Music Technology Skills and Conceptual Understanding for Undergraduate Music Students: A National Survey

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Presented at the ATMI/CMS National Meeting, Richmond, VA, 2011

Full results posted on: http://peterrwebster.com and http://teachmusictech.com/resources.html

Survey Design

Based on our years of experience in teaching college-level technology courses, development of our own materials, and in discussion with a number of colleagues, we arrived at a set of 51 competencies in 7 families:

- Physics of Sound
- File and Disk Formats
- Digital Audio/Recording and Editing
- Notation
- Teaching, Collaboration, Distance Learning
- Multimedia
- Digital Citizenship and Historical Trends

Pilot at Northwestern University (2011) as part of a recent strategic planning exercise

Procedures:

- Sought and Received IRB approval at Northwestern
- Sought and Received Permission from CMS to use their database of professors
- Distributed survey to all professors whose professional area included "technology" and to add all music executives (dean, chairs, directors) of record
- Used the online SurveyMonkey service with emails sent from CMS with a link to the survey
- Only 1 email was sent and no follow-up was performed for non-respondents prior to the present time
- Three weeks time was given for response

Respondents:

- N= 276 total responses from approximately 2,699 emails (731 opened email, 306 clicked on link)
- Representation from all states and Canada with the exception of Alaska, Delaware, Hawaii, New Mexico, Rhode Island
- Highest response rates: California (24), Texas (19), Florida (13), New York (13), Illinois (12), Michigan (10), North Carolina (10), Virginia (10), CANADA (10), Minnesota (9), Ohio (8), Georgia (7), Alabama (6), Connecticut (6), Massachusetts (6) South Carolina (6), Wisconsin (6)

Research Questions:

Global
- What are the most frequently marked competencies in each "family"
- What are the most frequently marked competencies overall

Specified Fields of Study
- What competencies may be unique to a field of study

Cross tabulations by size of institutions across competencies for families and global

Top Competencies Marked by 70% of Participants in Current Study
Bolded items were also noted by 70% of Northwestern Professors in Pilot

	Percent
Answer Options	
Describe what an overtone series is how it relates to instrument timbre.	**94.0%**
Show how to use a digital audio program to record a music performance and save the file for listening.	**93.9%**
Create a musical score with a notation program that includes expressions, articulations, and appropriate music notation conventions.	**93.9%**
Describe the concept of "fair use" and how it relates to music use in teaching or creative work.	**93.5%**
Describe under what circumstances both printed and recorded music can be copied and distributed.	**87.6%**
Demonstrate how to edit a score with a music notation program, including transposing parts, copying and pasting notation, and saving scores in different formats	85.7%
Show how to burn an audio or a data CD with a computer.	**83.3%**
Demonstrate how to edit a sound file by cutting, copying and pasting portions and add simple effects such as loudness control and fade in and out.	80.4%
Understand the capabilities of different levels of music notation software, include options for online notation.	**80.4%**
Describe the difference between digital audio and MIDI sound files.	79.6%
Describe what a compressed audio file is and be able to create one for distribution on the Internet.	**79.6%**
Presentation software to support a presentation about music that uses text, animation, digital audio, video, and graphics.	79.1%
Show how to use an aural skills/music theory fundamentals software program.	78.2%
Describe the basics of how sound is perceived by the ear and understood by the brain.	**77.2%**
Explain the difference between analog and digital sound.	76.8%
Show how to extract digital audio from an audio CD to a computer.	**74.7%**
Distinguish between what is represented by these commonly encountered file formats: wav, .aif, .mid, .mov, .doc, .pdf,	**74.3%**
Explain the functions of a basic digital music keyboard and show how to attach one to a computer.	73.9%
Describe how to setup a music workstation that might include a computer, music keyboard, mixer, headphones, amplifier	71.7%
Demonstrate use a computer or other digital device to control a video projector, "smartboard" projection system	71.6%
Describe how hardware and software might be used to assist in improving music performance skills.	71.6%
Explain the basic functions of an audio mixer.	70.4%
Show how to troubleshoot a problem with audio in and out on a computer when recording.	70.0%
Mid Range (68 -53%)	
Create and upload a simple website that features musical content.	68.7%
Show how notation software might be used to create worksheets and other teaching materials for music.	67.6%
Create a simple composition with a multi-track recording program that uses loop-based sound files, live recordings	67.4%
Explain "hertz" and "decibel scales" as measures of pitch and loudness.	66.4%
Show various ways to embed music notation into a webpage, word processing file, or presentation software.	65.7%

Explain the options for attaching a microphone to a computer for sound recording.	64.8%
Describe typical software licensing agreements for the legal purchase and use of commercial music software.	64.5%
Know the difference between different cable types (e.g. 1/4" phono, RCA, mini stereo, XLR) often used in audio work.	63.9%
Describe the function of a typical multi-track recording software program and explain the types of audio that can be combined to form a composition.	63.5%
Describe how software and hardware might assist with collaborative learning and creative work.	61.3%
Describe a typical software program that assists with musical accompaniment.	60.9%
Describe the basic differences between types of microphones and how they might be used in different environments	60.4%
Explain recent developments in class management systems (e.g. Blackboard) and social networking environments	60.0%
Record, edit and produce a digital video on a music topic suitable for distribution on a video streaming site such as YouTube.	59.7%
Explain the difference between sampling rate (e.g. 22-, 44-kHz) and bit size (e.g. 8-bit, 16-bit) for a digital audio file	58.8%
Explain the difference between a DVD disc and a CD disc.	57.6%
Explain important historical trends in the development of music technology	57.1%
Create a DVD that contains artifacts of creative work for a digital portfolio.	55.7%
Explain what is involved in basic mixing and mastering of digital audio prior to distribution.	53.9%
Describe how smartphones, computer tablets, and other alternative music instruments might be used for creative work.	53.9%
Explain important criteria for selecting music teaching software for educational settings.	53.3%

Lowest Range (48-32%)

Show how typical plug-in effects can be used to edit sound files in multi-track recording.	48.70%
Describe a typical simulation software title that help students compose and/or improvise music.	46.20%
Know how to remove noise from a digital recording and do editing work such as adding equalization and reverb.	45.20%
Describe how software and hardware might assist with distance learning and creative work.	44.40%
Show how to create a synthesized sound by using a software program.	43.90%
Show how to adapt a computer to display information in ways that might assist users with disabilities.	32.90%

Overarching Competencies

1. Use a notation program
2. Record and mix a performance with digital audio program
3. Understand copyright and fair use
4. Burn a CD or DVD
5. Edit digital audio
6. Basic understanding of acoustics and audiology
7. Use presentation software and connect to projector or "Smartboard"
8. Set up a computer music workstation and troubleshoot problems