3. Enriching the aural experience in audio education

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Audio education's essential outcome is aural. Lectures and readings on aesthetics, techniques, and technologies can never communicate audio concepts effectively without critical elucidation through sound. Quality audio education has always made frequent use of laboratories, recording sessions, and critical listening classrooms to keep sound at the center of student learning. Recently authored and published web-based multimedia and digital audio workstation self-study experiences are discussed and demonstrated. The sonic illustrations, visual reinforcement, and associated interactivity are found to provide meaningful pedagogical advancements in audio education.

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INTRODUCTION

Teaching audio engineering, in part, through use of actual, prepared, reproduced audio is intuitive. Integrating the audio experiences into any course of study is not without drawbacks. As the delivery of education is rethought in a world interconnected with bandwidth capable of high quality audio and video delivery, opportunities for improving audio education must be explored.

AUDIO IN EDUCATION

Audio experiences historically have been offered to students as part of a lecture, lab, or studio experience.

Audio Within the Lecture

Prepared audio examples can be played during the course of any lecture. The educational value of that audio illustration is modulated by the quality of the playback equipment and classroom acoustics. Audio/visual systems in classrooms are often designed for monophonic spoken word, not stereo presentation of music. The bandwidth, dynamic range, and stereophonic image of musical examples are therefore compromised.

Variability is introduced into the listening experience based on where the student is sitting. Classrooms typically spread-out left to right and front to back to cover most of the occupiable space. The effectiveness of the audio example in supporting the lecture content is therefore at least somewhat diminished. Different students have different experiences based on where they sit, and the educator never really knows what the learner heard, much less what they conclude from what they heard.

There is the added frustration, for the educator, that it can be difficult to direct the focus of the students to the desired element of the audio example. Out of necessity, the educator should stop speaking while the audio example is playing, leaving only conductor-like gestures and graphical support to continue the lecture during the playback. Experienced professors prepare their audio examples carefully, keeping them as short as possible, creating accompanying graphics and listening notes, and playing audio comparisons in close succession, level-matched as needed, to narrow other listening variables and make the salient point audible and available to the student.

Audio Within the Lab

Independent and small group audio experiences can be provided through lab work, often allowing the student to place themselves in a playback sweet spot, in a room designed for stereo music playback. Labs allow the students themselves some direct control over what they hear. The relatively passive classroom experience is replaced with the active learning of the lab.

Carefully structured, tightly organized lab assignments give students the chance to interact with studio tools without all of the distractions and complexities of a full recording session. The variables are narrowed, so the students’ quality of experience is made more predictable. The students’ progress through the assignment is at their own pace, with chances to repeat experiences as desired. The learner may even occasionally be encouraged to explore other paths and make their own desired changes to the processors and procedures, with results reflected in the audio they create and control.

The principle drawback is that typically, the faculty member is not present during the lab, so it can be difficult to ensure the audio within the lab was exactly what was intended. In addition, in order to make the lab a largely student-guided set of activities, simplification and complexity reduction is necessarily designed in to the lab syllabus, and therefore many, more complex audio concepts simply cannot be explored or demonstrated.

Audio Within the Recording Session

Part of teaching sound recording should certainly include having the students participate in actual recording sessions. Student-run recording sessions are a clear opportunity for the student to connect what they know and are learning to what they are hearing. Interacting directly with all drivers of sound quality – musician, instrument, room
acoustics, studio equipment, and the many decisions made by the student as they develop their recording craft – is a powerful way to develop audio engineering skills.

A sonically successful recording session isn’t always obtainable, even by the best students, early in their course of study. So many challenges are faced – with the performers, instruments, room acoustics and studio equipment – and there is so much to be mastered, that it can be difficult to include in the session some valuable audio experiences.

EXPERIENTIAL LEARNING

The Kolb Experiential Learning Model [1] [2] defines a four stage learning cycle (see Figure 1), very briefly summarized here. Concrete Experience (CE) might present the learner with real world, real time events, involving them directly in the experience. Reflective Observation (RO) allows the learner time to witness and absorb more fully any past experiences. Abstract Conceptualization (AC) introspectively integrates past observations into self-made concepts and hypotheses. Active Experimentation (AE) allows for creative action, allowing for hands-on testing and experiments to advance learning.

FIGURE 1. Kolb model of experiential learning defines a repeating cycle through four ordered stages, begun at any point and progressed through clockwise. Learning is advanced as the student cycles through these different forms of experience. The cycle is repeated without limit [1] [2].

The four stages form a complete cycle with sequential order, but no hierarchy. Learners enter the cycle at any point based on their own learning style and the type of challenge presented. But no matter where they enter, learning is advanced by progress, repeated progress, through the cycle. “Each step provides a foundation for the succeeding one. Concrete experience (CE) forms the basis of observation and reflection (RO). These observations, in turn, are used to develop one’s ideas, including generalizations and theories (AC). From this development of ideas, new implications for action can be discerned (AE).” [3]

Concrete Experience and Abstract Conceptualization are opposite forms of the grasping dimension (see Figure 2). Learners obtain mastery here, externally through experience, or internally through thinking.

FIGURE 2. The Grasping dimension of experiential learning is bound by two extremes: experiencing versus thinking [1] [2].
Active Experimentation and Reflective Observation are opposite ends of the *processing* dimension (see Figure 3). Learners obtain mastery by both doing and watching.

**FIGURE 3.** The Processing dimension of experiential learning is bound by two opposites: doing versus watching [1] [2].

The Kolb model makes clear the effectiveness of providing a variety of strategically selected learning experiences to enable the student to obtain ever-higher mastery of the subject.

**SOUND AND LEARNING**

The study of sound recording, particularly music recording, requires mastery and integration of a variety of fields of study. The successful student will have advanced knowledge and capabilities of math, physics, electronics, computer science, music, business, and psychology. They need to know these diverse fields so well that they integrate them into advanced logic, problem solving, trouble shooting, team building, creative expression, and performance abilities. Advanced, integrated, mastery of such complexity comes through several loops through the experiential learning cycle.

Several trends have converged in the last decade to make it possible to deliver audio education experiences in a more effective, more efficient, media-rich way.

**Recording Studio as Consumer Product**

The digitization of audio and the ever-increasing processing power of home computers have shifted the recording studio away from the expensive, customized, proprietary, highly specialized, analog-centric facility. The most essential recording studio capabilities are now available in the environment of the digital audio workstation. The workstation hardware consists of readily available, stock, consumer computer hardware – desktops, laptops, tablets and phones. Sound recording, processing, and mixing software is a consumer product, available in many forms, from open source to proprietary, and entry level to high-end applications.

As a result, audio education no longer relies on a destination learning facility to teach multitrack production. The students can learn, in part, using their own recording studio.

**Broadband Networks**

Our interconnectedness is of such high bandwidth, and is so pervasive, that it can be assumed to be available often enough, and at sufficient resolution, to be an education distribution channel. The channel allows for two-way, multimedia communication, from one to many. The model for audio education has always gone beyond the traditional classroom, using instead the concept of a classroom within the multitrack recording studio.

Media-rich communication across the internet expands the model to include remote delivery of lectures, reading materials, audio examples, audio experiences, graphics, animations and videos.
Experiencing Audio

When the students are each in their own studio, courtesy of the broadband connection to a computer-based studio, the educator has improved opportunities for including audio in the educational experience.

Remote Lecture

The classroom lecture can be distributed to remote locations, using video of the educator and graphics for the traditionally-chalk-board materials. An important chance for improved efficacy comes through the fact that the audio examples that are part of any lecture are now presented to each student in their own listening environment. The student has the ability to take these audio experiences to their most carefully designed critical listening space. In fact, the student will usually take the audio experiences to the same space where they do their studio production work. So they hear the educational audio in the same room, and on the same playback system, that they will use when they next apply this learning to their next real world project.

The interaction goes beyond simply recording and replaying the lecture. New forms of educational experiences can be leveraged.

Media-Enhanced Lecture

Experiences not easily achieved in the traditional classroom become possible when education is delivered via prepared web delivery. A recorded lecture can be subjected to a rich post-production process, where the lecture is edited for crisp delivery, the lecture notes are converted into easy-on-the-eyes graphics, and static graphics are converted – where appropriate – into more informative forms of motion graphics. Importantly, opportunities for the delivery of high quality audio in support of the lecture are seized.

Audio Examples

Presentation of audio from a digital audio workstation tempts the educator to show the full richness of the digital audio workstation workspace as it creates the audio. Meters, knobs, faders, sliders, and countless active graphics are part of the audio production environment within the digital studio. While each processor in the production environment might at times have the need to offer detailed visual feedback, the user of the studio needn’t observe the fine visual details of all processes that are running.

To the contrary, the visual feedback from all the active digital signal processors can be distracting, undermining the learning for the student new to their craft. It is too often easier to hear, and therefore to learn, without the visual stimulus that might accompany it outside of the academic environment. An opportunity is presented: the audio can be reproduced – to multiple students via one-at-a-time presentation in their own studios – in a lower sensory noise floor environment. The educator can have a good sense of what they might hear, while controlling what they see.

Low noise floor – visually – presentation of audio via prepared multimedia experiences have the chance to be more effective as a way to communicate versus the attention-getting production experience of competitive digital audio workstations.

Recording Sessions Demonstrations

Actual recording sessions are a powerful way to communicate some of the infinite complexity of the student’s future recording challenges. Observing a faculty member or other professional in an actual recording session therefore taps into the picture-is-worth-1,000-words potential. When those presentations include high quality audio, presented to the student in their most promising acoustic monitoring environment, the educational efficacy is improved.

Recording Session Experiences

One the most informative experiences for the student of audio is the recording session. When those sessions are presented as laboratory experiences constrained by rigorous written rules, only so much can be accomplished. When those sessions are offered to the student openly, without constraint, as digital audio workstation session files,
in which a robust set of foundational work is built-in and the student is asked to develop them further while exploring them without bounds, learning operates at a higher level.

*Time Management*

All of the above happens very much under the control of the learner. When a rich lesson on audio is available at the click of a mouse, the student finds new ways to integrate learning in a more sustained way, one that fits into the other activities of their life. While there is much emphasis on the quality of the listening environment within this paper, when insightful audio is on offer to the student, there is no doubt that much of the learning experience can be appreciated by the student in ear buds, on mobile devices, and elsewhere. Spoken word is forgiving of audio and video quality.

The student has the empowering ability to divvy up their educational experience. Lectures and graphics can be appreciated in a range of venues. Importantly, audio experiences can quite literally be brought into the most appropriate environment for the student: their studio.

**CONCLUSIONS**

The challenge of distributing the learning environment from the classroom to many individual student learning contexts has been accompanied by the redistribution of the recording studio from the isolated, proprietary hardware-centric studio to the distributed, digital, every-student production environment. This presents rich opportunities for the educator to offer the student a rich experiential learning journey, in many formats, that support the cycle of experiential learning.

**REFERENCES**