

Current Developments in Music Technology:  
Technology and the College Music Curriculum

NASM Pre-Conference Presentation, November 18th, 2006 (Rev 11/21/06)  
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PowerPoint Content

Session I: New Developments in Music Technology

Technology Futures

Bit of Music Technology History

- 1970s: Computer aided instruction
- 1980s: Desktop music notation
- 1990s: Multimedia music instruction

Technology Directions

- All going to software
- New creative tools for music
- Intelligent assistants
- Portability
- Changing limits of time and space

Its all going soft....

- Soft Synth(esizer)s
- Traditional Instrument Sounds
- Music Software Shift
- Basic Music Setup

New creative tools

- Making music
- Performance accessible: Beatbug, Haile, MIDI performance tools
- Creation accessible: Looping software, GarageBand, etc.

Intelligent Assistants

Portability

Portable & Personal

- Desktop to Laptop
- Wireless

Overcoming Limits of Time and Space

- Commodity Internet and Internet2
- Video conferencing to tele-immersion
- Virtual performance in real time

Social DIRECTIONS

Gen Y Behaviors

- Want their own rooms/own space (personalization)
- Live a 24/7 lifestyle and want privacy
- Have iPods, laptops, cellphones, PDAs etc.
- Expect services instantly
- Multi-task and expect flexibility
- Want their own rooms/own space (personalization)
- Live a 24/7 lifestyle and want privacy
- Have iPods, laptops, cellphones, PDAs etc.
- Expect services instantly
- Multi-task and expect flexibility
- Prefer to avoid reading if at all possible
- Want comfort, food & drink when computing

Judge you by your website (within 3 secs)

e-Information

Search Engines

Google

Wikipedia (the good, the bad, and the ugly...)

Ask.com

Materials in electronic form, not hard copy

Online bibliography tools, journals, language translators

“Computing is not about computers anymore. It is about living.”

Nicholas Negroponte, Being Digital (1995)

Software Futures

Approach to Understanding Software Categories

Music Production

Digital Audio Management and Editing

Multitrack: Digital Audio

Multitrack: Looping

MIDI/Digital Audio Sequencing

Virtual Synths, Samplers, and Instruments

Notation and Scanning

Multimedia Production

Computer-Aided Instruction

Drill and Practice

Flexible Practice

Guided Instruction

Game-Based

Creative

Teacher Resource

Internet

Key Question: Have I maximized the opportunities for all learners to make their own aesthetic decisions with my guidance and encouragement?

Exemplary Software: iTunes, Audacity, Toast Titanium, Audition, Live, Logic Pro, Reason, Sibelius, Auralia, Practica Musica, TimeSketch, Music Ace I and II, Hearing Music, Smart Music, Band-in-a-Box, Making Music, Super Duper Music Looper, Sibelius Instruments

Speed Bumps

Industry shifts

Major recent mergers

Blackboard and WebCT

Adobe and Macromedia

Avid: Digidesign, M-Audio, Sibelius, Pinnacle

Apple & E-magic & iTunes

Open source development efforts (Audacity, Moodle, OpenCourseWare)

Online courses and degrees

Changing nature of “university”

Canned courses and course materials online (connect4education.com)

Online degree programs emerging in music

Security and Privacy

Security of information

Institutional and government surveillance

Viruses, SPAM, network/server attacks, spoofs, etc.

Much of law (or lack thereof) remains to be tested, challenged, or written

Technology funding

Computer company margins too thin to support funding as in the 1980s  
 Government grants targeted to K-12 and NCLB efforts as well as Homeland Security  
 Campus central funds diverted to other needs and to maintaining technology as a utility not as instructional support

#### Research (See References)

Forthcoming article “Computer-Based Technology and Music Teaching and Learning: 2000-2005” International Handbook of Research in Arts Education, edited by Liora Bresler, 2006 Springer

See other research references in the reference list provided

#### Key Points

- Survey results show growing numbers of schools that use technology; music teachers lag behind in implementation
- Students come to college better prepared to use technology for general purposes but not for music production and CAI
- Scant evidence that music teachers as a whole are integrating technology into instruction; few have a conceptual or philosophical base for why to use technology
- Study of the more creative music software is increasing with the need for more sophisticated designs to determine its effectiveness
- Greater number of qualitative studies
- Increased evidence of distance education with positive results on learning achievement
- Need study: issues of gender, digital divide, teaching strategies

## Session II Music Labs and Laptops

#### Agenda

Traditional music labs  
 Trends to mobile computing  
 Our vision for the future of music labs and laptops  
 Mobile computing dispersion models and examples  
 Key issues  
 Some data and examples

#### Traditional Labs

#### Trends to Mobile

- Computing going personal and mobile (part of a new movement today toward more personal, intimate, “social” computing, e.g. MySpace.com, iPods, YouTube)
- Wireless, ubiquitous access (hot spots cropping up in many places, whole towns and cities going wireless)
- Telephone companies offering cellular phone communication technology on a card inside the computer (no need for a hot spot)
- Music hardware reborn as software
- Basic software already on students' computers and they most likely know how to use it
- Most laptops have built-in communication abilities for other devices and other laptops (e.g. bluetooth)

“It is not hard to imagine a time when pro studios won't contain any computers at all, just big displays that musicians can plug their notebooks into” *Computer Music*, September 2004

#### Future Vision

- Computing in the hands of students with institutional support in the form of access points for advanced software and hardware requirements.
- Mobile devices become tools for the further construction of knowledge, skills, attitudes, and values
- Professors become more of guides on the side and less sages on the stage

#### Dispersion Models

- Cart: set of laptops for checkout
- Dispersed: laptop and non-laptop Ss
- Desktop: few laptops per classroom
- Social: intellectual commons for food, study, and computing

- Mixed: combinations of above
- Concentrated: 1 laptop to each S

Issues

Software  
Hardware  
Security  
Personalization  
Basic Music Setup  
Filling Stations

Low-budget Software Student List

Finale NotePad for notation (free)  
Cubase SE or Tracktion for digital audio/MIDI sequencing (~\$75)  
SourceForge Audacity for wave editing (free)  
Band-in-a-Box (\$50)  
AcidXpress(Win, free)/ACID Music Studio or GarageBand (Mac, \$29) for loop sequencing  
SmartMusic subscription for intelligent accompanist (\$20 per year)  
iTunes and an iPod of some type (~\$120)

Preferred Software Student List

Finale or Sibelius full version (~\$200)  
Cubase SE Sequencer (~\$75)  
SourceForge Audacity for wave editing (free): or Audition (PC) and Peak (Mac)  
Band-in-a-Box (\$50)  
ACID Music Studio (Win, \$50)/ACID Music Studio or GarageBand (Mac, free) for loop sequencing  
SmartMusic subscription for intelligent accompanist (\$20 per year)  
iTunes and an iPod of some type  
ProTools M-Powered (\$149)  
Reason (\$199)

Advanced Software for the Lab: Reason, Live, ProTools, Logic, Digital Performer, Cubase, Sonar, Max/MSP. Dreamweaver, Photoshop, FinalCut, Premiere, Toast

Special Hardware

Video and Graphics  
Projection

Software Distribution

Dedicated license servers (e.g. Sibelius)  
Dongle/USB control  
Keyserver (e.g., Sassafras Keyserver)  
Loaners  
Rental (e.g., e-Academy)

Open Source Solutions

Security concerns: Locking devices, Software tracking (e.g., LapCop), Insurance, Password Protection

Personalization: campus portals

iTunes: Personalized Music

Survey (see data charts below)

Why give up desktop (responses to survey)?

- Portability, mobility, and flexibility at work and home (10)
- All files in one place (3)
- Easily take laptop to the classroom to use projector (2)
- Have enough computing power and enough ports to replace desktop
- Can use larger external hard drives with laptops
- All applications and files on personal portable machine
- Save physical space
- Integrated system

Why not give up (Responses to survey)?

- Desktops have more speed/memory, hard-disk size, expandability (10)
- Large monitors for desktops (8)
- Durability issues with laptops (5)
- Desktops still cheaper (3)
- Ergonomic issues with laptops(3)
- Laptops easily lost or stolen (3)
- Desktops easier to use with high-end music technology (3)

New Activities With Laptops (responses to survey)

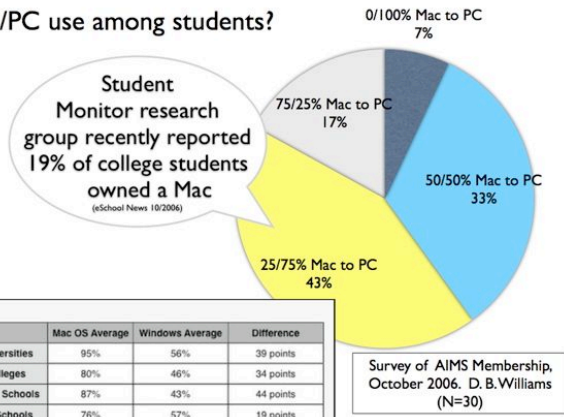
- More collaboration especially wireless interaction
- Working at one's own pace
- Information literacy activities in all music courses (e.g., music history, resources in music education, etc.) through the Internet
- More extensive homework assignments
- Evaluate more shareware and demo software
- More use of ear-training software
- More student music arranging for varied class activities
- Greater use of voice and instrumental performance analysis
- More in-class ensemble work using computer performance
- Greater use of courseware management software (e.g., WebCT or Blackboard)
- Take class outside on the Quad!
- Instant student demonstrations from their laptops (especially with remote desktop management software)

DATA & EXAMPLES

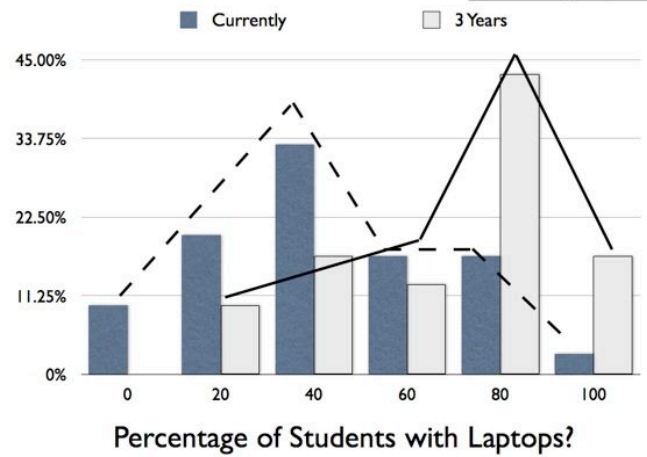
Sources

- Williams AIMS Survey, 2006
- Williams & Webster Surveys for San Francisco (2004), Quebec (2005), and San Antonio CMS/ATMI Conferences (2006) [www.emtbook.net](http://www.emtbook.net)
- Educause CORE DATA study (2005) <http://www.educause.edu/coredata/>
- Kenneth Green Campus Computing Project (2005) <http://www.campuscomputing.net/>
- Berklee College Notation Study (2005) <http://notationsurvey.blogspot.com>
- Others

Mac/PC use among students?

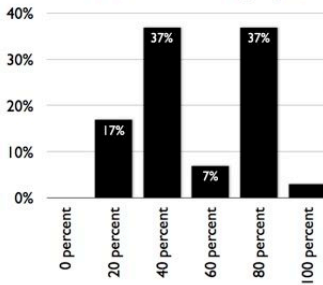


Survey of AIMS Membership, October 2006. D. B. Williams (N=30)



Berklee College Notation Study, 2005 (N=668)

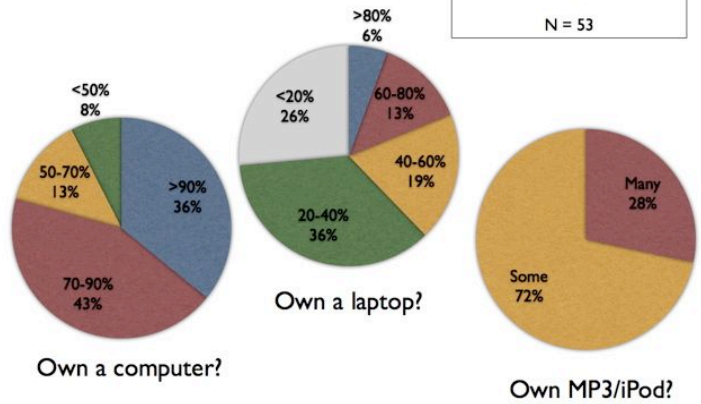
Percentage of students with iPod-like music players?



Survey of AIMS Membership, October 2006. D. B. Williams (N=30)

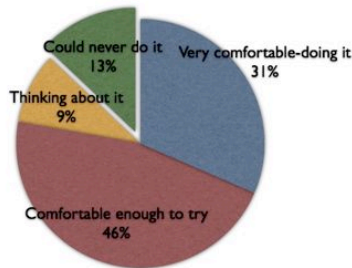
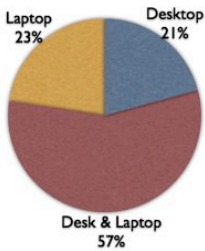


Students who...



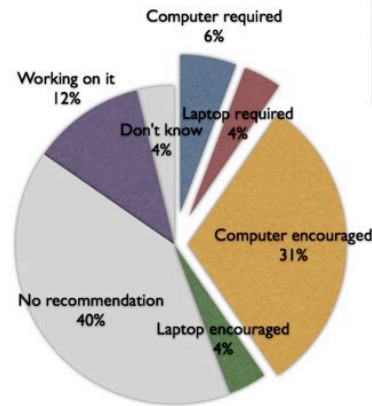
Survey of ATMI membership for San Francisco Conference, 2004. Williams & Webster  
N = 53

Faculty preference?



How comfortable are you with giving up your desktop and doing all your work on a laptop?

Survey of ATMI membership for San Francisco Conference, 2004. Williams & Webster  
N = 53



Survey of ATMI membership for San Francisco Conference, 2004. Williams & Webster  
N = 53

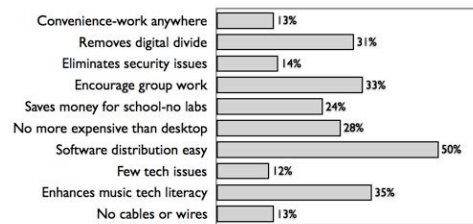
Campus Computer Requirement?

Computer Requirement

	Percent
All students provided a personal computer	2.9%
Students are required to purchase/lease their own	3.6%
Students in some departments or majors required to purchase their own	15.1%
Personal computer purchase recommended but not required	31.5%
Recommended but not required in some departments/majors	7.2%
No requirements	37.7%
Other	2%

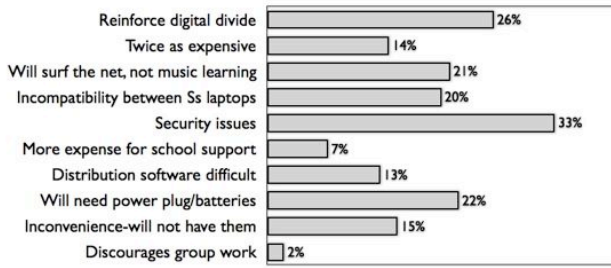
Educause CORE DATA study for 2005 (N=945 schools)

Survey of ATMI membership for San Francisco Conference, 2004. Williams & Webster  
N = 53

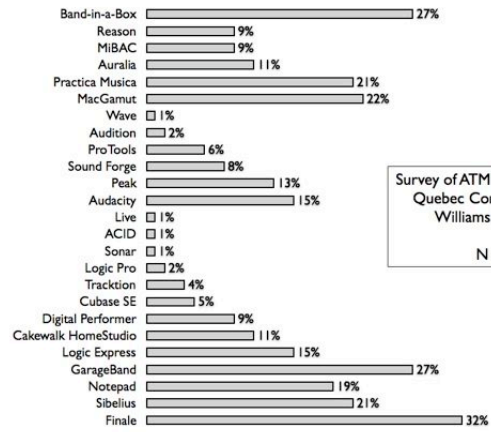


Advantages of laptops

Survey of ATMI membership for San Francisco Conference, 2004. Williams & Webster  
N = 53



### Disadvantages of laptops



Survey of ATMI membership for Quebec Conference, 2005. Williams & Webster  
N = 21

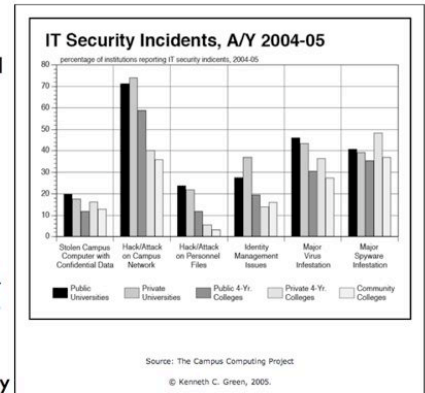
### Use of Software in Music Classes

	Finale Average	Sibelius Average	Difference
Top Universities	93%	73%	20 points
Top Colleges	73%	54%	19 points
Top Music Schools	91%	74%	17 points
All U.S. Schools	83%	48%	35 points

Illinois had an above average use of Sibelius from the mean .58 ratio; the study did not determine what version of Finale or Sibelius was used.

Berklee College Notation Study, 2005 (N=668)

Campus IT officials identify “network and data security” as the “single most important IT issue affecting their institution over the next two-three years... The 2005 data also document a major shift in campus IT priorities from instructional integration to security and ERP/infrastructure issues.”



The 2005 National Survey of Information Technology in US Higher Education ([www.campuscomputing.net](http://www.campuscomputing.net))

## Session III: Music Online Learning: The Music Classroom, the Internet, and Video Conferencing

- Distance Education Triptych Panels
  - Classroom
  - Internet and Software
  - Video Conferencing

### Classroom Context

What do you want to do with the technology in terms of your philosophy and instructional intent

### Internet and Software

What Internet connections and specific software might work to support distance education?

### Video Conferencing (VC)

To use this important tool for distance education, what technology concepts and hardware options work best for you?

### Overview

#### Introduction

Distance Education: Umbrella for Three Panels of our Triptych

Distance Education Profiles

Survey Demographics

Triptych for Distance Education (Light, Moderate, Intensive)

Panel 1: Classroom Context

Panel 2: Internet and Software

Panel 3: Video Conferencing

Key threads

- Emphasis on concepts, strategies, and applications, not technical details
- Based on survey responses (N=88)
- Help in finding your own path through distance education (there's one for everyone to try)



## Profiles

		Light	Moderate	Intensive	
	MODELS*	A, B, C, D	E, F, G	H, I, J, K	
Instructional Design	<b>Proportion of Instructional Content Delivered by Distance</b>	Use of some distance techniques and tools; local clientele	Larger portions of time devoted to distance techniques and tools; mixture of clients	Entire class online with few or no scheduled meetings; remote clientele	
	<b>Use of Computer-Mediated Tools</b>	Mostly web pages and some use of pdfs, mp3s, digital movies; short segments of video conferencing	Use of course management tools such as WebCT and Blackboard to manage web page content and digital files	Complete use of software tools to deliver all instruction by distance	
	<b>A/S</b>	Largely Synchronous	Mixture of Synchronous/Asynchronous	Largely Asynchronous	
	<b>Interaction</b>	Teacher-centered with support content online	Moderate interaction between class members and instructor	Extensive interactions between class and instructor	
	<b>Locus of Content</b>	Teacher creates nearly all material and uses some online support for archive and distribution	Content is created mostly by instructor but use is made of online material to augment; prominent use of course management software	Teacher creates core but makes extensive use of web-based resources; encourages exploration	
	<b>Assessment</b>	In-class techniques with some online submissions	More use of online submissions paired with in-class work	All work submitted electronically	
	Technical Design	<b>Hardware</b>	Personal computer-based (low cost)	More specialized equipment (higher cost); devices from Polycom and others for video conferencing	High-end equipment with sophisticated codecs for video; knowledge of issues for lighting, audio quality, microphone and camera use
		<b>Software</b>	Text-based chatting, emails, web browsers, blogs	More sophisticated understanding of course management software; advanced videoconferencing	Netmeeting capabilities with whiteboard, desktop sharing
<b>Connectivity</b>		Client/Server	Client/Server	Client/Server, Dedicated IP, Internet2	
<b>PP/MP</b>		PP	PP	PP/MP	
<b>Management of Content</b>		Handouts, some archive support	Mixture of local and archived material	Extensive use of on-demand content	
<b>Resource Assistance</b>		Informal, personal	Formal help from IT support groups for testing, scheduling	Help with technical aspects of lighting, audio quality, microphone use and camera support	

\*Note: Letters refer to the models that emerged from our online survey (see below)

## Panel 1: Classroom Context

Models for Distance Education Emerging from the Questionnaire<sup>†</sup>

## A. E-Presenters

- Guest lecturers for classes (Illinois State advanced computer notation class using Polycom/I2)
- Industry representatives interacting with students in class

## B. Collaboration/Communication

- Virtual collaboration community
- Overseas, student-exchange materials for students off-campus for a semester to stay in contact
- Interacting with colleagues internationally
- E-mail and Chat/Instant messaging (IM)

- C. Field work
  - Observations
  - Student teaching assessment remotely, etc.
  - Asynchronous music lessons ([www.musicmatters2u.com](http://www.musicmatters2u.com))
- D. Online resources
  - WebCT materials/E-mail/Threaded discussions for onsite course or off-site course (Northwest College intro to music class; software design in the arts classes at Illinois State with WebCT; creative thinking in music class at Northwestern U with Blackboard)
- E. Online modules
  - Portions of music education core curriculum for students on or off campus (Southwestern College intro to music class using Blackboard)
  - Summer workshops
- F. Skills training
  - Aural skills training via Blackboard (Northwestern U undergraduate aural skills)
- G. Testing and remediation
  - Online placement tests (entrance or placement music exams)
  - Online remediation or rudiments courses (e.g., music theory or fundamentals)
- H. Online mentoring
  - Synchronous music lessons and master classes (New World Symphony I2 sessions; I2 music performance teaching at U of Oklahoma, Indiana U, Northwestern, Royal School of Music in London)
- I. Course delivery (full)
  - Online delivery only with no live classroom events (UL Lafayette music appreciation class)
  - Online summer tech courses for teacher re-certification
  - Graduate classes for music education, often with students that are employed full time elsewhere (Queens College music education foundations class; Columbia Teachers College music education research classes)
  - Grad classes of employed music teachers
  - Course offering simultaneously with on-campus and one or more off-campus sites
  - Online courses using a required CD/DVD for media ([www.connect4education.com](http://www.connect4education.com) commercially prepared music classes used a Florida community college in Jacksonville)
- J. Team teaching
  - Team teaching a course online with instructors in different locations
 Complete degree programs online (Auburn, IUPUI, Boston University, Duquesne, Conservatorium in Sidney, Australia)

### Distance Education Profiles (Build your own profile)

#### Panel 2: Internet and Software

##### Connectivity

##### Connection

Wireless

Direct connection through Ethernet

Direction connection through DSL or cable or other (natural gas?)

##### Internet Options

Internet1 (a.k.a. commercial, commodity, or plain-old-Internet)

Internet2

##### Internet2

What is it? Consortium for research and education; I2 and I2 pipes (e.g. Abilene network)

What are its advantages? Bandwidth, predictable synchronicity, speed, and more

Who can get connected? Anyone with I2 membership or access to ISP with membership

Who can you connect to? Anyone on I2

You may be on Internet 2 and Not Know It!

##### Software

Web Portal

Course Management Software (WebCT/Blackboard)

Netmeeting-like software with whiteboards and desktop sharing

Specialized Servers

Personalized Portal

WebCT or Blackboard

Interactive white board and shared desktops

What Do You Need to Get Started with Client/Server VC?

- Account with VC/chat Server
- Video Camera & mount/tripod
- Microphone in computer, camera, or other
- Software
- Connected to the Internet in some fashion
- Computer
- Someone who is on same service

What Do You Need to Get Started with VC, Static IP, and Internet2?

- IT Support Cooperation on Campus
  - Internet2 Connectivity
  - Video Cameras and Software (more specialized)
  - Communication with tech personnel at remote campus
  - Special Room or Portable Unit
  - Scheduling (time zones)
  - More specialized lighting and audio
  - Testing Time
  - Computer
  - Someone who has the same stuff
- Polycom over Internet2  
Synchronous Internet2 with DVTS

Why or Why Not Do Distance Education?

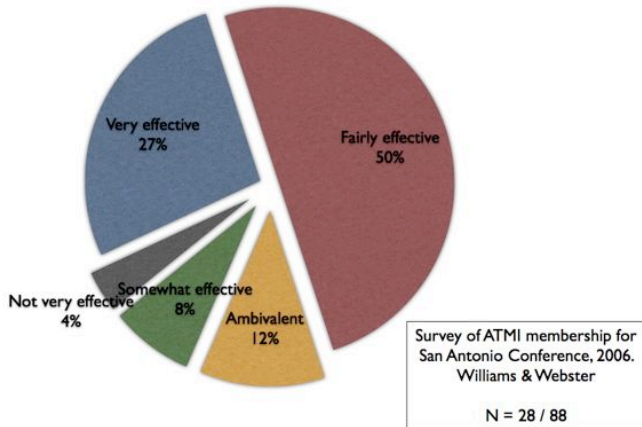
Why DO it according to survey?

- Students can work at their own pace
- Reach more students
- Best way to reach remote, rural, geographically-restricted, health restricted students
- Collaboration opportunities with other schools and international contacts
- Maintain essential communication with students and colleagues
- Good opportunity for remote master classes and ensemble coaching
- Forces you to learn to organize and prepare your classes better, both on and off site
- Technology just keeps getting better
- It is so easy, especially with video built into new Macs
- We are falling behind music programs in other countries in the use of technology

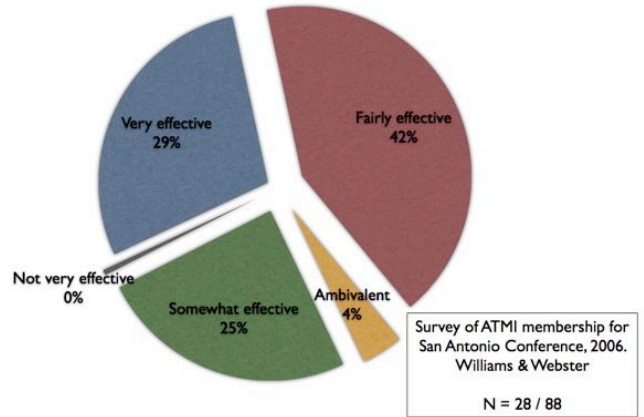
Why NOT do it according to survey?

- Time
- Wait until technology is more advanced and reliable
- Need more tech support and training
- Loose important interpersonal relationships with students
- Requires more student dialogue and a change in teaching methods only works for the more “academic” content courses
- Only for small classes
- Difficult to deal with technical/physical aspects of set up with remote students
- Audio distortion for live music presentations
- Need a lot of bandwidth
- Don't fully understand how it works or have a sense for its effectiveness

How effective is Distance Learning (DE) compared to traditional, onsite teaching?



How effective is Video Conferencing as an instructional tool?



### Course Management Systems

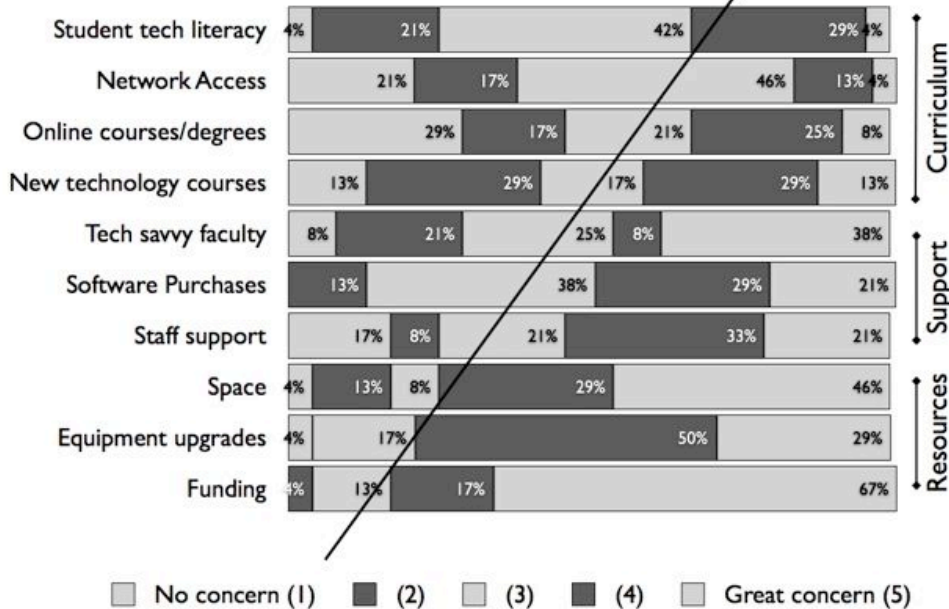
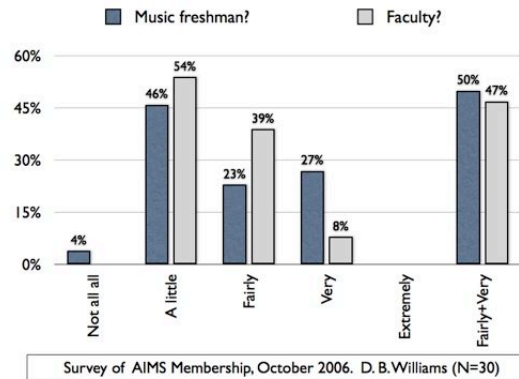
69.5 % of campuses support a “single” course management system like Blackboard or WebCT

24.6% said that nearly all courses use a CMS system(s); 75.4% indicated that they are used “selectively” by faculty.

Educause CORE DATA study for 2005 (N=945 schools)

ATMI SA data?

How technology savvy are your



Survey of AIMS Membership, October 2006. D. B. Williams (N=30)