The University Music Technology Lab

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Abstract

This presentation will focus on the composition of a university music technology lab, including who will build it, how it will be funded and what disciplines will use it. Beginning with instructional objectives and the listing of equipment, details of a simple lab and an advanced lab will be discussed and enhanced with photographs. University support for continued upgrades and maintenance are important issues mentioned. The specifics of a lab include hardware and software consideration, including projection systems, surround sound, networks, servers, interfaces, peripheral equipment, screen to screen, synthesizers, software programs and computers. Although software is not a focus of this presentation, current and future activities utilizing the lab are discussed. The Loyola University Mac Lab will be used as the basis for discussion.

1. Introduction

Twenty years ago this author built his first educational music technology lab utilizing six Apple II computers, working in conjunction with rudimentary ear training CAI software and a program accompanying Bruce Benward’s theory textbook. The lab evolved through several grants and generations to what is presently used at the university where I teach: a 24-seat G-5 Mac Lab and a 13-seat Windows lab, fulfilling needs for several music disciplines.

This presentation will focus mainly on the composition of a university music technology lab, who will build it and what disciplines will use it.

2. Disciplines

Before a lab can be built, a music learning system needs to be identified using instructional objectives. Requirements of the various disciplines must be studied, including the interviewing of fellow faculty members and charging them with their own research on the needs of their particular curriculum. Does the lab requirement involve multidisciplinary curriculum? Examples of disciplines include music theory, music education, music therapy, music business, electronic music, MIDI loops, recording, multimedia, WEB design, video and visual graphics, piano and guitar, all important in the development of a music student in higher education. Software will be fuel for the composition of the lab. The courses taught at this lab will be discussed in section 14 of this paper.

3. Devising a Music Learning System

Topics to discuss with faculty and administration include financing, grants, future support and software updates, scheduling, operating systems including Mac versus Windows in basic labs and more advanced systems in developmental software. The continuity for the future of the programs involves keeping abreast with the latest hardware and software. Using existing space, remodeling or building new facilities are questions to be asked in this early phase of planning. Budgets include grants to develop a lab and then funding to sustain a lab is crucial. Software and hardware updates are a continuous concern regarding budgets. This is where administrative support is vital to keep the lab current, utilizing IT or student fees to keep a constant funding source available for updating.

4. Types of Music Technology Stations

There are several levels of music technology labs, beginning with basic student and teacher stations consisting of only a computer to advanced multimedia workspaces including 16X9 projection for HD video and surround sound. The Loyola Mac Lab consists of most of the equipment listed in the following sections.

5. Teacher Station

The typical teacher station includes an educator controller, computer, synthesizer, interface (MIDI and audio), Internet access, rack-mounted audio (CD player/burner including SACD and DVD-Audio, sound modules, amplifier, and mixer to hear student workstations), a patch bay that can include audio and computer I/Os, video players, (VHS, SVHS, BETA), student screen projection and furniture. Figures 5.1 and 5.2 show a configuration of a teacher workstation.
Teacher Workstation

Figure 5.1. This photo shows a Loyola faculty workstation configuration of a synthesizer, computer keyboard, two displays, a Yamaha 001 mixer and in the background a rack with a mixer and digital audio interface and patches.

Figure 5.2. Rack of a Loyola faculty workstation, including various video interfaces

6. Typical Student Station

The student station is substituted with headphones for audio in a similar setup compared to the teacher station. Because digital audio is a key element in today’s music programs, an audio interface is necessary for higher sampling rates than is provided by computers alone. A two-channel interface such as the Digidesign M-Box is adequate for most labs because they are mainly used for monitoring audio but can be used to record a stereo input. If multi-tracking recording is necessary, then multiple input interfaces such as a MOTU interface can be bought for a moderate price. Loyola’s lab uses a Digidesign 002 rack at each station. An important advanced element for a lab is the ability to have screen to screen capability and have audio heard from each student station through the main sound system. Advanced equipment includes CD/DVD combination player/recorders (can be installed in many computers, but external equipment is useful at times), other video equipment (VHS, SVHS, Beta, and cable television) and other audio equipment (SACD, DVD-Audio, turn table, i-Pod, Mini-disk and cassette players). Figure 6.1 shows a simple configuration of a student workstation.

Student Workstation

Figure 6.1. This photo shows a simple configuration of a Yamaha Motif synthesizer, a computer keyboard, a good-sized display and in the background a rack with a Yamaha 001 mixer, Digidesign 002 rack audio interface and a patch bay including computer I/Os, audio and video.

7. Printers, Scanners and Video Converters

Although most multimedia work is created solely in a computer, printers, scanners and video converters are important in multimedia and video production. One of each is recommended, with a scanner and video converter perhaps on a moveable cart used at each individual station.

8. Servers and Storage

A server can greatly enhance a lab in two ways. “Mailboxes” can serve as a storage depot for students’ projects and files. The teacher can access all files for grading and evaluation, where the student can “drop” their files into a drop box. If fiber optics is used in the lab, the speed of the network can be fast enough to allow all programs to be loaded on the server for access. If Ethernet is the means for the network, local drives are used as the source for programs and working on files. One image is made for all local drives. This allows a corrupted drive to be cleaned and reinstalled with software at anytime. (And this happens often). Loyola is now requiring students to bring a portable fire wire drive to the lab with minimum speed and storage requirements as personal backup and as a working drive for projects. They will use the drive for their four-year tenure in school.

9. Recording Studios Connected to Labs

If digital recording is a component of a lab (teaching Pro Tools, or digital audio in conjunction with a sequencer), connection of the lab to a recording studio is essential. This
can be accomplished by utilizing an Ethernet or fiber network in place at most universities. A recording studio can be the facility for multi-track recording using an expensive recording system such as Pro Tools TDM. The audio files can then be sent to the server of the lab via the network for editing, mixing and mastering on less-expensive systems such as Pro Tools LE at the individual workstations.

10. Overhead Projection

Overhead projection is not necessary but found in most advanced labs. Using two systems allows for multiple screen projection, enabling demonstration of a program on one screen and an explanation via Quicktime, Power Point or a text program on another screen simultaneously. As mentioned earlier, screen-to-screen is another powerful tool for students to see demonstrations at their own station without having to look at an overhead. An audio and network connection from each student station to the teacher station enables the entire class to hear and see a work of an individual. Figure 10.1 demonstrates the use of two projection systems, including 16X9 HD.

Overhead Projection

Figure 10.1. This photo shows a complete lab including two overhead projection screens.

11. Audio

Two systems can be used in today’s labs. Stereo is still very common, but surround sound is important as a standard in many studios, including a student lab. Also important is the ability for all students to hear a single workstation through the sound system via a mixer at the teacher station.

12. Miscellaneous Support Equipment

Other miscellaneous items to assist the teacher in presentations include whiteboards, electronic computer boards, a laser pointer, sound reinforcement for speaking using a wireless lapel microphone, and overhead cameras of the teacher station to demonstrate hardware equipment such as a synthesizer or mixer. A wireless master control system can switch on and off projectors, lights, and channel sound to a pre-amp.

13. Maintenance and University IT Support

Administration and maintenance of the lab is vitally important. IT support from a university can keep the lab running and updated with the latest software and hardware. Dedicating full time IT personnel to a lab is a necessary luxury in support of teaching by faculty. Budgetary considerations from the university for the maintenance and upgrades cannot depend on grants alone. Student IT university fees should be considered in the continuation of funding for the labs. Leasing should be an alternative to purchasing because this can free up money for other upgrades. Also, Work Study students are needed to staff the labs open hours for individual work outside of class.

14. Current Activities in Our Lab

Present courses offered in this lab include: 1) Introduction to Technology in Music, giving students an overview of most technologies they will use in the music industry, including music composition, video and graphics; 2) Intro to Digital Audio, an introductory class in the makeup of digital audio and the practical applications using various programs; 3) MIDI Loops, the creating of music utilizing loops; 4) Electronic Music Composition, for music composition majors; 5) Music Notation, (Finale and Sibelius); 6) Multimedia Production, graphics and web design; 7) Music Visualization, combining music with video and web creation; 8) Video Editing; and 9) Advanced Multimedia.

15. Future Activities for Our Labs

Plans are in place to build addition labs because of time constraints on the present lab and an increasing student population. To combine visual and music programs will be the focus of future labs so labs will be integrated with both types of programs. However, separate studios for audio and video will be built to support the labs. Actual recording of music and video will take place in their respective studios, and then editing will take place in the labs.

Pro Tools certification will be offered both through our program and through the Pro Tools Training Center, which has used our facilities in the past for the entire community.

16. Where to Buy Music Equipment

http://www.brookmays.com
http://www.sweetwater.com
http://www.fullcompass.com
http://www.washingtonmusic.com
http://www.musicianfriend.com
17. Where to Buy Visual and Media Equipment

http://www.800valiant.com
http://www.bhphotovideo.com
http://www.smalldog.com
http://www.newegg.com
http://www.jr.com
http://www.compusa.com
http://www.sweetwater.com
http://www.fullcompass.com
http://www.apple.com
http://www.ecost.com

18. Software

For another conference

19. Summary

This Power Point presentation provides bullets with photos and diagrams of the narrative above. Beginning with instructional objectives and listing equipment, I explore the details of a simple lab and a “dream” lab. Support is an important consideration in the planning of a lab as well. If you have no plan for the future, you need one to succeed.