

USING THEORETICAL FRAMEWORKS FOR TECHNOLOGY INTEGRATION IN MUSIC  
TEACHER PREPARATION METHODS COURSES

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### *Overview*

Several accrediting agencies oversee the curricula and implementation of music teacher training programs. The National Council for the Accreditation of Teacher Education (NCATE) and the National Association of Schools of Music (NASM) are two of the most prevalent. These agencies both have mandates for the inclusion of technology training in teacher preparation programs for the 21<sup>st</sup> century. These standards are broad enough to be inclusive of all disciplines, but fail to provide structure for implementation. The National Center for Educational Statistics (2007) recently polled faculty about their technology use at 4-year degree granting institutions. Faculty cited lack of time, training, interest, and infrastructure as significant barriers to increased technology integration into their courses. Other barriers to technology integration include the rapid rate of technological change, and the inappropriateness of software available for classroom use. However, student interest is not a problem.

The National Association of Schools of Music (NASM) outlines curricular requirements for degrees offered through NASM accredited schools. However, the 2007-2008 NASM handbook's only requirement of technology for Music Education falls under the Common Body Knowledge of Skills for all baccalaureate music degrees. It simply states, "students must acquire the ability to use technologies current to their area of specialization" (p. 85). Subsequently, a NASM addendum issued in 2007 regarding technology in undergraduate professional degrees in music has some added insight. The first statement reminds schools that content must drive technology. Second, NASM states clearly that meeting technological competencies in the undergraduate curriculum does not require the addition of new classes. With the limits of the number

of undergraduate credits allowed to be required of music teacher education programs, and the number of state certification requirements, schools are urged to find the extent to which technological competencies are already being met. Third, NASM acknowledges that there are several ways in which to meet the requirements. Technology must be matched to the objectives and goals specific to each program. Finally, NASM addresses the need for faculty development. Professional development in technology integration must entail a deeper context than just the enhancement of technology skills. This deeper context may include developing faculty members' understanding of technology integration as it relates to curricular redesign and instructional use (NASM, 2007). What is needed, then, is a theoretical framework for technology integration into music teacher preparation methods courses. According to Mishra and Koehler (2006), "merely knowing how to use technology is not the same as knowing how to teach with it" (p. 1033). It is up to those in charge of teacher preparation programs to implement constructive, meaningful experiences that engage future music educators with technology.

The concept of pedagogical content knowledge has been in the education vernacular for more than two decades (Shulman, 1986). This knowledge is context-dependent, and includes the understanding of what makes the learning of specific topics difficult or easy when the predispositions of the learners are considered. In 2006, Mishra and Koehler took that concept further, and Technological Content Pedagogical Knowledge (TPACK) grew. This new model considers the situated nature of learning: learning that is dependent on subject matter, grade level, student background, and the availability and types of technology.

Mishra and Koehler describe teaching, and teacher training in the TPACK model as an "ill-structured, complex domain" (p.3). They acknowledge that teachers practice in a multifaceted and ever changing environment. Much like the fields of medicine and law, teaching involves

real-world problems that do not have a single best answer. Teachers must incorporate their knowledge of student thinking and learning, subject matter, and technology. In addition, the structure of teaching within the discipline has a high level of variability across situations and a context-dependent association between knowledge and practice.

To further the difficulty of technology integration, often practitioners consider pedagogy and technology distant domains under separate authority. Teachers and technologists “live in two different worlds and often hold curiously distorted images of each other” (p.9). The two disciplines can have different values, norms, and language. To achieve full technological integration, the boundaries between pedagogy and technology must be reduced. Each field, however, believes that the instruction of technology integration is somebody else’s problem (AACTE, 2008).

Compounding the situation, teaching with technology is defined as a “wicked problem” (Rittel & Weber, 1973). As opposed to a “tame” problem, a wicked problem has imperfect, incongruous, and fluctuating requirements (Mishra & Koehler, 2006). There are no right answers to wicked problems, as they are all unique and novel involving a large number of contextually bound variables. The diversity of teachers, students, settings, and technology all contribute to this social context. Each person will contribute his or her own goals, objectives, and beliefs to the problem. This social psychological complexity compounds traditional problem solving. Therefore, there is no definitive solution to technology integration. Traditional methods of instruction in technology training are ill suited to produce a deep understanding that teachers need to be intelligent users. Factors contributing to this mismatch include the rapid rate of technology change, inappropriate design of software for the classroom, and the situated nature of learning. Technology use in the classroom is context bound – dependent on grade level, subject matter, student backgrounds, and the types of computers and software available. Traditional technologi-

cal instruction leads to accumulation of techno-facts, not knowledge integration. In fact, most technology curricula fail because they lack a framework to guide principles of learning and knowledge construction. To help provide the field of Music Teacher Education direction towards solutions, this paper will address three theoretical frameworks for technology infusion into music methods courses.

### *Learning Technology by Design*

The first framework is a design-based approach to provide structure for technology integration into music methods courses. This entails taking content knowledge, redesigning as appropriate, and presenting it a technological format.

Situated Cognition Theory believes that knowing is dependent on the learner-environment interaction. Learning is best when content and context are presented together so that students' assign meaning, value, and understanding (Lave, 1997). Within this context, less traditional teaching occurs as more constructivist approaches emerge.

Within music education teacher training programs, there are many opportunities to learn technology by design. Pre-service music teachers can learn web-based software by redesigning current websites for students of different ages. A music theory website would need a different look and feel when designed for elementary school children than when it is designed for high school students.

Many institutions require electronic portfolios within teacher education programs. Students can design a professional portfolio using web-based software that incorporates both audio and video examples of teaching and performing to teach editing software; examples of orchestration to showcase notation software, and examples of academic works to showcase learning of multimedia and productivity tools.

### *Scaffolding and Instructional Blogging*

The second framework for technology integration includes Vygotsky's social component of learning and Lipman's concept of community of inquiry to provide structure for instructional blogging (Glogoff, 2005). Additionally, Clark and Mayer (2003) provide three types of learning in online situations: receptive, directive, and guided discovery. Instructional blogging allows opportunities to engage students in a virtual classroom, or in addition to a face-to-face classroom. Blogging, therefore, can either be a knowledge-centered or learner-centered tool.

Vygotsky's Zone of Proximal (ZPD) development theory provides structure for instructional blogging. The first level in the ZPD learning indicates a child's functioning without the assistance of others. The second level measures a child's level of functioning with assistance from a more skilled child or adult. The difference between a child's independent and potential levels of functioning is the Zone of Proximal Development (ZPD).

Closely related to ZPD, scaffolding has been developed as a metaphor for social-constructivist theory to describe how adults support children's learning through experience (Bruner, 1983; Wood, Bruner, & Ross, 1976). Some researchers consider scaffolding as complementary and interdependent between the learner and more experienced partner. Rogoff (1990) believed that a shared understanding came from both the teacher and the learner, and that cognitive development takes place routine social activities. In addition, Stone (1993) contends that the zone of proximal development is not dependent on the fixed attributes of the learner, but an interdependent function of the both participants and a function of interpersonal relationships.

As Dewey believed, education should not be a collection of refined, finished products for children to memorize and repeat. Instead, it should include raw subject matter and endeavor to get students to construct solutions and engage in true inquiry. Lipman (1991) defines a commu-

nity of inquiry as one in which “students listen to one another with respect, build on one another’s ideas, challenge one another to supply reasons for otherwise unsupported opinions, assist each other in drawing inferences from what has been said, and seek to identify one another’s assumptions” (p.20). Instead of directing students towards prescribed outcomes, a community of inquiry should follow the direction of the inquiry.

Additionally, Clark and Mayer (2000) posit three types of learning involved in the e-learning process: receptive, directive, and guided discovery knowledge. Receptive learning involves students merely reporting what they have learned. This is best utilized for class assignments, reflections, and journal entries as a way to extend beyond the class time. Students need to acquire, report, and evaluate information about a certain topic or within a certain context.

Directive learning, then, can be used to expand students’ understanding of specific issues. Teachers use blogs to provide more in-depth information on topics. These can include summaries of topics that students grapple with during class, a summary of class discussions, or reinforcement of key points. Because of the ability to respond within blogs in a timely manner, teachers can strengthen student responses and provide opportunities for frequent practice with corrective feedback. The public natures of blogs provide all students with equal access to important information.

Blogs can also encourage guided discovery and knowledge construction. Using cognitive scaffolding to build upon prior knowledge, students think about what they have learned, and seek out more information (Clark & Mayer, 2003). Guided discovery is most accurate framework to relate theory to practice. The discovery of the nature of real-world problems can facilitate the transfer of knowledge, where guidelines presented in coursework are adapted in unpredictable situations that most resemble real life. The use of scaffolding, a basic tenet of constructivism,

allows for student reflection on learning and the expansion of knowledge. The use of community in blogging provides opportunities to for teachers and students alike to make significant contributions to student learning.

Within music teacher education, teachers can use blogs for student reflection of teaching experiences. Because of the community aspects, students can reflect and gain peer input. This peer input will help students' objectively evaluate their perception of the experience.

Music education teacher trainers can also use guided discovery in blogging for group work. The class, or groups of students, can be assigned a blog topic in which to respond and create a cohesive group answer. The synergistic interaction among the group takes the assignments to levels that would not be acquired through single assignments.

### *Video Reflection*

Finally, guided video reflection provides pre-service teachers with concrete evidence in which to develop their senses as a reflective practitioner (Schön, 1987). The benefits of reflective practice have long been advocated in teacher education training. Reflection allows pre-service teachers to construct knowledge through asking questions, critiquing, and evaluating (Lee, 2005). Reflective journaling can activate thinking, facilitate meaning during the learning process, and increase awareness about the way teachers teach and students learn. This practice can also provide opportunities for teacher candidates to analyze their own learning and see strategies for improvement. The topics of reflection can be wide ranging, including evaluation of teaching, theories of teaching and learning, methods of teaching, and questions about student learning. Greiman and Covington (2007), however, indicate that written reflection is not the preferred method. Student teachers' preferred reflective modality was verbal reflection.

Reflection frameworks in recent teacher education research (Dewey, 1933; Shon, 1983)

have some common elements. In particular, they attempt to describe the developmental qualities of reflection that distinguish higher levels of thinking from lower levels of reflection. Lee's (2005) framework includes three levels of reflection: recall, rationalization, and reflectivity. Hatton and Smith (1995) identify four levels of reflection: descriptive writing, descriptive reflection, dialogic reflection, and critical reflection. Van Manen (1997) also identifies three levels of reflection: skill and knowledge reflection, consequences of learning, and moral and ethical dimensions of teaching. All of these frameworks provide a hierarchy of reflection skills in which the lowest level involves descriptive recall without questioning, whereas the highest level of reflection involves reasoning based in a broader context.

There have been a variety of methods and media used to promote reflective practice in teacher candidates. Some include journal writing, conferences, microteaching with reflective journaling, multimedia cases, online discussions, portfolios, and video. Wang and Hartley (2003) suggest that video technologies have the potential to provide teacher candidates with the necessary perspective to observe and reflect the rich contexts of teaching and learning. In addition, video feedback provides teacher candidates objective feedback that is not susceptible to selective memory. Romano and Schwartz (2005) found that teacher candidates perceived video recording their teaching as the most effective way to promote self-reflection. Consequently, Crawford and Patterson (2004) found that guided reflection of video footage increased the level of reflectivity beyond mere recall. Through two related studies, Sherin and van Es (2005) found that teachers who regularly examined videotapes of their teaching shifted focus from pedagogy to student learning. In the second study, the researchers used the Video Analyst Support Tool (VAST) to allow students to import and annotate footage of their own teaching to using a series of textual scaffolds. The researchers found that using video editing students began to organize their reflec-

tions around significant aspects of teaching and learning above and beyond the descriptive level. In both studies, students examining video moved from the purely evaluative (e.g. what went well, what did not go well) to interpretive (e.g. why this happened) in their reflections.

The use of video editing software can greatly enhance the depth of reflection within music teaching experiences. Video editing provides students with the tools to objectively assess the temporal nature of music teaching.

### *Conclusion*

The problems of technology integration into music teacher education continue to be challenging, with contributing variables changing at near warp speed in the 21<sup>st</sup> century. There will never be a single solution to the multifaceted problem of technology integration and literacy. By working within theoretical educational frameworks, however, music teacher educators may begin to explore integration successfully. Learning technology by design, the use of instructional blogging, and using video editing software to foster reflective thinking are three attempts to guide higher education faculty towards a 'better' answer to a wicked problem.

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