2009

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Abstract: During this two-part symposium, we will first introduce and explain the activity types approach to technology integration, demonstrating how it helps teachers to develop technology integration knowledge (specifically, technological pedagogical content knowledge, or TPACK). We will then introduce, explain, and share learning activity type taxonomies for K-6 literacy, secondary English, foreign language, mathematics, science, and social studies curriculum areas. During the final segment of each symposium session, we will invite attendees to collaborate on further development and refinement of the activity types by requesting that they offer the taxonomies to their colleagues for review and comment. We will collect these evaluation data via an online survey instrument, and then propose to report on the results of this vetting and refinement process during SITE 2010.

Introduction

Mishra & Koehler's (2006) model of technological pedagogical content knowledge (TPCK or TPACK) has helped to both explain the complex and interdependent aspects of teachers' knowledge required for effective

technology integration, as well as to open up new avenues for research and development in technology and teacher education. Since this introduction, scholars in educational technology, as well as in many curriculum areas, have produced more than eighty TPACK-framed articles, book chapters, Web reports, dissertations, and conference presentations (Koehler & Mishra 2008). With the publication of the *Handbook of Technological Pedagogical Content Knowledge for Educators* (2008), educators in eight curriculum areas provided direction for understanding and exploring TPACK in their respective educational disciplines, as well as in teacher education.

Despite this flurry of scholarly work relating to theoretical notions of TPACK, to date there has been comparatively little work that helps to operationalize it for teachers and teacher educators—in particular, how to help teachers to develop TPACK. Koehler & Mishra's (2005) learning by design (Koehler Mishra & Yahya 2007), Niess' (2005) content-based modeling and Pierson's (2008) inquiry approaches, along with our own model (Harris & Hofer 2006; Harris 2008) have been suggested, but considerably less empirical than theoretical investigation of TPACK has been undertaken to date. Acknowledging the nature and parameters of the teacher knowledge required for technology integration is important and necessary, but also insufficient to help teachers to more effectively integrate technology in their teaching. They need accessible, grounded models that help them to develop their TPACK, while also guiding their curriculum-based technology integration efforts.

The Activity Types (AT) approach to planning for technology integration is one such model. It focuses upon creating awareness of the full range of possible technology-supported *learning activity types* within particular curriculum disciplines, while helping teachers to know how to select and combine learning activities to help students meet content and process standards in ways that are congruent with their differentiated learning needs and preferences. Our work suggests that it is only after teachers are familiar with a full range of learning activity types within a particular content area, that they can appropriately choose among and effectively implement technology-supported activities for each unique learning situation. Since content, pedagogy, and technology knowledge are so interrelated and interdependent—as illustrated in the TPACK framework itself—it serves to reason that there are identifiable and unique learning activity types, primarily within, but also across curriculum content areas. (More on the activity types approach to developing TPACK can be found in these Proceedings in Harris & Hofer, 2009.)

During this two-part symposium, we will present the results of our efforts to date to develop comprehensive taxonomies of learning activity types in six core curriculum disciplines: K-6 literacy, mathematics, science, secondary English, social studies, and world languages. The conceptual organization of each of these taxonomies is described below. The taxonomies themselves are available online via the Activity Types Wiki, located at http://activitytypes.wmwikis.net/.

K-6 Literacy Learning Activity Types

We have identified 88 learning activity types for K-6 literacy. These activities are classified under the two predominant literacy processes of reading and writing. The 56 activity types in reading are further divided into those that focus on pre-reading (e.g. decoding skills; making predictions), reading (e.g. guided reading; literature circles), post-reading (e.g. summarizing; discussing), vocabulary (e.g. vocabulary awareness; vocabulary analysis), comprehension (e.g. graphic organizers/charts; compare and contrast), and fluency (e.g. repeated reading; storytelling). The 32 writing activity types are subdivided into pre-writing (e.g. brainstorming; outlining), writing (e.g. drafting; revising), post-writing (e.g. sharing; publishing), writing conventions (e.g. mechanics; grammar) and writing genres (e.g. narrative; poetry).

Mathematics Learning Activity Types

In mathematics, we have identified 31 activity types in seven categories, named to correspond with predominant mathematical thinking processes identified by the National Council of Teachers of Mathematics. The seven categories include: consider, practice, interpret, produce, apply, evaluate, and create. The six "consider" activity types encourage students to consider new concepts or information (e.g. read text; investigate a concept). The three "practice" activity types focus on providing students with opportunities to practice computational techniques or other algorithm-based strategies (e.g. do computation; drill and practice). Using the six "interpret" activity types, students explore and explain mathematical relationships (e.g. develop an argument; interpret a representation). In the five "produce" activity types, students produce mathematical materials (e.g. problems). The three "apply" activity types focus upon students' application of mathematics to the real world (e.g. choose a strategy; apply a representation). The four "evaluate" activity types encourage students to evaluate their own

mathematical work or the work of others (e.g. compare and contrast; test a conjecture). The four remaining learning activity types encourage students to think creatively in mathematics (e.g. create a product; create a process).

Science Learning Activity Types

We identified 38 science learning activity types. Twenty-seven help students to build science-related knowledge, and eleven help them to express the science knowledge that they have built. The 27 knowledge building activity types are subdivided into 17 that focus upon conceptual knowledge-building (e.g., distinguishing observations from inferences; analyzing data), and 10 that focus upon procedural knowledge-building (e.g., collecting samples; recording data). The remaining 11 science knowledge expression learning activity types include both traditional (e.g., write a report; draw/create images) and nontraditional (e.g., create/perform; develop a game) options.

Secondary English Learning Activity Types

The 64 secondary-level English learning activity types that we have identified are divided into five categories of English learning processes: reading, writing, language, oral speaking/performing and listening/watching. Within the reading category, two prereading activity types (e.g., making predictions) help students to frontload meaning, fourteen during-reading activity types (e.g., directed/guided reading; literature circles; critical analysis/reflection) assist students with constructing meaning, and seven post-reading activity types (e.g., summarizing; sharing/collaborating; reconstituting/reconsidering text) help students to extend meaning. The four subcategories of writing process activity types address learning before, during, and after writing. Three prewriting activity types help students to generate ideas and build fluency (e.g., brainstorming; free writing); four activity types help students to organize their ideas for writing (e.g., storyboarding; identifying purpose and audience), eight activity types assist students' writing (e.g., conferencing; revising; editing), and three activity types help students to share, publish, and/or perform their writing.

Language activity types are subdivided into five categories. There are three activity types that address language exploration, inquiry, and awareness; two activity types that help students with language practice (e.g., sentence composing); four activity types that assist with language analysis (e.g., style/error analysis; semantic analysis); five activity types that help students with language conventions, such as mechanics, grammar, and spelling; and three activity types that help students to develop vocabulary awareness, use, and analysis skills. Speaking, performance/production, and evaluation or critique of performance/production, plus listening, viewing, and multimodal or multimedia-based learning activity types complete this taxonomy.

Social Studies Learning Activity Types

In the social studies, we have identified 42 learning activity types. Like the science activity types, these AT's are divided into two categories of student action: knowledge building and knowledge expression. The 15 knowledge building activity types assist students in developing their knowledge of the social studies. They range from more general activities (e.g. read text; group discussion) to more discipline-specific activities (e.g. artifact-based inquiry; historical chain). The 27 knowledge expression activity types can be classified as either convergent or divergent. The six convergent knowledge expression activity types (e.g. answer questions; create a timeline) encourage all students to present their understanding in comparatively similar ways. The 21 divergent knowledge expression activity types (e.g. design an exhibit; create a film; create a game) are subdivided into 5 written, 3 visual, 3 conceptual, 6 product-oriented, and 4 participatory ATs. These challenge students to share their unique understandings of curriculum content in individualized ways.

World Languages Learning Activity Types

The 56 world languages activity types that we have identified are divided into five categories: listening, speaking, writing, reading, and viewing. The seven listening activity types help students to develop their abilities to comprehend spoken language (e.g. listen to a conversation; listen to a broadcast). Another thirteen activity types

provide opportunities for students to develop their speaking skills in the target language (e.g. do role plays; create an audio/video recording). Twenty-three activity types assist students in writing (e.g. label something; write a story). Ten activity types focus on reading (e.g. read a story; read a comic). A final five world languages activity types focus on student viewing (e.g. watch a performance; view an exhibit).

Conclusion

The six learning activity types taxonomies introduced here represent our best efforts to date to identify all possible learning activity types in each discipline-based curriculum area, regardless of pedagogical approach, since educational technologies can and should be used to support teaching and learning of all types. The contents of the taxonomies are based upon both discipline-specific scholarship in pedagogical content knowledge and technology integration, and our collective experience as technology-using teachers and teacher educators. Since this knowledge evolves continually — as do technologies and their potential educational uses — the activity types taxonomies must also change over time. In recognition and in support of this process, we have and will continue to vet the activity types actively with teacher educators and experienced classroom teachers. We invite our readers to view the activity types taxonomies and provide feedback on each and all via the Activity Types Wiki (http://activitytypes.wmwikis.net).

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